

Final Safety Evaluation Report for Combined Licenses for Turkey Point Units 6 and 7

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ABSTRACT

This final safety evaluation report¹ (FSER) documents the U.S. Nuclear Regulatory Commission (NRC) staff's technical review of the combined license (COL) application submitted by the applicant for Turkey Point Units 6 and 7 by Florida Power & Light Company (FPL).

By letter dated June 30, 2009, the applicant submitted its application to the NRC for COLs for two AP1000 advanced passive pressurized-water reactors pursuant to the requirements of Sections 103 and 185(b) of the Atomic Energy Act of 1954, as amended; Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, certifications and approvals for nuclear power plants," and the associated material licenses under 10 CFR Part 30, "Rules of general applicability to domestic licensing of byproduct material"; 10 CFR Part 40, "Domestic licensing of source material"; and 10 CFR Part 70, "Domestic licensing of special nuclear material." These reactors are identified as Turkey Point Units 6 and 7, and would be located on the Turkey Point plant property, comprised of approximately 9,400 acres (38 square km) in unincorporated southeast Miami-Dade County, Florida, east of Florida City and the City of Homestead and bordered by Biscayne Bay to the east. The applicant submitted its final update to the COL application, Revision 8, on August 26, 2016.

The application incorporated by reference 10 CFR Part 52, Appendix D, "Design Certification Rule for the AP1000 Design," including the AP1000 Design Certification Document (DCD) Revision 19. The results of the NRC staff's evaluation of the AP1000 DCD are documented in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

This FSER presents the results of the staff's review of information submitted in conjunction with the COL application, except those matters resolved as part of the referenced design certification rule. Appendix A to this FSER identifies certain license conditions and inspections, tests, analyses and acceptance criteria (ITAAC) that the staff recommends the Commission impose, should COLs be issued to the applicant. In addition to the ITAAC in Appendix A, the ITAAC found in the AP1000 DCD Revision 19 Tier 1 material will also be incorporated into the COLs, should COLs be issued to the applicant.

¹ This FSER documents the NRC staff's position on all safety issues associated with the combined license application. The Advisory Committee on Reactor Safeguards (ACRS) independently reviewed those aspects of the application that concern safety, as well as the advanced safety evaluation report without open items (an earlier version of this document), and provided the results of its review to the Commission in reports dated April 18, 2016 and September 16, 2016. These reports are included as Appendix F to this FSER.

The staff's review² of the application, as documented in this FSER, supports the following conclusions with respect to the safety aspects of the COL application: 1) the applicable standards and requirements of the Atomic Energy Act and Commission regulations have been met; 2) required notifications to other agencies or bodies have been duly made; 3) there is reasonable assurance that the facility will be constructed and will operate in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's regulations; 4) the applicant is technically and financially qualified to engage in the activities authorized; and 5) issuance of the license will not be inimical to the common defense and security or to the health and safety of the public.

² An environmental review was also performed of the COL application, and its evaluation and conclusions are documented in NUREG-2176, "Final Environmental Impact Statement for Combined Licenses for Turkey Point Nuclear Plant Units 6 and 7," dated October 2016.

CONTENTS

The chapter and section layout of this FSER is consistent with the format of (1) NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)”; (2) Regulatory Guide (RG) 1.206, “Combined License Applications for Nuclear Power Plants”; and (3) the applicant’s final safety analysis report (FSAR). Where applicable, references to other regulatory actions (e.g., design certifications) are included in the text of the safety evaluation report (SER).

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EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52 include requirements for licensing new nuclear power plants.³ These regulations include the NRC's requirements for design certification and combined license (COL) applications. The COL process (10 CFR Part 52, Subpart C, "Combined Licenses") allows an applicant to seek authorization to construct and operate a new nuclear power plant.

This FSER describes the results of a review by the NRC staff of a COL application submitted for two new reactors to be located at the Turkey Point Units 6 and 7 site. The applicant is Florida Power & Light Company (FPL). The staff's review was to determine the applicant's compliance with the requirements of Subpart C of 10 CFR Part 52, as well as the applicable requirements under 10 CFR Parts 30, 40, and 70 governing the possession and use of source, byproduct and special nuclear materials. This FSER identifies the staff's conclusions with respect to the COL safety review.

The NRC regulations in 10 CFR Part 51, "Environmental protection regulations for domestic licensing and related regulatory functions," also require an applicant to submit an environmental report. The NRC reviews the environmental report as part of the Agency's responsibilities under the National Environmental Policy Act of 1969, as amended. The NRC presents the results of that review in a final environmental impact statement (FEIS), which is a report separate from this FSER. The staff's FEIS, NUREG-2176, "Final Environmental Impact Statement for Combined Licenses (COLs) for Turkey Point Nuclear Plant Units 6 and 7," was issued in October 2016, and can be accessed through the Agencywide Documents Access and Management System (ADAMS) at Accession Nos. ML16300A104, ML16300A137, ML16301A018, and ML16300A312.⁴

³ Applicants may also choose to seek a construction permit (CP) and operating license in accordance with 10 CFR Part 50, "Domestic licensing of production and utilization facilities," instead of using the 10 CFR Part 52 process.

⁴ The Agencywide Documents Access and Management System (ADAMS) is the NRC's information system that provides access to all image and text documents that the NRC has made public since November 1, 1999, as well as bibliographic records (some with abstracts and full text) that the NRC made public before November 1999. Documents available to the public may be accessed via the Internet at <http://www.nrc.gov/reading-rm/adams.html#web-based-adams>. Documents may also be viewed by visiting the NRC's Public Document Room at One White Flint North, 11555 Rockville Pike, Rockville, Maryland. Telephone assistance for using web-based ADAMS is available at (800) 397-4209 between 8:30 a.m. and 4:15 p.m., Eastern Time, Monday through Friday, except Federal holidays. The staff is also making this FSER available on the NRC's new reactor licensing public web site at <http://www.nrc.gov/reactors/new-reactors/col/turkey-point/documents.html>.

By letter dated June 30, 2009, the applicant submitted its initial application to the NRC for COLs for two AP1000 advanced passive pressurized-water reactors (PWRs) (ADAMS Accession No. ML091830589) to be located at the Turkey Point Units 6 and 7 site. The Turkey Point Units 6 and 7 site is located in Miami-Dade County, Florida, approximately 25 mi (40 km) south of Miami, 8 mi (13 km) east of Florida City, and 9 mi (14 km) southeast of Homestead, Florida.

The application incorporated by reference 10 CFR Part 52, Appendix D, "Design Certification Rule for the AP1000 Design," including the AP1000 Design Certification Document (DCD) Revision 19. The results of the NRC staff's evaluation of the AP1000 DCD are documented in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements. The applicant submitted its final update to the COL application, Revision 8, on August 26, 2016.

Appendix A to this FSER identifies certain license conditions, and inspections, tests, analyses and acceptance criteria (ITAAC) that the staff recommends the Commission impose, should COLs be issued to the applicant. In addition to the ITAAC in Appendix A, the ITAAC found in the AP1000 DCD Revision 19 Tier 1 material will also be incorporated into the COLs should COLs be issued to the applicant.

Inspections and audits conducted by the NRC have verified, where appropriate, the conclusions in this FSER. The inspections focused on selected information in the COL application and its references. The FSER identifies applicable inspection reports as reference documents.

The NRC's Advisory Committee on Reactor Safeguards (ACRS) also reviewed the bases for the conclusions in this report. The ACRS independently reviewed those aspects of the application that concern safety, as well as the advanced safety evaluation report without open items (an earlier version of this document), and provided the results of its review to the Commission in reports dated December 14, 2015 and September 16, 2016. Appendix F includes a copy of this report by the ACRS on the COL application, as required by 10 CFR 52.87, "Referral to the Advisory Committee on Reactor Safeguards (ACRS)."

ABBREVIATIONS

χ/Q	atmospheric dispersion
A2LA	American Association for Laboratory Accreditation
AB	annex building
ac	alternating current
ACI	American Concrete Institute
ACP	access control point
ACRS	Advisory Committee on Reactor Safeguards
ADAMS	Agencywide Documents Access and Management System
ADS	automatic depressurization system
AE	architect-engineer
AEA	Atomic Energy Act of 1954
AFFF	aqueous film forming foam
AFUDC	allowance for funds used during construction
AHPS	Advanced Hydrologic Prediction Service
ALARA	as low as is reasonable achievable
ALI	annual limit on intake
ALWR	advanced light-water reactor
AMP	amperes
ANI	American Nuclear Insurers
ANS	Alert and Notification Systems
ANS	American Nuclear Society
ANSI	American National Standards Institute
ANSS	Advanced National Seismic System
AOO	anticipated operational occurrence
AOV	air-operated valve
ASA	Applicable Safety Analyses
ASCE	American Society of Civil Engineers
ASE	advanced safety evaluation
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATE	advisory to evacuate
ATWS	anticipated transients without scram
AWWA	American Water Works Association
B&PV	Boiler and Pressure Vessel (ASME BPV Code)
BDBE	beyond-design basis event
BE	best estimate

BL	Bulletin
BLN	Bellefonte Nuclear Station
BPV	Boiler & Pressure Vessel
BTP	Branch Technical Position
BWR	boiling-water reactor
C	Celsius
C&C	command & control
CAS	central alarm station
CAV	cumulative absolute velocity
CCS	component cooling water system
CDF	core damage frequency
CDI	conceptual design information
CDM	certified design material
CDRS	control rod drive system
CEM	Coastal Engineering Manual
CFBC	Cross Florida Barge Canal
CFD	computational fluid dynamics
cfm	cubic feet per minute
CFR	<i>Code of Federal Regulations</i>
cfs	cubic feet per second
cGy	centiGray
CLSM	controlled low strength material
cm	centimeters
CMT	core makeup tank
COL	combined license
CP	construction permit
CR	control room
CR3	Crystal River Unit 3
CRD	control rod drive
CRDM	control rod drive mechanism
CRDS	control rod drive system
CREC	Crystal River Energy Complex
CRNP	Crystal River Nuclear Plant
CRR	cyclic resistance ratio
CS	containment system
CS	core supports
CS	critical system
CSA	control support area
CSC	Coastal Services Center

CSDRS	certified seismic design response spectra
CTA	critical target area
CVCS	chemical and volume control system
CVS	chemical and volume control system
CWS	circulating water system
DAC	derived air concentration
DAS	Diverse Actuation System
DBA	design-basis accident
DBE	design-basis event
DBT	design-basis threat
dc	direct current
DC	design certification
DCA	design certification amendment
DCD	design control document
DCP	Design Change Package
DCRA	design-centered review approach
DE	deaggregation earthquakes
DEI	dose equivalent iodine
DEM	digital elevation model
DEM	Division of Emergency Management
DEP	Departure
DF	design factor
DG	diesel generator
DHBRC	Department of Health, Bureau of Radiation Control
DHEC	Department of Health and Environmental Control
DHS	Department of Homeland Security
DNBR	departure from nucleate boiling ratio
DOE	Department of Energy
DOT	Department of Transportation
D-RAP	Design Reliability Assurance Program
DTS	demineralized water treatment system
DVI	direct vessel injection
DWS	demineralized water system
EAB	exclusion area boundary
EAL	emergency action level
EAS	Emergency Alert System
EC	Emergency Coordinator
ECC-GC	extended continental crust Gulf Coast

ECCS	emergency core cooling system
ECL	effective concentration limit
ED	Emergency Director
EDMG	Extensive Damage Mitigation Guidelines
EIA	Energy Information Agency
EIS	Environmental Impact Statement
ENC	Emergency News Center
ENS	Emergency Notification System
EOC	emergency operation center
EOF	emergency operations facility
EOP	emergency operating procedure
EP	Emergency Plan
EP	emergency planning
EPA	Environmental Protection Agency
EPAct	Energy Policy Act of 2005
EPC	engineering, procurement, and construction
EPDM	ethylene propylene diene monomer
EPIP	emergency plan implementing procedure
EP-ITAAC	emergency planning-inspections, tests, analyses, and acceptance criteria
EPRI	Electric Power Research Institute
EPZ	emergency planning zone
EQ	environmental qualification
EQL	equivalent linear
EQMEL	Environmental Qualification Master Equipment List
ERDS	emergency response data system
ERF	emergency response facility
ERM	Eastern rift margin
ERO	emergency response officer
ERO	Emergency Response Organization
ERT	emergency response team
ESATCOM	Emergency Satellite Communications System
ESF	engineered safety feature
ESFAS	engineered safety features actuation system
ESP	Early Site Permit
ETE	evacuation time estimate
ETS	Emergency Telephone System
F	Fahrenheit
FAC	flow-accelerated corrosion
FBI	Federal Bureau of Investigation

FDLE	Department of Law Enforcement
FEIS	final environmental impact statement
FEM	Finite Element Model
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FFD	fitness for duty
FHA	Fuel Handling Accident
FIRS	foundation input response spectra
FIV	flow induced vibration
FMCRD	fine motion control rod drive
FMEA	failure mode and effects analysis
fps	feet per second
FPS	fire protection system
FPSC	Florida Public Service Commission
FR	<i>Federal Register</i>
FRCC	Florida Reliability Coordinating Council
FRS	floor response spectra
FS	factor of safety
FSAR	final safety analysis report
FSER	final safety evaluation report
ft	feet
GALL	Generic Aging Lessons Learned
GCSZ	Gulf Coastal Source Zones
GDC	General Design Criteria (Criterion)
GE	General Emergency
GG&S	Geotechnical, Geological, and Seismological
GL	Generic Letter
GMRS	ground motion response spectra
gpm	gallons per minute
GSI	Generic Safety Issue
GSI	geologic strength index
GSU	generator step-up
GTS	generic technical specification
GWMS	gaseous waste management system
HCM	Highway Capacity Manual
HCLPF	high confidence in low probability of failure
HEPA	high efficiency particulate air
HFE	human factors engineering

HP	health physics
HPN	Health Physics Network
HPS	Health Physics Society
hr	hour
HRA	human reliability analysis
HRHF	hard rock high frequency
HRTS	Hot Ringdown Telephone System
HSI	human-system interface
HV	high voltage
HVAC	heating, ventilation, and air conditioning
HX	heat exchanger
Hz	Hertz
HZP	Hot Zero Power
I&C	instrumentation and control
IBC	International Building Code
ICMO	interim compensatory order
IDLH	immediate danger to life and health
IDS	1E dc and uninterruptible power supply system
IEEE	Institute of Electrical and Electronic Engineers
IFR	Interim Findings Report
IGSCC	intergranular stress corrosion cracking
IHP	integrated head package
IIS	incore instrumentation system
ILAC	International Laboratory Accreditation Cooperation
in	inch
INPO	Institute of Nuclear Power Operations
IRWST	in-containment refueling water storage tank
ISA	independent safety assessment
ISC	International Seismological Centre
ISG	Interim Staff Guidance
ISI	inservice inspection
ISL	Information Systems Laboratory, Inc.
IST	inservice testing
ITAAC	inspections, tests, analyses, and acceptance criteria
ITP	Initial Test Program
JOG	Joint Owners Group
JTWG	Joint Test Working Group

kg/m ³	kilogram per cubic meter
kg/yr	kilograms per year
km	kilometers
kPa	kilopascal
kV	kilovolt
kWe	kilowatt electric
LAN	Local Area Network
lb/ft ²	pounds per square foot
LB	lower bound
LBB	leak-before-break
LCCWS	low capacity chilled water subsystem
LCD	Local Climatological Data
LCO	limiting condition for operation
LEFM	Leading Flow Edge Meter
LLB	Lower LB case
LLEA	local law enforcement agency
LLHS	light load handling system
LLNL	Lawrence Livermore National Laboratory
LLRW	low-level radioactive waste
LMA	left margin annotation
LNP	Levy Nuclear Plant
LOA	letter of agreement
LOAC	Loss of AC Power to Plant Auxiliaries
LOCA	loss-of-coolant accident
LOLA	loss of large area
LOOP	loss of offsite power
LPZ	low population zone
LRF	large release frequency
LSS	low strategic significance
LRA	locked rotor accident
LTOP	low-temperature overpressure protection
LWA	Limited Work Authorization
LWMS	liquid waste management system
LWR	light-water reactor
M	magnitude
m	meter
m/s	meters per second
m ³ /s	cubic meters per second

Ma	million years ago
MAAP	Modular Accident Analysis Program
m_b	body-wave magnitude
Mbtu/hr	one million British thermal units/hour
MC&A	material control and accounting
MCL	Management Counterpart Link
MCR	main control room
MCRE	main control room envelope
M_d	duration magnitude
MEI	maximally exposed individual
MERL	Mobile Emergency Radiological Laboratory
MESE	Mesozoic and younger extended prior
mgd	million gallons per day
mGy	milliGray
mi	miles
MIDC-A	Midcontinent A
MIT	Massachusetts Institute of Technology
M_L	local magnitude
mld	million liters per day
MLU	Multi-Layer Unsteady
mm	millimeters
M_{max}	maximum magnitude
MOA	Memorandum of Agreement
MOM	maximum envelope of water
MOU	Memorandum of Understanding
MOV	motor-operated valve
MOX	mixed-oxide
mph	miles per hour
MR	Maintenance Rule
MRA	Mutual Recognition Arrangement
mrad	millirad
mrem	millirem
MSD	Mitigative Strategies Description
MSLB	Main Steam Line Break
MSSS	main steam supply system
MST	Mitigative Strategies Table
mSv	milliSievert
MT	magnetic particle
MW	megawatts
MWe	megawatts electric

MWt	megawatts thermal
N	North
NCDC	National Climatic Data Center
NDQAM	Nuclear Development Quality Assurance Manual
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NGS	National Geodetic Survey
NI	nuclear island
NIRMA	Nuclear Information and Records Management Association
NIST	National Institute of Standards and Technology
NMFS	New Madrid Fault System
NNS	non-nuclear safety
NOAA	National Oceanic and Atmospheric Administration
NOUE	Notification of Unusual Event
NOV	Notice of Violation
NPSH	net positive suction head
NRC	U.S. Nuclear Regulatory Commission
NRCOC	NRC Headquarters Operations Center
NRF	National Response Framework
NRO	Office of New Reactors
NS	nonseismic
NSM	Nuclear Shift Manager
NSSS	nuclear steam system supplier
NSW	nonlinear shallow-water
NTTF	Near-Term Task Force
NUMARC	Nuclear Management and Resources Council
NVLAP	National Voluntary Laboratory Accreditation Program
NW	northwest
NWS	National Weather Service
OBE	operating basis earthquake
ODCM	Offsite Dose Calculation Manual
OE	operating experience
OER	operating experience review
OHLHS	overhead heavy load handling system
OM	Operation and Maintenance (ASME OM Code)
OPRAA	operational phase reliability assurance activity
ORE	occupational radiation exposure
ORO	Offsite-Response Organizations

OSC	Operational Support Center
OSHA	Occupational Safety and Health Administration
PA	protected area
PABS	private automatic branch system
PAM	Postaccident Monitoring
PAP	primary access point
PAR	protective action recommendation
PBSRS	performance based surface horizontal and vertical response spectra
PCCAWST	passive containment cooling ancillary water storage tank
PCCWST	passive containment cooling water storage tank
pcf	pounds per cubic foot
pcf	per cubic foot
PCP	Process Control Program
PCS	passive containment cooling system
PDP	procedure development program
PE	Polyethylene
PEC	Progress Energy Carolinas, Inc.
PEF	Progress Energy Florida
PF	performance goal
PGA	peak ground acceleration
PGM	Plant General Manager
PGP	procedures generation package
PID	Public Information Director
P&IDs	pipng and instrumentation diagrams
PLT	point load test
PM	preventive maintenance
PMCL	Protective Measures Counterpart Link
PMP	probable maximum precipitation
PMS	protection and safety monitoring
PMSS	probable maximum storm surge
PMT	pressuremeter tests
PORV	power-operated relief valve
POV	power-operated valve
ppm	parts per million
PRA	probabilistic risk assessment
PRHR	passive residual heat removal
PRP	Peer Review Panel
psf	pounds per square foot
PSHA	probabilistic seismic hazard analysis

PSI	preservice inspection
psi	pounds per square inch
psig	pounds per square inch gauge
PS-ITAAC	physical security inspections, tests, analyses, and acceptance criteria
PSP	Physical Security Plan
P-T	pressure temperature
PT	liquid penetrant
PT&O	plant test and operations
PTAC	Plant Transmission Activities Coordinator
PTS	plant-specific technical specifications
Pu	per unit
PWR	pressurized-water reactor
PWS	potable water system
PWSCC	primary water stress corrosion cracking
PXS	passive core cooling system
QA	quality assurance
QDPS	Qualified Data Processing System
QAPD	Quality Assurance Program description
QC	quality control
RAI	request for additional information
RAP	reliability assurance program
RAT	reserve auxiliary transformer
RB	radwaste building
RCA	radiation controlled area
RCCA	rod cluster control assembly
RCL	reactor coolant loop
RCOL	reference combined license
RCP	reactor coolant pump
RCPB	reactor coolant pressure boundary
RCS	reactor coolant system
REA	Rod Ejection Accident
REAC/TS	Radiation Emergency Assistance Center/Training Site
rem	roentgen equivalent man
REMP	Radiological Emergency Management Plan
REP	radiological emergency preparedness
RG	regulatory guide
RH	relative humidity
RIS	Regulatory Issue Summary

RLME	repeated large magnitude earthquake
RMS	rock mass rating
RMS	radiation monitoring system
RMS	root-mean-square
RNS	residual heat removal system
RO	reactor operator
RPP	Radiation Protection Program
RPV	reactor pressure vessel
RSCL	Reactor Safety Counterpart Link
RSW	Remote Shutdown Workstation
RTDP	revised thermal design procedure
RT _{NDT}	nil-ductility reference transition temperature
RTNSS	regulatory treatment of nonsafety systems
RTP	rated thermal power
RT _{PTS}	pressurized thermal shock reference temperature
RV	reactor vessel
RVSP	reactor vessel surveillance capsule program
RWS	raw water system
RXS	reactor system
S&PC	steam and power conversion
SAE	Site Area Emergency
SAMSON	Solar and Meteorological Surface Observation Network
SAR	safety analysis report
SAT	systematic approach to training
SBO	station blackout
SC	steel concrete composite
SCBA	self-contained breathing apparatus
SCOR	soil column outcrop response
SCE&G	South Carolina Electric and Gas Company
SCOL	subsequent combined license
SCDOT	South Carolina Department of Transportation
SCP	Safeguards Contingency Plan
SCPSC	South Carolina Public Service Commission
SCR	stable continental region
SE	safety evaluation
SEC	Securities and Exchange Commission
SER	safety evaluation report
SFP	spent fuel pool
SFS	spent fuel pool cooling system

SG	steam generator
SGI	safeguards information
SGTR	steam generator tube rupture
SLOSH	Sea, Lake, and Overland Surge from Hurricanes
s/m	seconds per cubic meter
SNC	Southern Nuclear Operating Company
SNM	special nuclear material
SMA	seismic margins analysis
SNMPPP	Special Nuclear Material Physical Protection Program
SP	Setpoint Program
SPDS	safety parameter display system
SPT	standard penetration test
sq	square
sq mi	square mile
SR	surveillance requirement
SRM	Staff Requirements Memorandum
SRO	senior reactor operator
SRP	standard review plan
SSAR	Site Safety Analysis Report
SSC	seismic source characterization
SSCs	structures, systems, and components
SSE	safe shutdown earthquake
SSI	soil-structure interaction
SS-ITAAC	site-specific inspections, tests, analyses and acceptance criteria
SSHAC	Senior Seismic Hazard Analysis Committee
STA	Shift Technical Advisor
STD	Standard
STS	standard technical specification
SUNSI	Sensitive Unclassified Non-Safeguards Information
SUP	Supplement
Sv	Sievert
SWFWMD	Southwest Florida Water Management District
SWMS	solid waste management system
SWPT	State Warning Point-Tallahassee
SWS	service water system
SWFWMD	South West Florida Water Management District
T&QP	Training and Qualification Plan
TAC	total annual cost
TB	turbine building

TCP	traffic control point
TCS	turbine building closed cooling water system
TEDE	total effective dose equivalent
TG	turbine-generator
TGS	turbine generator system
TLD	thermoluminescent dosimeter
TMI	Three Mile Island
TR	technical report
TS	technical specification
TSC	Technical Support Center
TSCSR	Truncated Soil Column Surface Response
TSO	transmission system operator
TSP	trisodium phosphate
TSTF	Technical Specification Task Force Traveler
TVA	Tennessee Valley Authority
U	unconfined compressive strength
UAT	unit auxiliary transformer
UB	upper bound
UCS	unconfined compressive strength
UCSS	updated Charleston seismic source
UF ₆)	uranium hexafluoride
UFM	ultrasonic flow meter
UFSAR	Updated Final Safety Analysis Report
UHF	ultra high frequency
UHRS	uniform hazard response spectra
UPS	uninterruptible power supply
USACE	United States Army Corps of Engineers
USE	upper shelf energy
USGCRP	United States Global Change Research Program
URD	Utility Requirements Document
USGS	United States Geological Survey
UT	ultrasonic
V&V	verification and validation
VAC	volts alternating current
VBS	nonradioactive ventilation system
VCSNS	V.C. Summer Nuclear Station
Vdc	volts direct current
VEGP	Vogtle Electric Generating Plant

VES	main control room emergency habitability system
VFS	containment air filtration system
V/H	vertical to horizontal
VHRA	very high radiation area
WAC	waste acceptance criteria
WCAP	Westinghouse Commercial Atomic Power
WEC	Westinghouse Electric Company
WSW	worst meteorological sector
WUS	Western United States
WWRB	waste water retention basin
WWS	waste water system
YFS	yard fire system

1.0 INTRODUCTION AND INTERFACES

This chapter of the final safety evaluation report (FSER) is organized as follows:

- Section 1.1 provides an overview of the entire combined license (COL) application.
- Section 1.2 provides the regulatory basis for the COL licensing process.
- Section 1.3 provides an overview of the COL application principal review matters and describes where the staff has documented its review of the 11 parts of the COL application.
- Section 1.4 documents the staff's review of Chapter 1 of the final safety analysis report (FSAR).
- Section 1.5 documents regulatory findings that are in addition to those directly related to the staff's review of the FSAR.

1.1 Summary of Application

In a letter dated June 30, 2009, as supplemented by several letters, Florida Power and Light Company (FPL or the applicant), submitted its application to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for a COL for two Westinghouse AP1000 advanced passive pressurized-water reactors (PWR) pursuant to the requirements of Sections 103 and 185(b) of the *Atomic Energy Act of 1954*, as amended (AEA), and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications and Approvals for Nuclear Power Plants." These reactors would be identified as Turkey Point Plant (Turkey Point), Units 6 and 7, and would be located in unincorporated southeast Miami-Dade County, Florida (FL), on an approximately 218-acre area south of the existing Turkey Point Units 3 and 4.

Unless otherwise noted, this FSER (also referred to as the safety evaluation report (SER) in later sections of this document) is based on Revision 8 of the Turkey Point COL application (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16251A127).

As indicated in the applicant's August 26, 2016, Revision 8 submission, the applicant incorporates by reference 10 CFR Part 52, Appendix D, "Design Certification Rule for the AP1000 Design," and the Westinghouse Electric Corporation's Design Control Document (DCD), Revision 19.

The AP1000 nuclear reactor design is a PWR with a power rating of 3400 megawatts thermal (MWt) and electrical output of at least 1000 megawatts electric (MWe). The AP1000 design uses safety systems that rely on passive means, such as gravity, natural circulation, condensation and evaporation, and stored energy, for accident prevention and mitigation.

In developing the FSER for Turkey Point Units 6 and 7, the staff reviewed the AP1000 DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to a particular review topic.

The Turkey Point COL application is organized as follows:

- **Part 1 General and Financial Information**

Part 1 provides an introduction to the application and includes certain corporate information regarding FPL pursuant to 10 CFR 50.33(a) through 10 CFR 50.33(d).

- **Part 2 Final Safety Analysis Report**

Part 2 includes information pursuant to the requirements of 10 CFR 52.79, "Contents of applications; technical information in final safety analysis report" and, in general, adheres to the content and format guidance provided in Regulatory Guide (RG) 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)."

- **Part 3 Environmental Report**

Part 3 includes environmental information pursuant to the requirements of 10 CFR 52.80, "Contents of applications; additional technical information," and 10 CFR 51.50(c).

- **Part 4 Technical Specifications**

Part 4 addresses how the AP1000 Generic Technical Specifications (GTS) and Bases are incorporated by reference into the Turkey Point Plant-Specific Technical Specifications (PTS) and Bases. Specifically, Section A addresses completion of bracketed information. Section B provides a complete copy of the Turkey Point PTS and Bases.

- **Part 5 Emergency Plan**

Part 5 includes the Turkey Point COL Emergency Plan, supporting information (e.g., evacuation time estimates (ETEs)), and applicable offsite State and local emergency plans.

- **Part 6 Limited Work Authorization (Revision 1)**

Part 6 of the COL application, Revision 0, included a site redress plan and environmental report related to a Limited Work Authorization (LWA) request to perform certain safety-related construction activities. Subsequently, the applicant withdrew its LWA request. As such, Part 6 of the COL application is not used.

- **Part 7 Departure and Exemption Requests**

Part 7 includes information regarding departures and exemptions. Departures refers to departures from the AP1000 DCD, Revision 19, incorporated by reference into the COL application. For each departure, Part 7 of the COL application identifies the portions of the DCD and FSAR affected and includes a description, a justification, an evaluation against criteria in 10 CFR 52.63(b), and a concluding statement about whether the departure requires NRC approval under 10 CFR Part 52, Appendix D, Section VIII.B.5.

"Exemptions" refers to requests for exemptions from NRC regulations. For each exemption request, Part 7 identifies the regulation and specific wording from which the applicant is requesting an exemption and provides a discussion supporting the request.

- **Part 8 Safeguards/Security Plans**

Part 8 addresses the Turkey Point Units 6 and 7 Safeguards/Security Plan, which consists of the Physical Security Plan (PSP), the Training and Qualification Plan, the Safeguards Contingency Plan, and the Special Nuclear Material (SNM) Physical Protection Program Description. These security plans are submitted to the NRC as separate licensing documents in order to fulfill the requirements of 10 CFR 52.79(a)(35) and 10 CFR 52.79(a)(36). These plans are categorized as security safeguards information and are withheld from public disclosure pursuant to 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements," and 10 CFR 73.22, "Protection of Safeguard Information: Specific Requirements." The staff's evaluation of the Safeguards and Security Plans is documented separately from this SER and is withheld from the public in accordance with 10 CFR 73.21. Section 13.6 of this SER provides a nonsensitive summary of the staff's evaluation of those plans.

- **Part 9 Withheld Information**

Part 9 identifies sensitive information that is withheld from public disclosure under 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." The information in this part includes sensitive unclassified non-safeguards information (SUNSI), proprietary financial information, and figures from Part 2 of the application that meet the SUNSI guidance for withholding from the public. In addition, this part of the application includes the following information:

- Turkey Point Units 6 and 7 offsite emergency response plans;
- Turkey Point Units 6 and 7 Cyber Security Plan, as required by 10 CFR 73.54, "Protection of Digital Computer and Communication Systems and Networks";
- Turkey Point Units 6 and 7 Mitigative Strategies Description and Plans, as required by 10 CFR 52.80(d); and
- Turkey Point Site-Specific Seismic Evaluation Report.

- **Part 10 Proposed Combined License Conditions (Including Inspections, Tests, Analyses, and Acceptance Criteria)**

Part 10 includes Turkey Point applicant's proposed license conditions and inspections, tests, analyses, and acceptance criteria (ITAAC) information in accordance with 10 CFR 52.80. A table identifying the staff's proposed license conditions and ITAAC appears in Appendix A of this FSER.

Part 10 of the application incorporated by reference the AP1000 Tier 1 information including ITAAC. In addition, the application includes site-specific ITAAC (e.g., emergency planning, physical security, electrical, and piping).

- **Part 11 Enclosures**

Part 11 includes information submitted by the applicant in support of the Turkey Point COL application. Specifically, these sections include the following:

- New Nuclear Projects Quality Assurance Program Description (QAPD). The QAPD is the top-level policy document that establishes the quality assurance (QA) policy and assigns major functional responsibilities for COL/construction/preoperation and operation activities conducted by or for FPL.
- Geotechnical Exploration and Testing.
- Cyber Security Plan. The SUNSI version of the cyber security plan is provided in Part 9 of the application.
- Mitigative Strategies Description and Plans. The SUNSI version of the Mitigative Strategies Description and Plans is provided in Part 9 of the application.
- SNM Material Control and Accounting Program Description.
- New Fuel Shipping Plan.
- Supplemental Information in Support of 10 CFR Part 70 Special Nuclear Material License Application.
- Supplemental Field Investigation Data Report.
- Surficial Muck Deposits Field and Laboratory Investigation Data Report.

1.2 Regulatory Basis

1.2.1 Applicable Regulations

The 10 CFR Part 52, Subpart C, "Combined Licenses," sets out the requirements and procedures applicable to Commission issuance of a COL for nuclear power facilities. The following are of particular significance:

- 10 CFR 52.79, "Contents of applications; technical information in final safety analysis report," identifies the technical information for the FSAR.
- 10 CFR 52.79(d) provides additional requirements for a COL referencing a standard certified design.
- 10 CFR 52.80, "Contents of applications; additional technical information," provides additional technical information outside of the FSAR (ITAAC, environmental report, and mitigative strategies plan required by 10 CFR 50.54(hh)(2)).
- 10 CFR 52.81, "Standards for review of applications," provides standards for reviewing the application.
- 10 CFR 52.83, "Finality of referenced NRC approvals; partial initial decision on site suitability," provides for the finality of referenced NRC approvals (i.e., standard design certification (DC)).

- 10 CFR 52.85, "Administrative review of applications; hearings," provides requirements for administrative reviews and hearings.
- 10 CFR 52.87, "Referral to the Advisory Committee on Reactor Safeguards (ACRS)," provides for referral to the ACRS.

The NRC staff reviewed this application according to the standards set out in:

- 10 CFR Part 20, "Standards for Protection Against Radiation."
- 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material."
- 10 CFR Part 40, "Domestic Licensing of Source Material."
- 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."
- 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."
- 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."
- 10 CFR Part 55, "Operators' Licenses."
- 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."
- 10 CFR Part 73, "Physical Protection of Plants and Materials."
- 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material."
- 10 CFR Part 100, "Reactor Site Criteria."
- 10 CFR Part 140, "Financial Protection Requirements and Indemnity Agreements."

The staff evaluated the application against the acceptance criteria provided in the following NUREGs:

- NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)."
- NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants."
- NUREG-1577, "Standard Review Plan on Power Reactor Licensee Financial Qualifications and Decommissioning Funding Assurance."
- "Standard Review Plan on Foreign Ownership, Control, or Domination"

In addition, the staff considered the format and content guidance in RG 1.206¹ for the COL application.

1.2.2 Finality of Referenced NRC Approvals

In accordance with 10 CFR 52.83, if the application for a COL references a DC rule, the scope and nature of matters resolved in the DC for the application and any COL issued are governed by 10 CFR 52.63, "Finality of standard design certifications."

Based on the finality afforded to referenced certified designs, the scope of this COL application review, as it relates to the referenced certified design, is limited to items that fall outside the scope of the certified design (e.g., COL information items, design information replacing conceptual design information (CDI), programmatic elements that are the responsibility of the COL, and departures from the certified design).

The certified AP1000 design currently incorporated by reference in the Turkey Point Units 6 and 7 COL application is in 10 CFR Part 52, Appendix D, and is based on the AP1000 DCD as amended through Revision 19. The results of the NRC staff's technical evaluation of the AP1000 DC application are documented in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

The contents of the AP1000 COL application are specified by 10 CFR 52.79(a), which requires the submission of information within the FSAR that describes the facility, presents the design bases and the limits on its operation, and presents a safety analysis of the structures, systems, and components (SSC) of the facility as a whole. For a COL application that references a DC, 10 CFR 52.79(d) requires the DCD to be included or incorporated by reference into the FSAR. A COL application that references a certified design must also include the information and analysis required to be submitted within the scope of the COL application, but which is outside the scope of the DCD. This set of information addresses plant- and site-specific information and includes all COL action or information items, design information replacing CDI, and programmatic information that was not reviewed and approved in connection with the DC rulemaking.

During its evaluation of the COL application, the staff confirmed that the complete set of information required to be addressed in the COL application was addressed in the DC, the DC as supplemented by the COL application, or completely in the COL application. Following this confirmation, the staff's review of the COL application is limited to the COL-specific review items.

1.2.3 Overview of the Design-Centered Review Approach

The design-centered review approach (DCRA) is described in Regulatory Issue Summary (RIS) 2006-06, "New Reactor Standardization Needed to Support the Design-Centered Licensing Review Approach." The DCRA is endorsed by the Commission's Staff Requirements

¹ Appendix D, Section IV.A.2.a to 10 CFR Part 52 requires the COL application to include a plant-specific DCD that includes the same type of information and uses the same organization and numbering as the generic DCD. The generic DCD used RG 1.70, Revision 3, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)," as a guide for the format and content. RG 1.206 was issued after the initial certification of the AP1000; thus, there are anticipated differences between the Turkey Point COL application and the guidance of RG 1.206.

Memorandum (SRM) SECY-06-0187, "Semiannual Update of the Status of New Reactor Licensing Activities and Future Planning for New Reactors," dated November 16, 2006. The DCRA, which is the Commission's policy intended to promote standardization of COL applications, is beyond the scope of information included in the DC. This policy directs the staff to perform one technical review for each standard issue outside the scope of the DC, and use this decision to support decisions on multiple COL applications. In this context, "standard" refers to essentially identical information. In some cases, the staff has expanded the use of this standard approach to other areas with essentially identical information for regulatory purposes. For example, the cyber security plans for the AP1000 COL applicants are essentially identical with the exception of title names being different. Other areas where this approach was used include technical specifications and loss of large-area fire reviews and may include information provided by the applicant(s) to resolve plant-specific issues.

The first COL application submitted for NRC staff review is designated in a design center as the reference COL (RCOL) application, and the subsequent applications in the design center are designated as subsequent COL (SCOL) applications. The Turkey Point Units 6 and 7 COL application has been designated as an SCOL application in the AP1000 design center.²

FPL, as an SCOL applicant in the AP1000 design center, organized and annotated its FSAR, Part 2 of the COL application, to clearly identify the following: a) sections that incorporate by reference the AP1000 DCD, b) sections that are standard for COL applicants in the AP1000 design center, and c) sections that are site-specific and thus only apply to Turkey Point Units 6 and 7. The applicant has used the following notations for the departures from and/or supplements to the referenced DCD included in this COL application:

- STD—standard (STD) information that is identical in each COL referencing the AP1000.
- PTN—plant-specific information that is specific to this application.
- DEP—represents a departure (DEP) from the DCD.
- COL—represents a COL information item identified in the DCD.
- SUP—represents information that supplements (SUP) information in the DCD.
- CDI—represents design information replacing CDI included in the DCD but not addressed within the scope of the DCD review.

The following text is added to the technical evaluation sections in this SER whenever the staff uses standard content evaluation material to resolve departures and/or supplements to the referenced DCD:

² In a letter dated April 28, 2009, the NuStart Energy Development, LLC, consortium informed the NRC that it had changed the RCOL designation for the AP1000 design center from Bellefonte Nuclear Plant (BLN) Units 3 and 4 to the Vogtle Electric Generating Plant (VEGP) Units 3 and 4. The transition of the RCOL from BLN Units 3 and 4 to VEGP Units 3 and 4 occurred after the issuance of the BLN Units 3 and 4 safety evaluation (SE) with open items. As part of the transition, the NRC staff concluded that the BLN evaluation material identified as Standard (STD COL, STD SUP, STD DEP, and Interfaces for Standard Design) in the BLN SE was directly applicable to the VEGP review. As a result, standard content material from the SE for the RCOL (VEGP) application and referenced in the Turkey Point FSER includes evaluation material from the SE for the BLN COL application.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant [VEGP] Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

To support the text added to the technical evaluation sections as described above, the staff evaluated any differences between the information provided by the Turkey Point applicant and that provided by the VEGP applicant regarding details in the application for the standard content material to determine whether the standard content material of the VEGP SER is still applicable to the Turkey Point application. These evaluations are in the SER sections that reference the standard content.

The staff applied the DCRA, described above, in Chapter 21 of this SER in conducting its evaluation of the five requests by the applicant to depart from the AP1000 certified design. These five departure requests were identical to departure requests in the Levy Nuclear Plant (LNP) COL review. Therefore, consistent with the NRC's DCRA, the staff referenced evaluations that were completed for the first time in the LNP review. The referenced evaluations in Chapter 21 of this SER are captured by use of italicized, double-indented formatting.

The staff performed a complete comparison of the standard content appearing in the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 FSAR, Revision 8. The staff confirmed that standard content items were incorporated in the Turkey Point Units 6 and 7 application and that the changes discussed in the standard content items were equally applicable to Turkey Point Units 6 and 7 COL FSAR. For departures reviewed in Chapter 21 of this SER, the staff also compared information in the LNP COL application with corresponding

information in the Turkey Point COL application and confirmed that the information was equally applicable to Turkey Point Units 6 and 7.

1.3 Principal Review Matters

The staff's evaluations related to the COL application review are addressed as follows:

- **Part 1 General and Financial Information**

The staff's evaluation of the corporate information regarding FPL pursuant to 10 CFR 50.33, "Contents of applications; general information," is provided in Section 1.5.1 of this SER.

- **Part 2 Final Safety Analysis Report**

The staff's evaluation of information in the Turkey Point COL FSAR is provided in the corresponding sections of this SER. The NRC staff has issued the following two SER chapters that do not have a corresponding chapter in the Turkey Point COL FSAR:

- Chapter 20, "Requirements Resulting from Fukushima Near-Term Task Force [NTTF] Recommendations," which describes the staff's evaluations and conclusions relating to the Fukushima NTTF recommendations that are applicable to the Turkey Point Units 6 and 7 COL application.
- Chapter 21, "Design Changes Proposed In Accordance with ISG-11," which describes the staff's evaluations and conclusions for departures from the certified design identified by the applicant in accordance with Interim Staff Guidance DC/COL ISG-011, "Finalizing Licensing-Basis Information."

- **Part 3 Environmental Report**

The staff's evaluation of information in an environmental report submitted pursuant to the requirements of 10 CFR 51.50(c) is provided in the Environmental Impact Statement.

- **Part 4 Technical Specifications**

Chapter 16 of this SER includes the staff's evaluation of the Turkey Point Units 6 and 7 PTS and Bases (specifically completion of bracketed text).

- **Part 5 Emergency Plan**

Chapter 13 of this SER includes the staff's evaluation of the Turkey Point Emergency Plan, supporting information such as ETEs, and the applicable offsite State and local emergency plans.

- **Part 6 Limited Work Authorization**

Part 6 of the application is not used and, therefore, has no corresponding staff evaluation.

- **Part 7 Departures and Exemption Requests**

The staff's evaluation of the departures and exemptions in Part 7 is provided in the applicable chapter of this SER. Table 1-1, below, lists the departures identified in the application and identifies where the evaluation is addressed in this SER. Several of the departures, as marked, correspond to exemptions requested by the applicant.

Table 1-1. Departures Identified in Part 7 of the COL Application

Description of Departure	Location of Evaluation in this Report
STD DEP 1.1-1. Administrative departure for organization and numbering for the FSAR sections ³	1.5.4
PTN DEP 1.8-1. Correction of an inconsistency in regulatory citation in an interface description	1.5.4
PTN DEP 2.0-1. Revision of operating basis wind speed	2.0.4
PTN DEP 2.0-2. Revision of maximum normal wet bulb (noncoincident) air temperature	2.0.4
PTN DEP 2.0-3. Revision of maximum safety wet bulb (noncoincident) air temperature ³	2.0.4
PTN DEP 2.0-4. Revision of population distribution exclusion area (site)	2.0.4
PTN DEP 3.2-1. Addition of downspouts and downspout screens to the condensate return portion of the Passive Core Cooling System	21.1
PTN DEP 3.11-1. Revision of "Envir. Zone" numbers for Spent Fuel Pool Level instruments	3.11
PTN DEP 6.2-1. Revision of ITAAC Acceptance Criteria for the in-containment Passive Core Cooling System compartment vents to reflect the current plant configuration ³	21.4
PTN DEP 6.3-1. Quantification of term "indefinitely" as used in the AP1000 DCD for maintenance of safe shutdown conditions using the Passive Residual Heat Removal Heat Exchanger during non-LOCA accidents ³	21.1
PTN DEP 6.4-1. Revision of estimated maximum doses to control room operators to meet 10 CFR Part 50, Appendix A, General Design Criterion 19, "Control Room" ³	21.2
PTN DEP 6.4-2. Revision of heat generated in the control room during accident conditions and the conditions for actuating the normal ventilation system supplemental filtration and the emergency ventilation system ³	21.3
PTN DEP 7.3-1. Modification to the engineered safety features to provide an operating bypass for the boron dilution block to meet the requirements of IEEE 603-1991, "Standard Criteria for Safety Systems for Nuclear Power Generating Stations," in accordance with 10 CFR 50.55a(h), Protection and safety systems." ³	21.5

³ These departures correspond to exemptions requests, listed below in Table 1-2.

Description of Departure	Location of Evaluation in this Report
STD DEP 8.3-1. Revision of Class 1E voltage regulating transformer current limiting features	8.3.2
PTN DEP 18.8-1. Revision of operations support center location	18.8.4
PTN DEP 18.8-2. Revision of technical support center location	18.8.4
PTN DEP 19.58-1. Revision of description of severe winds and tornadoes	19.58

Part 7 of the COL application, Part B, requests nine exemptions, as listed in Table 1-2.

Table 1-2. Exemption Requests Identified in Part 7 of the COL Application

Description of Exemption	Location of Evaluation in this Report
Exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.a related to COL application organization and numbering	1.5.4
Exemption from maximum safety wet bulb (noncoincident) air temperature cited in in AP1000 DCD Tier 1, Table 5.0 1	2.0.4
Exemption from the requirements of 10 CFR 70.22(b), 10 CFR 70.32(c), 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51, for SNM Material Control and Accounting Program Description	1.5.4
Exemption from AP1000 DCD Tier 1 Tables 2.2.3-1 and 2.2.3-2 and Technical Specification (TS) Surveillance Requirement (SR) 3.5.4.7 related to Containment Cooling Changes in regard to Passive Core Cooling System Condensate Return	21.1
Exemption from AP1000 DCD Tier 1 Subsection 2.7.1 and Tables 2.2.5-1 and 2.2.5-5 and TS Limiting Condition for Operation 3.7.4 and TS SR 3.7.4.1 related to Main Control Room Dose	21.2
Exemption from AP1000 DCD Tier 1 Tables 2.2.5-1, 2.2.5-4, 2.5.2-3 and 2.5.2-4, and TS 3.3.2 and 3.7.6 related to Main Control Room Heatup	21.3
Exemption from AP1000 Tier 1 Table 2.3.9-3 related to Combustible Gas Control in Containment	21.4
Exemption from AP1000 TS Table 3.3.2-1 related to Source Range Neutron Flux Doubling Block Permissive	21.5
Exemption from 10 CFR 52.93(a)(1) ⁴	1.5.4

• **Part 8 Safeguards/Security Plans**

The staff's evaluation of the Safeguards and Security Plans is documented separately from this SER and is withheld from the public in accordance with 10 CFR 73.21 and 10 CFR 73.22. A

⁴ Part 7 of the Turkey Point Units 6 and 7 COL application does not include an exemption request related to the requirements found in 10 CFR 52.93(a)(1). As discussed in Section 1.5.4 of this report, the staff determined that an exemption from this regulation is necessary.

non-sensitive summary of the staff's evaluation of those plans is provided in Section 13.6 of this SER.

The staff's evaluation of the SNM Physical Protection Plan is documented in Section 1.5.5.1 of this SER.

- **Part 9 Withheld Information**

The staff's evaluation of the withheld information occurs in the context of the specific subject being reviewed and is documented accordingly. A summary of the staff's evaluation of the Mitigative Strategies Description and Plans for loss of large areas of the plant due to explosions or fires is provided in Appendix 19A of this SER. The staff's complete evaluation is documented separately from this SER and is withheld from the public in accordance with 10 CFR 2.390.

The staff's evaluation of the Turkey Point Units 6 and 7 Cyber Security Plan is provided in Section 13.8 of this SER.

- **Part 10 Proposed Combined License Conditions (Including ITAAC)**

The staff's evaluation of the proposed COL conditions and ITAAC is provided in the applicable SER chapters. Appendix A identifies the proposed license conditions and ITAAC and the location of the evaluations. Each license condition is sequentially numbered in individual chapters of this SER. The license conditions and ITAAC are based on the provisions of 10 CFR 52.97, "Issuance of combined license."

- **Part 11 Enclosures**

Part 11 includes enclosures submitted by the applicant in support of the Turkey Point Units 6 and 7 COL application.

Organization of the SER

The staff's SER is structured as follows:

- The SER adheres to the finality afforded to COL applications that incorporate by reference a standard certified design. As such, this SER does not repeat any technical evaluation of material incorporated by reference; rather, it points to the corresponding review findings of NUREG-1793 and its supplements. However, the referenced DCD and the Turkey Point COL FSAR are considered in the staff's SER to the extent necessary to ensure that the expected scope of information to be included in a COL application is addressed adequately in either the DCD or COL FSAR or in both.
- For sections that were completely incorporated by reference without any supplements or departures, the SER simply points to the DCD and related staff evaluation in NUREG-1793 and its supplements and confirms that all the relevant review items were addressed in the AP1000 DCD.

- For subject matter within the scope of the COL application that supplements or departs from the DCD, this SER generally follows a six-section organization as follows:
 - “Introduction” section provides a brief overview of the specific subject matter.
 - “Summary of Application” section identifies whether portions of the review have received finality and clearly identifies the scope of review for the COL.
 - “Regulatory Basis” section identifies the regulatory criteria for the information addressed by the COL application.
 - “Technical Evaluation” section focuses on the information addressed by the COL application.
 - “Post Combined License Activities” section identifies the proposed license conditions, ITAAC, or FSAR information commitments that are post-COL activities.
 - “Conclusion” section summarizes how the technical evaluation resulted in a reasonable assurance determination by the staff that the relevant acceptance criteria have been met.

1.4 Staff Review of Turkey Point Units 6 and 7 COL FSAR Chapter 1

1.4.1 Introduction

There are two types of information provided in Chapter 1 of the Turkey Point COL FSAR:

- General information that enables the reviewer or reader to obtain a basic understanding of the overall facility without having to refer to the subsequent chapters. A review of the remainder of the application can then be completed with a better perspective and recognition of the relative safety significance of each individual item in the overall plant description.
- Specific information relating to qualifications of the applicant, construction impacts, and regulatory considerations that applies throughout the balance of the application (e.g., conformance with the acceptance criteria in NUREG-0800).

This section of the SER will identify the information incorporated by reference, summarize all of the new information provided, and document the staff’s evaluation of the sections addressing regulatory considerations.

1.4.2 Summary of Application

The information related to COL/SUP items included in Chapter 1 of the Turkey Point Units 6 and 7 COL FSAR encompasses the statements of fact or information recommended by RG 1.206. No staff technical evaluation was necessary where the statements were strictly background information. However, where technical evaluation of these COL/SUPs was necessary, the evaluation is not in this SER section, but in subsequent sections as referenced below.

FSAR Section 1.1, "Introduction"

Section 1.1 of the Turkey Point COL FSAR, Revision 8, incorporates by reference Section 1.1, "Introduction," of the AP1000 DCD, Revision 19, with the following supplements, and Includes proprietary information and safeguards information referenced in the AP1000 DCD.

- STD SUP 1.1-1

The applicant specified the incorporation of Revision 19 of the Westinghouse AP1000 DCD in all sections of the Turkey Point COL FSAR. Additionally, the applicant incorporated by reference Nuclear Energy Institute (NEI) technical reports as identified in Table 1.6-201, "Additional Material Referenced," of the Turkey Point COL FSAR.

- PTN SUP 1.1-2

The applicant clarified that the FSAR was submitted to NRC by FPL under Section 103 of the AEA to construct and operate two nuclear power plants under the provisions of 10 CFR Part 52, Subpart C, "Combined Licenses."

- PTN COL 2.1-1

The applicant provided additional information in Turkey Point COL 2.1-1 to address COL Information Item 2.1-1 (COL Action Item 2.1.1-1). Specifically, Turkey Point Units 6 and 7 are to be located in Miami-Dade County, FL approximately 25 miles south of Miami, FL. This is a brief introductory summary of the plant location. An expanded discussion of PTN COL 2.1-1 is included in Turkey Point COL FSAR Section 2.1.

- PTN COL 1.1-1

The applicant provided the anticipated schedule for construction and operation of Turkey Point Units 6 and 7 in Turkey Point COL FSAR Table 1.1-203, "Schedule for Construction and Operation of Units 6 & 7." The applicant committed to provide a site-specific construction plan and startup schedule after issuance of the COL.

- STD SUP 1.1-6

The applicant identified that, while the Turkey Point COL FSAR generally follows the AP1000 DCD organization and numbering, there were some organization and numbering differences that were adopted, where necessary, to include additional material, such as additional content identified in RG 1.206.

Related to this is STD DEP 1.1-1, "Administrative departure for organization and numbering of the FSAR sections," in Turkey Point COL FSAR Section 1.8 and Part 7 of the Turkey Point COL application. The staff's evaluation of this departure is included in Section 1.5.4 of this SER.

- STD SUP 1.1-3

The applicant provided additional information to describe annotations used in the left hand column of the Turkey Point COL FSAR to identify departures, supplementary information, COL items, and CDI.

- STD SUP 1.1-4

The applicant provided additional information to indicate how proprietary, personal, or sensitive information and withheld from public disclosure pursuant to 10 CFR 2.390 and RIS 2005-026, "Control of Sensitive Unclassified Nonsafeguards Information Related to Nuclear Power Reactors," is identified in the Turkey Point COL FSAR. Proprietary and sensitive material was provided in Part 9 of the COL application.

- PTN SUP 1.1-5

The applicant provided additional information to identify acronyms and abbreviations used in the Turkey Point COL FSAR that are in addition to the acronyms identified in the AP1000 DCD.

FSAR Section 1.2, General Plant Description

Section 1.2 of the Turkey Point COL FSAR, Revision 8, incorporates by reference Section 1.2, "General Plant Description," of the AP1000 DCD, Revision 19 with the following departures and supplements:

- PTN DEP 18.8-1

The applicant modified the AP1000 DCD Figure 1.2-18, "Annex Building General Arrangement Plan at Elevation 100'-0" & 107'-2"," to reflect the proposed relocation of the Operations Support Center (OSC). The staff's evaluation of the location of the OSC is discussed in Section 18.8.4 of this SER.

- PTN COL 2.1-1; PTN COL 3.3-1; and PTN COL 3.5-1

The applicant provided additional information on the site plan for Turkey Point Units 6 and 7 summarizing the principal structures and facilities, parking areas, and roads. The applicant also describes the location and orientation of the power block complex. These COL information items are expanded in other sections of the Turkey Point COL FSAR.⁵

FSAR Section 1.3, Comparisons with Similar Facility Designs

Section 1.3 of the Turkey Point COL FSAR, Revision 8, incorporates by reference Section 1.3, "Comparisons with Similar Facility Designs," of the AP1000 DCD, Revision 19 with no departures or supplements.

⁵ Table 1.8-202 of the Turkey Point COL FSAR provides a COL information item index of occurrences in the Turkey Point COL FSAR.

FSAR Section 1.4, Identifying Agents and Contractors

Section 1.4 of the Turkey Point COL FSAR, Revision 8, incorporates by reference Section 1.4, "Identification of Agents and Contractors," of the AP1000 DCD, Revision 19 with the following departures and/or supplements:

- PTN SUP 1.4-1

The applicant provided additional information to identify FPL as the COL applicant for Turkey Point Units 6 and 7. Additionally, the applicant identified FPL as the owner and operator of Turkey Point Units 6 and 7.

- PTN SUP 1.4-2

The applicant states that contractors participating in preparing the COL application are addressed in Subsection 1.4.2.8 of the Turkey Point COL FSAR. However, the applicant has not yet contracted the nuclear steam supply system (NSSS) provider, the architect-engineer, and the constructor. Subsection 1.4.2.8 of the FSAR will be revised to include information identifying the NSSS provider, the architect-engineer, and the constructor.

- PTN SUP 1.4-3

The applicant provided additional information related to specialized consulting firms that assisted in preparing the COL application.

FSAR Section 1.5, Requirements for Further Technical Information

Section 1.5 of the Turkey Point COL FSAR, Revision 8, incorporates by reference Section 1.5, "Requirements for Further Technical Information," of the AP1000 DCD, Revision 19 with no departures or supplements. This section of the DCD provides information related to testing conducted during the AP600 conceptual design program to provide input into the plant design and to demonstrate the feasibility of unique design features. The DCD also describes the analyses performed to show that the AP600 and AP1000 exhibit a similar range of conditions such that the AP600 tests are sufficient to support the AP1000 safety analysis.

FSAR Section 1.6, "Material Referenced"

Section 1.6 of the Turkey Point COL FSAR, Revision 8, incorporates by reference Section 1.6, "Material Referenced," of the AP1000 DCD, Revision 19 with the following supplements:

- STD SUP 1.6-1

The applicant identified Table 1.6-201 as providing a list of the technical documents incorporated by reference in the Turkey Point COL FSAR in addition to those technical documents incorporated by reference in the AP1000 DCD.

- PTN SUP 1.6-2

The applicant identified supplemental portions of Table 1.6-201 as site specific and identified them as PTN SUP 1.6-2.

- PTN DEP 6.4-1

The applicant provided information about PTN DEP 6.4-1 in Section 1.6 of the FSAR related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this report.

FSAR Section 1.7, "Drawings and Other Detailed Information"

Section 1.7 of the Turkey Point COL FSAR, Revision 8, incorporates by reference Section 1.7, "Drawings and Other Detailed Information," of the AP1000 DCD, Revision 19, with the following supplements:

- PTN SUP 1.7-1

The applicant identified the site-specific piping and instrumentation diagrams or system drawings. These are the circulating water system, raw water system, and transmission switchyard and offsite power system.

FSAR Section 1.8, Interfaces for Standard Design

Section 1.8 of the Turkey Point COL FSAR, Revision 8, incorporates by reference Section 1.8, "Interfaces for Standard Design," of the AP1000 DCD, Revision 19 with the following departures and/or supplements:

- PTN DEP 1.8-1

The applicant provided a departure to address an error in the DCD Table 1.8-1 listing of plant interfaces where Item 13.1 incorrectly references Appendix O of 10 CFR Part 50. This departure is evaluated in Section 1.4 of this document.

- PTN SUP 1.8-1

The applicant identified departures in Turkey Point COL FSAR Table 1.8-201, "Summary of FSAR Departures from the DCD." The departures are listed above in Table 1-1.

- PTN SUP 1.8-2

The applicant provided a list of the COL information items in the AP1000 DCD. In Turkey Point COL FSAR Table 1.8-202, "COL Item Tabulation," FPL provides the sections of the application addressing these issues. The table further identifies the AP1000 COL items as an applicant item, a holder item, or both. An applicant item is completely addressed in the application. FPL's definition of a COL holder item is an item that cannot be resolved prior to issuance of the COL. These items are regulatory commitments of the COL holder and will be completed as specified in the appropriate section of the referenced DCD and their completion is the subject of a COL license condition presented in Part 10 of this COL application.

- PTN SUP 1.8-3

The applicant provided in Turkey Point COL FSAR Table 1.8-203, "Summary of FSAR Discussions of AP1000 Plant Interfaces," a list of interface items from the AP1000 DCD and the corresponding Turkey Point COL FSAR section(s) that address those interface items.

FSAR Section 1.9, Compliance with Regulatory Criteria

Section 1.9 of the Turkey Point COL FSAR, Revision 8, incorporates by reference Section 1.9, "Compliance with Regulatory Criteria," of the AP1000 DCD, Revision 19 with the following supplements:

- STD COL 1.9-1 and PTN COL 1.9-1

The applicant provided additional information related to NRC regulatory guides cited in the Turkey Point COL FSAR. Table 1.9-201, "Regulatory Guide/FSAR Section Cross-References," identifies the regulatory guide revision and provides Turkey Point COL FSAR cross-references. In addition, Appendix 1AA, "Conformance with Regulatory Guides," was developed by the applicant to supplement the detailed discussion presented in Appendix 1A, "Conformance with Regulatory Guides," of the referenced DCD. Specifically, Appendix 1AA delineates conformance of design aspects as stated in the DCD and conformance with programmatic and/or operational issues as presented in the Turkey Point COL FSAR. In certain regulatory guides, design aspects were beyond the scope of the DCD and are presented in the Turkey Point COL FSAR.

- STD COL 1.9-2 and PTN COL 1.9-2

The applicant provided additional information related to operational experience. Turkey Point COL FSAR Table 1.9-204, "Generic Communications Assessment," provides a list of Bulletins and Generic Letters (GLs), the appropriate Turkey Point COL FSAR cross-references, and whether the subject matter was addressed in the AP1000 DCD.

- STD COL 1.9-3

The applicant provided additional information related to the review of Unresolved Safety Issues and Generic Safety Issues (GSIs). Specifically, Table 1.9-203, "Listing of Unresolved Safety Issues and Generic Safety Issues," lists Three Mile Island (TMI) Action Plan items, Task Action Plan items, New Generic Issues, Human Factors Issues, and Chernobyl Issues and states how they were considered in the AP1000 DCD and COL application. In addition, the applicant provided discussion on four new generic issues: Issue 186 related to heavy load drops, Issue 189 related to susceptibility of certain containments to early failure from hydrogen combustion, Issue 191 related to PWR sump performance, and Issue 196 related to the use of Boral in long-term dry storage casks for spent reactor fuel.

- STD SUP 1.9-1 and PTN SUP 1.9-1

The applicant provided additional information related to conformance with NUREG-0800. Specifically Turkey Point COL FSAR Table 1.9-202, "Conformance with SRP Acceptance Criteria," delineates conformance with NUREG-0800 for design aspects as stated in the

AP1000 DCD and conformance for subjects beyond the scope of the DCD as presented in the Turkey Point COL FSAR.

- PTN SUP 1.9-2

The applicant clarified that the severe accident mitigation design alternatives (SAMDA) evaluation for the AP1000 in Appendix 1B to the DCD is not incorporated into the Turkey Point COL FSAR; but is addressed in the COL application Environmental Report.

- STD SUP 1.9-3

The applicant provided information related to station blackout (SBO) procedures and training for operators to include actions necessary to restore offsite power after 72 hours by addressing alternating current (ac) power restoration and severe weather guidance in accordance with NUMARC-87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light-Water Reactors."

FSAR Section 1.10, Nuclear Power Plants to Be Operated On Multi-Unit Sites

The applicant identified this as a new section in the Turkey Point COL application that was not part of the referenced DCD.

- STD SUP 1.10-1

The applicant provided an assessment of the potential impacts of construction of one unit on SSCs important to safety for an operating unit, in accordance with 10 CFR 52.79(a)(31). This section addresses the review of an evaluation of potential hazards to the SSCs important to safety of the operating units resulting from construction activities, as well as a description of the managerial and administrative controls to be used to provide assurance that the limiting conditions for operation (LCOs) are not exceeded as a result of construction activities at a multi-unit site.

- PTN SUP 1.10-1

The applicant identified that the power blocks for Turkey Point Units 6 and 7 have a minimum separation of at least 850 feet between plant centerlines. The standard portion of the application discusses the primary consideration in setting this separation distance as the space needed to support plant construction via the use of a heavy-lift crane.

License Conditions

- The applicant proposed that the ITAAC identified in the tables in Appendix B of Part 10 of the Turkey Point COL application be incorporated into the COL.

1.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the introductory information in Turkey Point COL FSAR Chapter 1 are given in Section 1.0 of NUREG-0800.

The applicable regulatory requirements for the introductory information are as follows:

- 10 CFR 50.43(e), "Additional standards and provisions affecting class 103 licenses and certifications for commercial power," as it relates to requirements for approval of applications for a DC, COL, manufacturing license, or operating license that propose nuclear reactor designs that differ significantly from light-water reactor (LWR) designs that were licensed before 1997, or use simplified, inherent, passive, or other innovative means to accomplish their safety functions.
- 10 CFR 52.77, "Contents of applications; general information," and 10 CFR 52.79, as they relate to general introductory matters.
- 10 CFR 52.79(a)(17), as it relates to compliance with technically relevant positions of the TMI requirements.
- 10 CFR 52.79(a)(20), as it relates to proposed technical resolutions of those unresolved safety issues and medium- and high-priority GSIs that are identified in the version of NUREG-0933, "Resolution of Generic Safety Issues (Formerly entitled 'A Prioritization of Generic Safety Issues')," current on the date up to 6 months before the docket date of the application and, which are technically relevant to the design.
- 10 CFR 52.79(a)(31) regarding nuclear power plants to be operated on multi-unit sites, as it relates to an evaluation of the potential hazards to the SSCs important to safety of operating units resulting from construction activities, as well as a description of the managerial and administrative controls to be used to provide assurance that the LCOs are not exceeded as a result of construction activities at the multi-unit sites.
- 10 CFR 52.79(a)(37), as it relates to the information necessary to demonstrate how operating experience insights have been incorporated into the plant design.
- 10 CFR 52.79(a)(41), as it relates to an evaluation of the application against the applicable NRC review guidance in effect 6 months before the docket date of the application.
- 10 CFR 52.79(d)(2) requiring that, for a COL referencing a standard DC, the FSAR demonstrate that the interface requirements established for the design under 10 CFR 52.47, "Contents of applications; technical information," have been met.
- 10 CFR 52.97(a)(1)(iv), "Issuance of combined licenses," regarding technical and financial qualifications.

The related acceptance criteria from NUREG-0800, Chapter 1 are as follows:

- For regulatory considerations, acceptance is based on addressing the regulatory requirements as discussed in FSAR Chapter 1 or within the referenced FSAR section.

The NUREG-0800 acceptance criteria associated with the referenced section will be reviewed in the context of that review.

- For performance of new safety features, the information is sufficient to provide reasonable assurance that: (1) these new safety features will perform as predicted in the applicant's FSAR, (2) the effects of system interactions are acceptable, and (3) the applicant provides sufficient data to validate analytical codes. The design qualification testing requirements may be met with either separate effects or integral system tests; prototype tests; or a combination of tests, analyses, and operating experience.

In conformance with the regulatory acceptance criteria in RG 1.206 the applicant provided an evaluation for conformance with guidance in RGs in effect 6 months prior to the submittal of the COL application.

1.4.4 Technical Evaluation

The NRC staff reviewed Section 1 of the Turkey Point COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.⁶ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to this introduction. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Station (BLN) Units 3 and 4 COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER. Confirmatory items that are first

⁶ See Section 1.2.2, "Finality of Referenced NRC Approvals" for a discussion of the staff's review related to verification of the scope of information to be included within a COL application that references a DC.

identified in this SER section have a Turkey Point designation (e.g., Turkey Point Confirmatory Item 1.4-1).

The staff reviewed the information in the Turkey Point COL FSAR:

Turkey Point COL FSAR Sections 1.1, 1.2, and 1.3

There are no specific NUREG-0800 acceptance criteria related to the general information presented in Sections 1.1, 1.2, and 1.3, and no specific regulatory findings. The information provides the reader with a basic overview of the nuclear power plant and the construct of the Turkey Point COL FSAR, itself.

- PTN COL 1.1-1

In Turkey Point COL FSAR Section 1.1, PTN COL 1.1-1 states that a site-specific construction plan and startup schedule will be provided after issuance of the COL. This is identified as **Turkey Point Commitment Number 1.4-1**.

The following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP FSER:

*In a letter dated November 11, 2010, the applicant added a discussion of incorporation of the proprietary information and safeguards information referenced in the AP1000 DCD. This information is included to meet the requirements of 10 CFR Part 52, Appendix D, Section IV.A.3, which indicates the applicant must “include, in the plant specific DCD, the proprietary information and safeguards information referenced in the AP1000 DCD” and, therefore, is acceptable. The incorporation of the above information into a future revision of the VEGP COL FSAR is **Confirmatory Item 1.4-1**.*

Resolution of Standard Content Confirmatory Item 1.4-1

Confirmatory Item 1.4-1 is an applicant commitment to revise FSAR Section 1.1 to include a discussion of incorporation of the proprietary information and safeguards information referenced in the AP1000 DCD. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 1.4-1 is now closed.

Turkey Point COL FSAR Section 1.4

- PTN SUP 1.4-1

This evaluation is limited to FPL’s technical qualification to hold a 10 CFR Part 52 license in accordance with 10 CFR 52.97(a)(1)(iv). The financial qualifications that are also a requirement of 10 CFR 52.97(a)(1)(iv) are evaluated in Section 1.5.1 of this SER.

Turkey Point COL FSAR Section 1.4 states that FPL will own and operate Turkey Point Units 6 and 7. Part 1 of the COL application, Section 1.0, states that FPL, the applicant for the Turkey Point Units 6 and 7 COLs, is primarily engaged in the generation, transmission, and distribution of electricity. The service territory covers the southern third and almost the entire

eastern seaboard of the state of Florida. FPL supplies electric service to approximately 4.5 million customer accounts. FPL owns and operates the following four nuclear power plants:

- St. Lucie Unit 1, near Ft. Pierce, FL.
- St. Lucie Unit 2, near Ft. Pierce, FL (85 percent ownership, FPL is authorized to act as agent for the Orlando Utilities Commission of the city of Orlando, FL and Florida Municipal Power Agency).
- Turkey Point Units 3 and 4, near Florida City, FL.

FPL is a regulated public utility and is subject to the regulatory provisions of the Florida Public Service Commission (FPSC), the NRC, and the Federal Energy Regulatory Commission. Since FPL holds 10 CFR Part 50 licenses for nuclear power plants and has demonstrated its ability to build and operate these plants, the staff finds that FPL is qualified to hold a 10 CFR Part 52 license. The staff notes that Section 17.5 of the Turkey Point COL FSAR discusses the QA program to be implemented at the receipt of the COL. The staff's evaluation of Section 17.5 of the Turkey Point COL FSAR is in Section 17.5 of this SER. Based on FPL's experience with building and operating a nuclear power plant and the staff's evaluation of FPL's QA program, the staff finds that FPL is technically qualified to hold a 10 CFR Part 52 license in accordance with 10 CFR 52.97(a)(1)(iv).

- PTN SUP 1.4-2 and PTN SUP 1.4-3

In PTN SUP 1.4-2 and PTN SUP 1.4-3, the applicant provided the names of contractors and description of the specialized services provided in the preparation of the COL application.

FPL received support from the following contractors in preparing the COL application:

- Bechtel Power Corporation
- Contingency Management Consulting Group, LLC
- Environmental Consulting & Technology, Inc.
- Golder Associates, Inc.
- KLD Associates, Inc.
- MACTEC Engineering and Consulting, Inc.
- McNabb Hydrogeologic Consulting, Inc.
- NuStart Energy, Inc.
- Risk Engineering, Inc.
- Tetra Tech NUS, Inc.
- William Lettis & Associates, Inc.
- Westinghouse Electric Company LLC
- AMEC Environmental & Infrastructure, Inc.
- Paul C. Rizzo Associates, Inc.
- Fugro Consultants, Inc.
- KLD Engineering, P.C.

The staff finds this acceptable because the applicant identified contractors beyond those identified in the DCD and provided a description of the specialized consulting services rendered in preparation of the COL application.

Turkey Point COL FSAR Section 1.5

The 10 CFR 50.43(e) requires additional testing or analysis for applications for a DC or COL that propose nuclear reactor designs that differ significantly from LWR designs that were licensed before 1997, or use simplified, inherent, passive, or other innovative means to accomplish their safety functions. This requirement was addressed in the AP1000 DCD and evaluated by the staff in NUREG-1793, Chapter 21, "Testing and Computer Code Evaluation." The Turkey Point COL application does not include any additional design features that require additional testing.

Turkey Point FSAR Section 1.6

In this section, the applicant provides a tabulation of all technical documents that are incorporated by reference as part of the application. There are no specific NUREG-0800 acceptance criteria related to the information presented in Section 1.6 and no specific regulatory findings. The staff finds that the applicant's supplemental information in FSAR Section 1.6 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.6.

Turkey Point COL FSAR Section 1.7

In this section, the applicant identified the site-specific piping and instrumentation diagrams or system drawings cross-referenced to the related application sections. There are no specific NUREG-0800 acceptance criteria related to the information presented in Section 1.7 and no specific regulatory findings. The staff finds that the applicant's supplemental information in FSAR Section 1.7 is acceptable within the review scope of Chapter 1 and satisfies RG 1.206, Regulatory Position C.I.1.7.

Turkey Point COL FSAR Section 1.8

- PTN SUP 1.8-1

As discussed in SER Section 1.4.2, the applicant identifies departures in Turkey Point COL FSAR Table 1.8-201 from the referenced AP1000 DCD. Section 1.3 of this SER provides a cross-reference to where these departures are discussed in this SER.

- PTN SUP 1.8-2

PTN SUP 1.8-2 contains the same type of information as VEGP SUP 1.8-2. Therefore, the following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP FSER:

In Sections 1.3 and 1.4.4 of the BLN SER, the staff identified a standard content Open Item 1-2 related to the decision regarding which of the BLN COL FSAR commitments, if any should become a license condition. On January 21, 2010, the NRC issued ISG-15, "Final Interim Staff Guidance on the Post-Combined License Commitments," ESP/DC/COL-ISG-15. This guidance discusses options regarding completion of COL items that cannot be completed until after issuance of the COL. The VEGP applicant identified that certain COL information items

cannot be resolved prior to the issuance of a COL. The applicant has identified proposed License Condition 2 in Part 10 of the COL application to ensure these COL items will be completed by the identified implementation milestones through completion of the action identified. The determination that these COL information items cannot be resolved prior to issuance of a COL is discussed in the relevant SER section related to the topic. In addition, using the guidance of ISG-15, the staff has identified certain FSAR commitments in individual sections of this SER and these FSAR commitments are listed in Appendix A.3 of this SER. The staff considers Open Item 1-2 is resolved.

- PTN SUP 1.8-3

The AP1000 DCD Table 1.8-1 presents interface items for the AP1000. This section of the DCD identifies certain interfaces with the standard design that have to be addressed in accordance with 10 CFR 52.47(a)(1)(vii).⁷ As required by 10 CFR 52.79(d)(2), the COL application must demonstrate how these interface items have been met. In the Turkey Point COL FSAR, the applicant did not explicitly identify how these interface items have been met. Table 1.8-203 of the Turkey Point COL FSAR identifies the FSAR location of information addressing the interface items identified in Section 1.8 of the AP1000 DCD. The staff's review of the identified FSAR locations confirmed that interface items are adequately addressed in the Turkey Point COL FSAR. The technical discussions related to specific interface requirements are addressed in related sections of this SER (e.g., SER Sections 8.2.4 and 11.3.2).

- PTN DEP 1.8-1

This Tier 2 departure, appearing in the FSAR Table 1.8-203 listing of AP1000 plant interfaces, corrects an error in DCD Table 1.8-1, Item 13.1. This interface addresses the design features that affect plans for coping with emergencies in the operation of the reactor facility or a major portion thereof. The departure changes the incorrect regulatory reference from Appendix O of 10 CFR Part 50 to 10 CFR 52.137(a)(11). In issuing the final rule for 10 CFR Part 52 in the *Federal Register (FR)* (see 72 FR 49352), the requirement relating to providing this interface information was moved from Appendix O of 10 CFR Part 50 to a new location in 10 CFR 52.137 (see 72 FR 49391). The applicant determined that this departure did not involve a change to or departure from Tier 1 or Tier 2* information or the technical specifications, nor did it require a license amendment under 10 CFR Part 52, Appendix D, § VIII.B.5.b or c. Accordingly, the applicant determined that the departure does not require prior NRC approval. While such determinations are subject to staff inspection, such departures are not material to the NRC decision on the acceptability of a COL application, and staff review of the departure is not required.

Turkey Point COL FSAR Section 1.9

In this section of the application, the applicant demonstrates conformance with regulatory guides and NUREG-0800 and addresses unresolved safety issues, GSIs, TMI action items, and operating experience.

⁷ Following the update to 10 CFR Part 52 (72 FR 49517), this provision has changed to 10 CFR 52.47(a)(25).

The following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP FSER⁸:

AP1000 COL Information Item

- STD COL 1.9-1

Regarding RGs, the applicant provides in BLN COL FSAR Table 1.9-201 a cross-reference between the RG and where it is discussed in the application, and Appendix 1AA, "Conformance with Regulatory Guides," to supplement the detailed discussion presented in Appendix 1A, "Conformance with Regulatory Guides," of the referenced DCD. The technical discussions related to this appendix are addressed in the related technical sections of the BLN COL FSAR. In addition, BLN COL FSAR Table 1.9-201 provides a listing of all RGs, the specific revision, and provides BLN COL FSAR and DCD cross-references.

The staff issued three RAIs associated with how the RG information in Table 1.9-201 and Appendix 1AA of the BLN COL FSAR is presented. In addition, there were two specific RAIs associated with how an individual RG is discussed in Table 1.9-201 and Appendix 1AA. A description of the RAIs and their responses follows.

RAI 1-5

In RAI 1-5, the staff noted that BLN COL FSAR Appendix 1AA lists the later version of the RG when compared with DCD Table 1.9-1 but in some cases does not discuss compliance with the later version. In other cases, exceptions to the RG were identified but not justified.

RAI 1-7

In RAI 1-7, the staff noted that not all RGs listed in Appendix 1AA provided a cross-reference to where they were discussed in accordance with the guidance in Section 1 of NUREG-0800.

RAI 1-11

In RAI 1-11, the staff noted that the information that TVA provided in response to RAIs 1-5 and 1-7 conflicted with information that TVA provided in response to another RAI. TVA was requested to reconcile these differences.

RAIs 1-1 and 1-10

These RAIs are associated with specific RGs and RAI 1-1 and RAI 1-10 are evaluated in Chapters 13 and 12, of this SER, respectively.

⁸ The text reproduced from Section 1.4.4 of the VEGP is unaltered, but is presented in sequential order of the COL and SUP items.

In TVA's response to RAIs 1-5 and 1-7, TVA committed to make changes to BLN COL FSAR Table 1.9-201 and Appendix 1AA to:

- *Add an additional statement to Appendix 1AA that specifically addresses the later version of the RG.*
- *Revise BLN COL FSAR Sections 1.9.1.1, 1.9.1.2, 1.9.1.3, and 1.9.1.4, to reflect that one method of identifying and justifying an alternative to an RG is the use of previous revisions of the RG for design aspects as stated in the DCD in order to preserve the finality of the certified design.*
- *Revise BLN COL FSAR Table 1.9-201 to address the RG listed in Appendix 1AA, thereby providing a more complete cross reference of where each RG is discussed in the COL application.*

In response to RAI 1-11, TVA committed to revising BLN COL FSAR Table 1.9-201 and Appendix 1AA to ensure that they are consistent with commitments made in other RAI responses.

The staff's evaluation of the RGs is addressed in Chapters 2 through 19 of this SER as needed. At a minimum the NRC staff's FSER sections will discuss any RG that involves an exception.

The staff finds TVA's responses to RAIs 1-5 and 1-7 acceptable. However, the staff notes that BLN COL FSAR Table 1.9-201 and Appendix 1AA will most likely need additional changes based on the staff's evaluation of the RGs in this SER and TVA's response to RAI 1-11. The NRC staff is still evaluating TVA's response to RAI 1-11 and has not yet made a determination of whether the response is acceptable. This is Open Item 1.4-2. The updating of BLN COL FSAR Table 1.9-201 to reflect changes committed to by TVA in response to RAI 1-11 and the updating of this information to reflect TVA's commitments in other RAI responses is Confirmatory Item 1.4-2.

Resolution of Standard Content Confirmatory Item 1.4-2

The NRC staff verified that VEGP COL FSAR Table 1.9-201 was updated to provide an acceptable cross reference of where each RG is discussed in the COL application. As a result, Confirmatory Item 1.4-2 is resolved for VEGP.

Resolution of Standard Content Open Item 1.4-2

In a letter dated September 21, 2009, the VEGP applicant provided clarification to a previously submitted response dated January 27, 2009 from the BLN applicant. Specifically, the applicant proposed to revise the discussion in the "General comment" portion related to preserving the finality of the certified design in VEGP COL FSAR Sections 1.9.1.1, 1.9.1.2, 1.9.1.3, 1.9.1.4 and Appendix 1AA Note (b); to clarify in VEGP COL FSAR Section 17.5 the "DCD scope" and the "remaining scope" discussion for QA-related RGs (including RG 1.28; RG 1.30, Quality Assurance Requirements for the Installation, Inspection, and Testing of

Instrumentation and Electric Equipment (Safety Guide 30)”; RG 1.33, “Quality Assurance Program Requirements (Operation),” Revision 2; RG 1.38, “Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants,” Revision 2; RG 1.39, “Housekeeping Requirements for Water-Cooled Nuclear Power Plants,” Revision 2; RG 1.94, “Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants,” Revision 1; and RG 1.116, “Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems”). In addition, the applicant proposed to revise the VEGP COL FSAR, Appendix 1AA Note (c) to clarify the purpose of a “General” entry under the column labeled “section Criteria” discussion. It is stated that a “Criteria Section” entry of “General” indicates a scope for the conformance statement of “all regulatory guide positions related to programmatic and/or operational aspects.” Thus an associated conformance statement of “Conforms” indicates that the applicant “complies with all regulatory guide positions related to programmatic and or/or operational aspects.” The proposed clarifications clearly provide the scope of conformance to the RGs and, therefore, they are acceptable. The staff verified that the VEGP COL FSAR was updated to reflect above. The staff considers Open Item 1.4-2 resolved for VEGP.

- PTN COL 1.9-1

In comparing VEGP COL FSAR Table 1.9-201 and Appendix 1AA to the respective tables in the Turkey Point Units 6 and 7 COL FSAR, the staff notes that there are several differences. These differences are associated with site-specific information and are reflected in the Turkey Point Units 6 and 7 COL FSAR by a “Turkey Point COL 1.9-1” designation. The staff reviewed the site-specific differences in Table 1.9-201 and Appendix 1AA and has determined that the Turkey Point COL 1.9-1 information in these tables was updated consistently with the update provided for the standard information; therefore, the staff considers the standard content open item as it relates to issues associated with the site-specific information resolved.

- STD COL 1.9-2, PTN COL 1.9-2, STD COL 1.9-3, and STD SUP 1.9-1

The following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP SER:

- *STD COL 1.9-2 (related to the first un-numbered COL information item identified at the end of DCD Table 1.8-2)*

Regarding demonstration of operating experience from Bulletins and GLs, as required by 10 CFR 52.79(a)(37), BLN COL FSAR Table 1.9-204 provides a list of Bulletins and GLs, the appropriate BLN COL FSAR cross-references, and whether the subject matter was addressed in the DCD. The technical discussions related to the specific safety issues are addressed in the related sections of the BLN COL FSAR and are addressed in Chapters 2 through 19 of this SER as needed.

The evaluation of GSI 163, "Multiple Steam Generator Tube Leakage," is described below because otherwise its evaluation would be spread across several SER chapters.

GSI 163 identified a safety concern associated with the potential multiple steam generator (SG) tube leaks triggered by a main steamline break outside containment that cannot be isolated. The issue was evaluated as part of the AP1000 DCD review and was resolved for the AP1000 design. The evaluation was documented in NUREG-1793, Chapter 20. The evaluation states in part the following:

The staff agrees that the issue should be closed for the AP1000 design. Issue 163 concerns the possibility that a multiple steam generator tube rupture (SGTR), resulting from a main steam line break and degraded SG tubes, could result in core damage due to depletion of the reactor coolant and safety injection fluid in the refueling water storage tank. For the AP1000 design, an SGTR is mitigated using the passive core cooling system, initially through the passive residual heat removal heat exchanger, and the core makeup tanks (CMTs). After the CMTs drain to the low level to actuate the automatic depressurization system, the reactor coolant depressurization would result in gravity injection from the in containment refueling water storage tank (IRWST), and eventually from the containment recirculation. The scenario that the safety injection from the refueling water storage tank, which is outside the containment in the existing plants, will be depleted to result in core damage is not likely for the AP1000 design because the IRWST and containment recirculation will continue to provide core cooling.

Since the resolution of Issue 163 is an ongoing NRC effort, any future requirements for the resolution of this issue will be required of the COL applicant, if applicable to the AP1000 design.

Subsequent to the original issuance of NUREG-1793, GSI 163 was closed via a July 16, 2009, memorandum. In the safety evaluation accompanying the closure of the issue, the following is stated:

the staff concludes that the technical specification requirements relating to SG tube integrity provide reasonable assurance that all tubes will exhibit acceptable structural margins against burst or rupture during normal operation and DBAs (including MSLB [main steam line break]), and that leakage from one or multiple tubes under DBAs will be limited to very small amounts, consistent with the applicable regulations for offsite and control room dose.

Therefore, in addition to the unique design features of the AP1000 cited in NUREG-1793 and its supplements as a basis for closure of the issue, the staff notes that for PWR designs in general the issue is resolved based on the technical specification requirements. The staff discusses these technical

specification requirements in Section 5.4, "Component and Subsystem Design," of this SER. Based on the evaluation in NUREG-1793 and its supplements, and based on the staff's evaluation of the SG tube surveillance program in Section 5.4 of this SER, the staff considers GSI 163 resolved for VEGP.

- STD COL 1.9-3

Regarding consideration of new and generic safety issues as required by 10 CFR 52.79(a)(17) and 10 CFR 52.79(a)(20), BLN COL FSAR Table 1.9-203, provides a listing of the TMI Action Plan items, Task Action Plan items, New Generic Issues, Human Factors issues, and Chernobyl Issues and states how they were considered in the DCD and COL application. The technical discussions related to the specific safety issues are addressed in the related sections of the BLN COL FSAR.

In addition, the applicant provided discussion of four new generic issues: Issue 186 related to heavy load drops; Issue 189 related to susceptibility of certain containments to early failure from hydrogen combustion; Issue 191 related to PWR sump performance; and Issue 196 related to the use of Boral in long-term dry storage casks for spent reactor fuel.

The applicant identified that neither Issue 189 nor Issue 196 is applicable to the design or application and that therefore neither is addressed in the BLN COL FSAR. Issue 186 states that there are not any planned heavy load lifts outside those described in the DCD; nonetheless, special procedures to address heavy loads are discussed in Subsection 9.1.5.3. Related to Issue 191, the applicant provided a reference to the protective coatings program and containment cleanliness program in Subsections 6.1.2.1.6 and 6.3.8.1 of the BLN COL FSAR, respectively.

Issue 186 and Issue 196 are evaluated in Chapter 9 of this SER. Issues 189 and 191 are evaluated in Chapter 6 of this SER.

- STD SUP 1.9-1

Regarding conformance with regulatory review criteria as required by 10 CFR 52.79(a)(41), BLN COL FSAR Table 1.9-202 provides the applicant's review of conformance with the acceptance criteria of NUREG-0800. The technical discussions related to the specific acceptance criteria of NUREG-0800 are addressed in the related sections of the BLN COL FSAR and addressed in Chapters 2 through 19 of this SER as needed.

- PTN SUP 1.9-1

Turkey Point COL FSAR Table 1.9-202 contains both site-specific and standard information about the application's conformance with NUREG-0800. The technical discussions related to the specific acceptance criteria of NUREG-0800 are addressed in the related sections of the Turkey Point COL FSAR and addressed in Chapters 2 through 19 of this SER, as needed.

- PTN SUP 1.9-2

The applicant clarified that the SAMDA evaluation for the AP1000 in Appendix 1B to the DCD is not incorporated into the Turkey Point COL FSAR; but is addressed in the Turkey Point COL Environmental Report. The staff reviewed this information as part of its development of the Final Environmental Impact Statement. Therefore, no further evaluation is needed for PTN SUP 1.9-2.

The following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP SER:

- *STD SUP 1.9-3*

This COL supplemental item is addressed as VEGP SUP 8.1-2 [PTN SUP 8.1-3] in SER Section 8.1.

Turkey Point COL FSAR Section 1.10

In this section of the application, the applicant provides an assessment of the potential hazards due to construction of one unit on SSCs important to safety for an operating unit, in accordance with 10 CFR 52.79(a)(31).

The following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP SER:

- *STD SUP 1.10-1*

The NRC staff reviewed the information in BLN COL FSAR Table 1.10-201, identifying the potential hazards from construction activities, BLN COL FSAR Table 1.10-202 that cross-references the construction hazard with the impacted SSCs, and BLN COL FSAR Table 1.10-203, identifying the specific managerial and administrative controls to preclude or mitigate the construction hazard. There is the potential that review of other areas of the application could impact the hazards and management programs identified in the Bellefonte application. For example, site runoff from construction of Unit 4, if not properly controlled, could impact the operation of Unit 3. Site runoff is evaluated in Section 2.4 of this report. The staff has not yet completed its review of this application against the requirements of 10 CFR 52.79(a)(31). This is part of Open Item 1.4-3.

In the application, TVA stated that controls within Section 1.10 of the FSAR are not required unless there is an operating unit on the site. To clarify this FSAR commitment, the staff requests TVA to revise the application to positively state these programs will be in place when there is an operating unit on the site. This is Open Item 1.4-4.

Resolution of Standard Content Open Item 1.4-4

In a letter dated July 29, 2009, the applicant proposed to revise VEGP COL FSAR Section 1.10.3 to positively state that these programs will be in place when there is an operating unit on the site. The staff verified that the VEGP COL

FSAR was appropriately updated to include the above. As a result, Open Item 1.4-4 is resolved.

- PTN SUP 1.10-1

The supplemental information states that the power blocks for Turkey Point Units 6 and 7 have a minimum separation of at least 850 feet between plant centerlines and notes that SSCs important to safety are described in Turkey Point COL FSAR Chapter 3 and the LCOs for Turkey Point Units 6 and 7 are identified in Part 4 of the COL application. In the standard portion of Turkey Point COL FSAR Section 1.10, there is a discussion that the primary consideration in setting the 850-foot separation distance is the space needed to support plant construction via the use of a heavy-lift crane.

The site-specific supplemental information is provided to supplement the standard information above and provides with specificity the location of the SSCs and LCOs required by 10 CFR 52.79(a)(31). The staff's review of this SUP item is included in resolution of Open Item 1.4-3.

The following portion of this technical evaluation section is reproduced from of Section 1.4.4 of the VEGP SER:

Resolution of Standard Content Open Item 1.4-3

A new draft ISG-22 has been issued to assist the staff with the evaluation of COL applicants' compliance with the requirements of 10 CFR 52.79(a)(31). The above draft ISG document was made available to the public including the applicant and was discussed at a public meeting on August 26, 2010.

The regulation at 10 CFR 52.79(a)(31) requires, in part, that applicants for a COL intending to construct and operate new nuclear power plants on multi-unit sites provide an evaluation of the potential hazards to the structures, SSCs important to safety for operating units resulting from construction activities on the new units. The requirement in 10 CFR 52.79(a)(31) can be viewed as having two subparts:

- 1. The COL applicant must evaluate the potential hazards from constructing new plants on SSCs important to safety for existing operating plants that are located at the site.*
- 2. The COL applicant must evaluate the potential hazards from constructing new plants on SSCs important to safety for newly constructed plants that begin operation at the site.*

The interim guidance recommends that the applicant provide a construction impact evaluation plan that includes:

- *A discussion of the construction activity identification process and the impact evaluation criteria used to identify and evaluate the construction activities that may pose potential hazards to the SSCs important to safety for operating unit(s).*

- *A table of those construction activities and the potential hazards that are identified using that construction impact evaluation plan, the SSCs important to safety for the operating unit potentially impacted by the construction activity, and expected mitigation method.*
- *Identification of the managerial and administrative controls, such as proposed license conditions that may involve construction schedule constraints or other restrictions on construction activities, that are credited to preclude and/or mitigate the impacts of potential construction hazards to the SSCs important to safety for the operating unit(s).*
- *A discussion of the process for communications and interactions planned and credited between the construction organization and the operations organization to ensure appropriate coordination and authorization of construction activities and implementation of the prevention or mitigation activities as necessary.*
- *A memorandum of understanding or agreement (MOU or MOA) between the COL applicant and the operating unit(s) licensee as a mechanism for communications, interactions, and coordination to manage the impact of the construction activities.*
- *An implementation schedule corresponding to construction tasks or milestones to ensure the plan is reviewed on a recurring basis and maintained current as construction progresses.*

The staff reviewed the VEGP COL FSAR Section 1.10, which provides information to address compliance with 10 CFR 52.79(a)(31). In order to complete the staff's review, in RAI 1.5-2, the staff requested that the applicant to provide a construction impact evaluation plan that includes:

- *A discussion of the process for communications and interactions planned and credited between the construction organization and the operations organization to ensure appropriate coordination and authorization of construction activities and implementation of the prevention or mitigation activities as necessary.*
- *A memorandum of understanding or agreement (MOU or MOA) between the COL applicant and the operating unit(s) licensee as a mechanism for communications, interactions, and coordination to manage the impact of the construction activities.*
- *An implementation schedule corresponding to construction tasks or milestones to ensure the plan is reviewed on a recurring basis and maintained current as construction progresses.*

In addition, the applicant was requested to identify the managerial and administrative controls (VEGP COL FSAR Table 1.10-203) that are credited to

preclude and/or mitigate the impacts of potential construction hazards to the SSCs important to safety for the operating units (VEGP Units 1 and 2).

In a letter dated November 2, 2010, the applicant stated:

- *VEGP COL FSAR Sections 1.10.2 and 13AA will be revised to include the discussion of the process for communications and interactions planned and credited between the construction organization and the operations organization.*
- *The COL applicant and the operating unit(s) licensee are the same entity, thus, no MOU or MOA is considered necessary.*
- *VEGP COL FSAR Sections 1.10.3 and 13AA will be revised to include the discussion of the implementation schedule corresponding to construction tasks or milestones.*
- *VEGP COL FSAR will be revised to indicate that managerial and administrative controls are developed and implemented as work progresses on site. These controls are intended to preclude and/or mitigate the impacts of potential construction hazards to the SSCs important to safety for the operating units.*

*The proposed changes to the VEGP COL FSAR meet the draft guidance of ISG-22 and, therefore, meet the requirements of 10 CFR 50.79(a)(31). The incorporation of the above proposed changes into a future revision of the VEGP COL FSAR is **Confirmatory Item 1.4-2**.*

Resolution of Standard Content Confirmatory Item 1.4-2

Confirmatory Item 1.4-2 is an applicant commitment to revise FSAR Sections 1.10.2 and 1.10.3 and Appendix 13A to address guidance included in ISG-22. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 1.4-2 is now closed.

License Conditions

- *Part 10, License Condition 1, ITAAC*

The applicant proposed that the ITAAC identified in the tables in Appendix B of Part 10 of the VEGP COL application be incorporated into the COL. The proposed license condition also states that after the Commission has made the finding required by 10 CFR 52.103(g), "Operation under a combined license," the ITAAC do not constitute regulatory requirements; except for specific ITAAC, which are subject to a hearing under 10 CFR 52.103(a), their expiration will occur upon final Commission action in such proceeding.

The ITAAC identified in tables in Appendix B of Part 10 of the VEGP COL application are evaluated throughout this SER. The remaining text of the

proposed license condition is already covered by regulatory requirements of 10 CFR 52.103(h). Therefore, there is no need for a license condition.

1.4.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the NRC staff has identified the following FSAR commitment as the responsibility of the licensee:

- **Turkey Point Commitment Number 1.4-1**—A site-specific construction plan and startup schedule will be provided after issuance of the COL.

1.4.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to principal review matters, and there is no outstanding information expected to be addressed in the Turkey Point COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point COL application are documented in NUREG-1793 and its supplements.

1.5 Additional Regulatory Considerations

1.5.1 10 CFR 52.97(a)(1)(iv) Applicant Financial Qualifications and Evaluation of Financial Qualification in Accordance with 10 CFR 50.33

BACKGROUND:

Florida Power and Light Company

According to the COL application, FPL is an investor-owned utility primarily engaged in the generation, transmission, and distribution of electricity in the southern third and almost the entire eastern seaboard of Florida. FPL supplies electric service to approximately 4.5 million customer accounts. There are five FPL power plants at the Turkey Point site: two natural gas/oil steam electric generating units (Units 1 and 2), two pressurized-water reactor nuclear units (Units 3 and 4), and one natural gas, combined-cycle, steam electric generating unit (Unit 5). Additionally, FPL owns and operates the following nuclear power plants:

- St. Lucie Unit 1, near Ft. Pierce, FL
- St. Lucie Unit 2, near Ft. Pierce, FL (85 percent ownership, FPL is authorized to act as agent for the Orlando Utilities Commission of the city of Orlando, Florida and Florida Municipal Power Agency)

The address of the applicant is Florida Power & Light Company, 700 Universe Boulevard, Post Office Box 14000, Juno Beach, FL 33408.

REGULATORY EVALUATION:

The applicant's request for the NRC to issue two combined licenses under Section 103 of the AEA for construction and operation is subject to, among other things, the requirements of the AEA, Subpart C to 10 CFR Part 52, 10 CFR Part 50, and 10 CFR Part 140.

In its review, the NRC staff used guidance in NUREG-1577, "Standard Review Plan on Power Reactor Licensee Financial Qualifications and Decommissioning Funding Assurance," Revision 1, issued February 1999, to evaluate the financial qualifications of the applicant to construct, operate, and decommission the proposed facility.

In addressing foreign ownership, control, or domination (FOCD), the NRC staff used guidance in the Standard Review Plan (SRP), "Foreign Ownership, Control, and Domination of applicants for Reactor Licenses," dated June 1999 (SRP on FOCD) to determine whether the applicant is owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. The NRC published the SRP on FOCD in the *Federal Register* on September 28, 1999 (64 FR 52357-52359).

The staff also used guidance in NUREG-1307, Revision 15, "Report on Waste Burial Charges: Changes in Decommissioning Waste Disposal Costs at Low-Level Waste Burial Facilities," to independently validate the licensee's calculation of the minimum funding needed for decommissioning.

The safety evaluation which follows documents the staff's review and analysis of financial qualifications, decommissioning funding assurance, FOCD, and nuclear insurance and indemnity. FPL has chosen to pursue this application under 10 CFR Part 52.

FINANCIAL QUALIFICATIONS:

Pursuant to 10 CFR 52.77, the application must include all of the information required by 10 CFR 50.33.

Construction:

Pursuant to 10 CFR 50.33(f)(1):

[T]he applicant shall submit information that demonstrates that the applicant possesses or has reasonable assurance of obtaining the funds necessary to cover estimated construction costs and related fuel cycle costs. The applicant shall submit estimates of the total construction costs of the facility and related fuel cycle costs, and shall indicate the source(s) of funds to cover these costs.

Construction Cost Estimate:

Under 10 CFR Part 50, Appendix C, "A Guide for the Financial Data and Related Information Required To Establish Financial Qualifications for Construction Permits and Combined Licenses," Section I.A.1:

[E]ach applicant's estimate of the total cost of the proposed facility has been broken down as follows and be accompanied by a statement describing the bases from which the estimate is derived:

- (a) Total nuclear production plant costs; [and]
- (b) Transmission, distribution, and general plant costs; [and]
- (c) Nuclear fuel inventory cost for first core.

If the fuel is to be acquired by lease or other arrangement than purchase, the application should so state. The items to be included in these categories should be the same as those defined in the applicable electric plant and nuclear fuel inventory accounts prescribed by the Federal Energy Regulatory Commission or an explanation given as to any departure therefrom.

In accordance with 10 CFR 50.33(f) and 10 CFR Part 50, Appendix C, the projected overnight costs for the construction of two AP1000 advanced light water reactors Turkey Point Units 6 and 7 site are outlined below (from Turkey Point Units 6 and 7 COLA, Part 1, Appendix 1A):

ESTIMATED TOTAL CONSTRUCTION COSTS
FOR TURKEY POINT UNITS 6 AND 7
(In 2015 \$)

	TOTAL	
	<u>Low Range</u>	<u>High Range</u>
Total Nuclear Production Plant Costs	\$6,679,486,952	\$9,729,206,579
Transmission, Distribution & General Plant Costs	\$1,739,757,497	\$2,520,144,553
Nuclear Fuel Inventory & Cost for First Core	\$39,598,094	\$48,370,595
TOTAL (OVERNIGHT COST)	\$8,458,842,544	\$12,297,721,727
Interest & Escalation	\$5,241,656,375	\$7,696,339,598
Total w/ Interest & Escalation	\$13,700,498,919	\$19,994,061,325

FPL initially developed the cost estimate by coupling information in the 2005 TVA Bellefonte Study for the ABWR technology with FPL site-specific information. Next, a technology-specific (AP1000) cost estimate was developed in 2010 to reflect current pricing and project features. This cost estimate was consistent with, and at the high end of, the original cost estimate range, following adjustment for the specific reactor technology and annual escalation. The cost estimate range remains consistent with the publicly available cost estimates of other U.S. AP1000 projects.

The construction cost estimate is expressed in term of “overnight cost,” which is a term commonly used in describing the cost of large capital projects.⁹ The applicant presented a combined Unit 6 and Unit 7 cost estimate for plant construction ranging from \$8,458M to \$12,297M. The applicant also escalated these values thereby resulting in an overnight cost ranging between \$13,700M and \$19,994M. Turkey Point Units 6 and 7 are expected to operate at an estimated combined gross electrical power output of approximately 2,200 MWe. Therefore the total overnight cost, including fuel costs as described above, is between \$3,845 and \$5,590 per kWe installed. If staff considered the escalated values, the cost range would be \$6,227 and \$9,088 per kWe. This value is derived by dividing the overnight cost per unit by the MWe output per unit. As noted above, the applicant has used, in part, a Westinghouse/Shaw consortium to develop technology-specific cost estimate in 2010.

The NRC staff compared the FPL AP1000 overnight construction cost estimate to cost estimates from a number of studies¹⁰ that have been conducted by governmental agencies, universities, and other entities. In particular, the U.S. Energy Information Administration’s (EIA) June 2012 report, “Annual Energy Outlook 2012 with Projections to 2035,” (DOE/EIA-0383(2012)), states that “the overnight capital costs associated with building a nuclear power plant planned in 2012 are assumed to be \$5,335 per kilowatt of capacity...” The staff applied a conservative annual adjustment factor ranging from 3% to 10% to the EIA overnight capital cost estimate to account for inflation beyond 2012, and determined that the EIA projected 2015 overnight cost would range from \$5,830 to \$7,101/kWe installed. The applicant’s overnight cost estimate range is in line with the most recent EIA 2012 range of overnight costs as adjusted for inflation. The staff determined that the FPL overnight construction cost estimate was consistent with studies of these costs identified above. Further, the FPL cost estimate is consistent with the publicly available cost estimates of other U.S. AP1000 projects. Accordingly, the NRC staff finds FPL’s overnight cost estimate to be reasonable as presented in its COL application.

Sources of Construction Funds:

Pursuant to 10 CFR Part 50, Appendix C, Section I.A.2:

The application should include a brief statement of the applicant's general financial plan for financing the cost of the facility, identifying the source or sources upon which the applicant relies for the necessary construction funds, e.g., internal sources such as undistributed earnings and depreciation accruals, or external sources such as borrowings.

According to the COL application, FPL expects to recover the cost of constructing the facility in accordance with Florida Statute 366.93, “Cost Recovery for the Siting, Design, Licensing, and Construction of Nuclear and Integrated Gasification Combined Cycle Power Plants,” and Florida Administrative Code R.25-6.0423, “Nuclear or Integrated Gasification Combined Cycle Power Plant Cost Recovery.” FPL expects to finance this project through a mixture of internally generated cash and external funding. The external funding will come from a mix of debt and equity capital. FPL currently uses first mortgage bonds and equity contributions from NextEra

⁹ Overnight cost is the cost of a construction project if no interest was incurred during construction, as if the project was completed “overnight.” An alternate definition is: the present value cost that would have to be paid as a lump sum up front to completely pay for a construction project. The overnight cost is frequently used when describing power plants.

¹⁰ See, e.g., the 2003 (updated in 2009) the Massachusetts Institute of Technology (MIT) interdisciplinary study entitled *The Future of Nuclear Power*; the U.S. Department of Energy’s Energy Information Agency (EIA) 2012 Annual Energy Outlook (AEO); the Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development 2005 update on *Projected Costs of Generating Electricity*; and the Keystone Center 2007 report entitled *Nuclear Power Joint Fact-Finding*.

Energy, Inc. to finance long-term utility assets. The staff concludes that both FPL and NextEra Energy have sufficient financing capacity to fund this project from the following sources: internally generated operating cash flows, commercial paper and bank facilities, and long-term debt and equity capital markets; and will recover the cost of constructing the facility in accordance with Florida Statute 366.93 and Florida Administrative Code R.25-6.0423.

Financial Qualifications

Pursuant to 10 CFR Part 50, Appendix C, Section I.A.3:

The application should also include the applicant's latest published annual financial report, together with any current interim financial statements that are pertinent. If an annual financial report is not published, the balance sheet and operating statement covering the latest complete accounting year together with all pertinent notes thereto and certification by a public accountant should be furnished.

FPL filed financial statements with the FPSC and the U.S. Securities and Exchange Commission (SEC) at the time they submitted the COL application. FPL submitted, pursuant to 10 CFR Part 50, Appendix C, Section I.A.3, annual financial statements. The NRC staff did not identify anything in FPL's financial statements that warranted further inquiry.

In consideration of the foregoing, the NRC staff finds that the applicant has demonstrated that it possesses or has reasonable assurance of obtaining the funds necessary to cover estimated construction costs and related fuel cycle costs. Therefore, the NRC staff finds that the applicant is financially qualified to construct the facilities.

Operating License

Pursuant to 10 CFR 50.33(f)(3),

If the application is for a combined license under subpart C of part 52 of this chapter, the applicant shall submit the information described in paragraphs (f)(1) and (f)(2) of this section.

10 CFR 50.33(f) provides that each application shall state:

[e]xcept for an electric utility applicant for a license to operate a utilization facility of the type described in 10 CFR 50.21(b) or 50.22, information sufficient to demonstrate to the Commission the financial qualification[s] of the applicant to carry out, in accordance with the regulations in this chapter, the activities for which the permit or license is sought.

10 CFR 50.2, "Definitions" states, in part, that an electric utility is:

[a]ny entity that generates or distributes electricity and which recovers the cost of this electricity, either directly or indirectly, through rates established by the entity itself or by a separate regulatory authority.

According to the information provided in the application, FPL is an electric utility as defined in 10 CFR 50.2. FPL is an investor-owned electric utility primarily engaged in the generation, transmission, and distribution of electricity and serves approximately 4.5 million customer accounts in the state of Florida. FPL is a regulated public utility and is subject to the regulatory provisions of the FPSC, the NRC, and the Federal Energy Regulatory Commission.

In consideration of the foregoing, the NRC staff finds that the applicant is an electric utility as defined in 10 CFR 50.2 and therefore is not subject to the financial qualification information requirements of 10 CFR 50.33(f)(2). Accordingly, the applicant is not required to provide financial qualification information related to operating cost recovery.

DECOMMISSIONING FUNDING ASSURANCE:

Regulatory Requirements:

Pursuant to 10 CFR 50.33(k)(1):

[A]n application for [a ...] combined license for a production or utilization facility, information in the form of a report, as described in 10 CFR 50.75, indicating how reasonable assurance will be available to decommission the facility.

Under 10 CFR 50.75, "Reporting and recordkeeping for decommissioning planning," the report must include a certification that the applicant will provide financial assurance for decommissioning using one or more of the methods allowed under the regulation at 10 CFR 50.75(e) no later than 30 days after the Commission publishes notice in the *Federal Register* under 10 CFR 52.103(a). In addition, the amount of the financial assurance may be more, but not less, than the amount stated in the table in 10 CFR 50.75(c)(1), as adjusted under 10 CFR 50.75(c)(2). Under 10 CFR 50.75(b)(4), a COL applicant need not obtain a financial instrument appropriate to the method to be used or submit a copy of the instrument to the Commission. (Once the COL is granted, the holder of a COL must submit an instrument as provided in 10 CFR 50.75(e)(3)).

Additionally, the staff used the guidance in NUREG-1577, Rev. 1, in its review of the Turkey Point Units 6 and 7 COL application.

Decommissioning Funding Estimate:

Turkey Point is a two-unit PWR site that is incorporating by reference the Westinghouse AP1000 certified design, as documented in the referenced DCD including any supplemental material.

FPL stated that it will provide decommissioning funding assurance in an amount of \$517 million per unit. The NRC staff independently calculated the minimum funding acceptable under 10 CFR 50.75(c), and found the applicant's amounts acceptable.

Decommissioning Funding Mechanism:

FPL stated in the application that it would use an external sinking fund in the form of a trust as the method to provide decommissioning funding assurance. Under 10 CFR 50.75(e)(1)(ii), an external sinking fund may be used as an exclusive method by a:

. . . licensee that recovers, either directly or indirectly, the estimated total cost of decommissioning through rates established by 'cost of service' or similar ratemaking regulation.

The NRC staff will verify the adequacy of the decommissioning funding mechanism and prospective financial instrument in the future consistent with the schedule, set forth in 10 CFR 50.75(e)(3), for the submission of reports by a holder of a combined license.

Therefore, the NRC staff finds that FPL has complied with applicable decommissioning funding assurance requirements.

ANTITRUST REVIEW:

The *Energy Policy Act of 2005* (EPAct) removed the antitrust review authority in Section 105c. of the AEA, as amended, regarding license applications for production or utilization facilities submitted under Sections 103 or 104b. of the AEA after the date of enactment of the EPAct. Accordingly, the NRC is not authorized to conduct an antitrust review in connection with this COL application.

FOREIGN OWNERSHIP, CONTROL, OR DOMINATION (FOCD):

Section 103 of the AEA, in relevant part, prohibits the Commission from issuing a license for a nuclear power plant to:

an alien or any corporation or other entity if the Commission knows or has reason to believe it is owned, controlled, or dominated by an alien, a foreign corporation or a foreign government.

10 CFR 50.38, "Ineligibility of certain applicants," is the regulatory provision that implements this statutory prohibition.

The NRC staff reviewed the application pursuant to the guidance provided in the SRP on FOCD to determine whether the applicant is owned controlled, or dominated by an alien, a foreign corporation, or a foreign government.

According to the application, FPL is not owned, controlled, or dominated by any alien, foreign corporation, or foreign government. FPL is an investor-owned public utility incorporated under the laws of the state of Florida, with its principal office located in Juno Beach, Florida. FPL is a wholly-owned subsidiary of NextEra Energy, Inc., an investor-owned electric utility. FPL's common stock is held solely by NextEra Energy, Inc. NextEra Energy, Inc. is investor-owned, with 27,994 common stockholders as of January 31, 2010. The shares of common stock of NextEra Energy, Inc. are publicly traded and widely held. The application also contains the names and addresses of the directors and officers of FPL and indicates that all are United States citizens.

Staff conducted an independent analysis, including open-source research and verification of the information provided in the application related to ownership of FPL, and found no evidence of FOCD.

Based on the foregoing, the staff does not know or have reason to believe that FPL is owned, controlled, or dominated by a foreign interest. Therefore, FPL conforms to the guidance provided in the SRP for FOCD and meets the requirements of 10 CFR 50.38.

NUCLEAR INSURANCE AND INDEMNITY:

This section of the SER addresses the applicant's offsite and onsite insurance requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 140, "Financial Protection Requirements and Indemnity Agreements," and 10 CFR 50.54(w), respectively.

The provisions of the Price-Anderson Act (Section 170 of the Atomic Energy Act of 1954, as amended) and the Commission's regulations in 10 CFR Part 140 require, in part, that each holder of a license issued pursuant to 10 CFR Part 52 have and maintain financial protection. Further, 10 CFR 50.54(w) establishes requirements for each power reactor licensee to obtain insurance or provide an equivalent amount of protection for the onsite costs of an accident. Under these regulations, FPL is required to provide satisfactory documentation that it has obtained the amount of financial protection required by (1) 10 CFR 140.13, "Amount of financial protection required of certain holders of construction permits and combined licenses under 10 CFR Part 52," (2) 10 CFR 140.11(a)(4), and (3) 10 CFR 50.54(w). In addition, each licensee is required to have and maintain financial protection under 10 CFR 140.11(a)(4) and shall provide evidence that it maintains a guarantee of payment of deferred premiums pursuant to 10 CFR 140.21, "Licensee guarantees of payment of deferred premiums." Finally, as required by 10 CFR 140.20, "Indemnity agreements and liens," the NRC staff will amend FPL's current indemnity agreement for existing Turkey Point Units 3 and 4 to include the addition of Turkey Point Units 6 and 7.

The regulation in 10 CFR 140.13 provides the amount of financial protection required by a Part 52 license holder, who also holds a license under 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," during the period before the Commission makes the finding under 10 CFR 52.103(g) (i.e., a finding that the acceptance criteria in the license are met, which allows the licensee to initially load fuel and operate). Because the 10 CFR Part 70 license will be issued with the COL, FPL must have and maintain \$1,000,000 in financial protection from issuance of the COL until the 10 CFR 52.103(g) finding is made. In addition, as required by 10 CFR 140.11(a)(4), after the 10 CFR 52.103(g) finding is made, each licensee must have and maintain financial protection in an amount equal to the sum of primary financial protection (\$375,000,000) and the amount available as secondary financial protection. By letter dated June 14, 2016 (ADAMS Accession No. ML16169A294), FPL provided proof of insurance coverage from American Nuclear Insurers (ANI) in the amount of \$375 million. Currently, ANI insures Turkey Point Units 3 and 4, Turkey Point Units 6 and 7 are covered under the same policy. This coverage will be effective concurrent with the NRC's issuance of a COL to FPL. Therefore, the staff concludes that the \$375,000,000 coverage satisfies the \$1,000,000 requirement of 10 CFR 140.13, and the primary financial protection requirement in 10 CFR 140.11(a)(4).

The staff notes that although licensees of large operating reactors under 10 CFR Part 50 and 10 CFR Part 52 must have and maintain financial protection under 10 CFR 140.11(a)(4) upon NRC action authorizing operation, the timing provisions for reporting under 10 CFR 140.21 do not explicitly address the 10 CFR Part 52 process. Under the requirements in 10 CFR 140.11(a)(4) and 10 CFR 140.21, the coverage for secondary financial protection and the guarantee of payment of deferred premiums are only required for reactors authorized to load fuel and operate. Under the 10 CFR Part 52 COL process, the license authorizes operation only upon a Commission finding pursuant to 10 CFR 52.103(g). Therefore, these requirements apply as of the date that the Commission makes such a finding. While 10 CFR 50.54(w) by its terms applies upon a Commission finding under 10 CFR 52.103(g), FPL also included a reporting requirement for 10 CFR 50.54(w) in its proposed condition.

FPL proposed the following license condition to address the reporting of 10 CFR Section 140.11(a)(4) requirements for secondary financial protection, and the reporting of 50.54(w) requirements for onsite financial protection. The staff agrees with the proposed license condition with modifications. The staff's recommended license condition is as follows:

License Condition (1-1) - Before the scheduled date for initial fuel load, and within ninety (90) days after the NRC publishes the notice of intended operation in the *Federal Register*, FPL shall provide satisfactory documentary evidence to the Director of the Office of Nuclear Reactor Regulation or the Director's designee that it has obtained the appropriate amount of primary and secondary financial protection required of licensees pursuant to 10 CFR 140.11(a)(4) and the appropriate amount of financial protection required by 10 CFR 50.54(w).

With the license condition as described above, the staff concludes that FPL will satisfy the requirements of 10 CFR 140.11(a)(4) with respect to obtaining an appropriate amount of secondary financial protection and 10 CFR 50.54(w) with respect to obtaining the appropriate amount of financial protection. The staff notes that it will conform any license condition to the correct format if the Commission determines to issue the license. For example, the staff may change "the Director of the Office of Nuclear Reactor Regulation" to "the Director of the Office of New Reactors" and other similar changes.

FPL also proposed the following license condition to address the reporting of 10 CFR 140.21 for guarantee of payment of deferred premiums. The staff agreed with the proposed license condition with modifications. The staff's recommended license condition is stated below:

License Condition (1-2) - Before the scheduled date of initial fuel load, and within 90 days after the NRC publishes the notice of intended operation in the *Federal Register*, the licensees shall provide evidence to the NRC that they would have the ability to pay into the nuclear industry retrospective rating plan in the event of a nuclear incident and in the amount specified in 10 CFR 140.11(a)(4) for one calendar year using one of the following methods:

- a. Surety bond
- b. Letter of credit
- c. Revolving credit/term loan arrangement
- d. Maintenance of escrow deposits of government securities, or
- e. Annual certified financial statement showing either that a cash flow (i.e., cash available to a company after all operating

expenses, taxes, interest charges, and dividends have been paid) can be generated and would be available for payment of retrospective premiums within three (3) months after submission of the statement, or a cash reserve or a combination of cash flow and cash reserve.

Thereafter, FPL shall provide evidence of the guarantees of payment of deferred premiums in accordance with the provisions specified in 10 CFR 140.21.

With the license condition as described above, the staff concludes that that FPL will satisfy the requirement in 10 CFR 140.21.

In consideration of the staff's evaluation and license conditions as described above, the staff concludes that FPL will satisfy the provisions of the Price-Anderson Act (Section 170 of the Atomic Energy Act of 1954, as amended) and the Commission's applicable regulations in 10 CFR Part 140, 10 CFR Part 52, and 10 CFR Part 50 for insurance and indemnity.

CONCLUSION:

In consideration of the staff's evaluation and license conditions as described above, the staff finds that FPL satisfies the provisions of the Price-Anderson Act (Section 170 of the Atomic Energy Act of 1954, as amended) and the Commission's applicable regulations in 10 CFR Part 140, 10 CFR Part 50, and 10 CFR Part 52 for insurance and indemnity. As presented in its application, FPL also conforms with the staff's guidance in NUREG-1577 and the Standard Review Plan on Foreign Ownership, Control or Domination. Accordingly, staff concludes that FPL is financially qualified to engage in the proposed activities for Turkey Point Units 6 and 7, and that there are no decommissioning funding assurance or foreign ownership, control, or domination issues.

1.5.2 Nuclear Waste Policy Act

Section 302(b) of the Nuclear Waste Policy Act of 1982, as amended, states,

The Commission, as it deems necessary or appropriate, may require as a precondition to the issuance or renewal of a license under section 103 or 104 of the Atomic Energy Act of 1954 [42 U.S.C. 2133, 2134] that the applicant for such license shall have entered into an agreement with the Secretary for the disposal of high-level radioactive waste and spent nuclear fuel that may result from the use of such license.

As listed in Table 1.2-1 of the Turkey Point COL application Environmental Report, FPL has contracts with the U.S. Department of Energy (DOE) establishing the terms and conditions applicable to the DOE's responsibility for disposal of spent nuclear fuel generated at the proposed Turkey Point Units 6 and 7. The DOE contract numbers referenced in the table are DE-CR01-09RW9012 for Turkey Point Unit 6 and DE-CR01-09RW9013 for Turkey Point Unit 7.

Because FPL has entered into contracts with the DOE for the disposal of spent nuclear fuel for Turkey Point Units 6 and 7, the staff considers that FP has met the applicable requirements of Section 302(b) of the Nuclear Waste Policy Act of 1982.

1.5.3 Consultation with Department of Homeland Security and Notifications

1.5.3.1 Consultation with Department of Homeland Security

In accordance with Section 657 of the EPAct, the NRC consulted with the Department of Homeland Security (DHS) with respect to the FPL COL application for Turkey Point Units 6 and 7. Between December 1, 2009, and December 3, 2009, DHS conducted a site visit. On August 2, 2010, NRC issued a DHS consultation report regarding the DHS site visit (ADAMS Accession No. ML101890846). The DHS report concludes that the applicant and the NRC staff have satisfied the requirements of Section 657 of the EPAct.

1.5.3.2 Notifications

As required by Section 182c of the AEA, as amended, and 10 CFR 50.43(a), the NRC notified the Public Service Commission of Florida of the Turkey Point COL application (ADAMS Accession No. ML16182A212). In addition, in July 2008, the NRC published notices of the application in *Total Leader* and *South Dade News Leader*. In accordance with Section 182c., the staff also published a notice of the application in the Federal Register on November 18, November 25, December 2, and December 9, 2011 (76 FR 71608, 72725, 75566, and 77021).

Based on the staff's completion of notifications to regulatory agencies and the public notices described above, the staff concludes that, for the purposes of issuing COLs for Turkey Point Units 6 and 7, any required notifications to other agencies or bodies have been duly made.

1.5.4 Evaluation of Departures and Exemption Associated with Numbering in the Application and Exemption Associated with Special Nuclear Material Material Control and Accounting Program

Evaluation of Departures and Exemption Associated with Numbering in the Application

In STD DEP 1.1-1, the applicant renumbered Turkey Point COL FSAR sections to include content consistent with RG 1.206 and NUREG-0800. The departure and the exemption associated with the numbering scheme of the FSAR are closely related. The departure provided in Part 7 of the COL application provides the specific sections of the Turkey Point COL FSAR that deviate from the DCD numbering scheme.

Pursuant to 10 CFR 52.7, "Specific Exemptions," and 10 CFR 52.93, "Exemptions and Variances," the applicant requested an exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.a, to include "a plant-specific DCD containing the same type of information and using the same organization and numbering as the generic DCD for the AP1000 design...." In Part 7, "Departures and Exemptions," of the Turkey Point COL application, the applicant states that the exemption will not result in any significant departures from the expected organization and numbering of a typical FSAR, and the information is readily identifiable to facilitate NRC review. The applicant states that the subject deviations are considered purely administrative to support a logical construction of the document. Further, the revised organization and numbering generally follows the guidance provided in RG 1.206 and NUREG-0800.

Pursuant to 10 CFR 52.7, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 52. 10 CFR 52.7 further states that the Commission's consideration will be governed by

10 CFR 50.12, "Specific exemptions," which states that an exemption may be granted when: (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) special circumstances are present. Special circumstances are present whenever, according to 10 CFR 50.12(a)(2)(ii), "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

Before considering whether this numbering exemption should be granted, the staff needed to address a threshold question regarding the review standard applicable to the request. Under 10 CFR 52.93(a)(1), if a request for an exemption is from any part of a DC rule, then the Commission may grant the exemption if the exemption complies with the appropriate change provision in the referenced DC rule, or if there is no applicable change provision, if the exemption complies with 10 CFR 52.63. Here, there is no applicable change provision in the referenced DC rule, so according to 10 CFR 52.93(a)(1), the exemption must meet 10 CFR 52.63. However, the standards of the appropriate provision of 10 CFR 52.63 applicable to requests for exemptions from a DC rule in 10 CFR 52.63(b)(1), by their terms, also do not apply to this change. Specifically, 10 CFR 52.63(b)(1) applies to changes to "certification information," and not administrative or procedural DC rule provisions such as this one under consideration. In the Statements of Consideration for 10 CFR 52.63, the Commission stated that it used the "phrase 'certification information' in order to distinguish the rule language in the DCRs from the DC information (e.g., Tier 1 and Tier 2) that is incorporated by reference in the DCRs," (72 FR 49444). The exemption requested from the AP1000 DCD numbering scheme is an exemption from rule language, not Tier 1 or Tier 2 information; therefore, 10 CFR 52.63 should not be used to analyze this exemption.

Because there is not an applicable change provision in the referenced DC, and because 10 CFR 52.63(b)(1) does not apply to this exemption, the exemption cannot comply with the plain language of 10 CFR 52.93(a)(1). In this situation, the language of 10 CFR 52.93(a)(1) does not appear to serve the underlying purpose of the regulation as described by the Commission in the Statements of Consideration to the rule, in which the Commission stated that only changes to certification information must meet 10 CFR 52.63. Instead, this exemption should have fallen under 10 CFR 52.93(a)(2), and, thus, be analyzed under the requirements in 10 CFR 52.7. Therefore, the staff finds that, pursuant to 10 CFR 52.7, an exemption to 10 CFR 52.93(a)(1) should be granted. This exemption is warranted because it meets the requirements in 10 CFR 50.12. First, because this is an administrative change regarding what exemption regulation applies, the exemption to 10 CFR 52.93(a)(1) is authorized by law, will not present an undue risk to public health or safety, and is consistent with the common defense and security. In addition, application of the regulation in this case is not necessary to achieve the underlying purpose of the rule. The underlying purpose of the rule is to maintain the safety benefits of standardization by requiring any exemption from certification information to meet the requirements in 10 CFR 52.63(b)(1). This underlying purpose does not apply to this exemption because the form and organization of the application does not affect the safety benefits of standardization of the certification information. Therefore, for the purpose of determining the standards applicable to the exemption related to STD DEP 1.1-1, the staff finds an exemption to 10 CFR 52.93(a)(1) to be acceptable for the review of the exemption related to STD DEP 1.1-1.

Pursuant to the exemption described above, the NRC staff has reviewed the exemption related to STD DEP 1.1-1 to determine whether it meets the requirements in 10 CFR 52.7. This exemption would allow the applicant to provide an FSAR with numbering and topics more closely related to NUREG-0800 and RG 1.206. The staff finds that this administrative change of

minor renumbering will not present an undue risk to the public health and safety and is consistent with the common defense and security. In addition, this exemption is consistent with the AEA and is authorized by law. Further, the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule. Therefore, the staff finds that the exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.a is justified. Finally, for the same reasons the staff is granting the exemption request, the staff also finds the departure from the numbering scheme in the Turkey Point COL FSAR to be acceptable.

Exemption Associated with Special Nuclear Material Material Control and Accounting Program

In Part 7 of the Turkey Point COL application, the applicant requested an exemption from the requirements of 10 CFR 70.22(b), 10 CFR 70.32(c) and, in turn, 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51. The provision of 10 CFR 70.22(b) requires an application for a license for SNM to include a full description of the applicant's program for MC&A of SNM under 10 CFR 74.31, 10 CFR 74.33, 10 CFR 74.41, or 10 CFR 74.51.¹¹ 10 CFR 70.32(c) requires a license authorizing the use of SNM to include and be subjected to a condition requiring the licensee to maintain and follow an SNM MC&A program as required under 10 CFR Part 74 Subparts C through E and to request Commission approval prior to implementing program changes. However, 10 CFR 70.22(b), 10 CFR 70.32(c), 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51 include exceptions for nuclear reactors licensed under 10 CFR Part 50. The regulations applicable to the MC&A of SNM for nuclear reactors licensed under 10 CFR Part 50 are provided in 10 CFR Part 74, Subpart B and 10 CFR 74.11 through 10 CFR 74.19 (excluding 10 CFR 74.17). The applicant stated that the purpose of this exemption request is to seek a similar exception for this COL under 10 CFR Part 52, such that the same regulations will be applied to the SNM MC&A program as nuclear reactors licensed under 10 CFR Part 50. In addition, the applicant stated that the exemption request is evaluated under 10 CFR 52.7, which incorporates the requirements of 10 CFR 50.12. As stated previously, that section allows the Commission to grant an exemption under the following conditions: 1) the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security and 2) special circumstances are present as specified in 10 CFR 50.12(a)(2). The criteria in 10 CFR 50.12 encompass the criteria for an exemption in 10 CFR 70.17(a) and 10 CFR 74.7, the specific exemption requirements for 10 CFR Parts 70 and 74, respectively. Therefore, by demonstrating that the exemption criteria in 10 CFR 50.12 are satisfied, this request would also demonstrate that the exemption criteria in 10 CFR 52.7, 10 CFR 70.17(a), and 10 CFR 74.7 are satisfied.

The applicant stated that the subject exemption would allow nuclear reactors licensed under 10 CFR Part 52 to be explicitly excepted from the requirements of 10 CFR 70.22(b), 10 CFR 70.32(c), 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51. There is no technical or regulatory basis to treat nuclear reactors licensed under 10 CFR Part 52 differently than reactors licensed under 10 CFR Part 50 with respect to the MC&A provisions in 10 CFR Part 74. As indicated in the Statement of Considerations for 10 CFR 52.0(b) (72 *Federal Register* 49352, 49372, 49436 (August 28, 2007)), applicants and licensees under 10 CFR Part 52 are subject to all of the applicable requirements in 10 CFR Chapter I, whether or not those provisions explicitly mention a COL under 10 CFR Part 52. This regulation clearly indicates that plants licensed under 10 CFR Part 52 are to be treated no differently than plants licensed under

¹¹ While not including an explicit exception for 10 CFR Part 50 reactors, 10 CFR 74.33 applies only to uranium enrichment facilities and thus is not directly implicated in this exemption request.

10 CFR Part 50 with respect to the substantive provisions in 10 CFR Chapter I (which includes 10 CFR Parts 70 and 74). In particular, the exception for nuclear reactors licensed under 10 CFR Part 50, as in 10 CFR 70.22(b), 10 CFR 74.31, 10 CFR 74.41, or 10 CFR 74.51, should also be applied to reactors licensed under 10 CFR Part 52.

The staff agrees with the applicant's justification that nuclear reactors licensed under 10 CFR Part 52 should be treated the same as the reactors licensed under 10 CFR Part 50 regarding the MC&A for SNM.

Pursuant to 10 CFR 70.17(a), the Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

In addition, pursuant to 10 CFR 74.7, the Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security, and are otherwise in the public interest.

Pursuant to 10 CFR 52.7, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 52. 10 CFR 52.7 further states that the Commission's consideration will be governed by 10 CFR 50.12, "Specific exemptions," which states that an exemption may be granted when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security and (2) when special circumstances are present. Special circumstances are present whenever, according to 10 CFR 50.12(a)(2)(ii), "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

The NRC staff reviewed the subject exemption, which will allow the applicant to have a similar exception for the COL under 10 CFR Part 52, such that the same regulations will be applied to the SNM MC&A program as nuclear reactors licensed under 10 CFR Part 50, and determined that this requested exemption will not present an undue risk to the public health and safety and is otherwise in the public interest. In addition, this exemption is consistent with the AEA and is authorized by law. Therefore, granting this exemption will not adversely affect the common defense and security. Further, the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule. Since the exemption criteria in 10 CFR 50.12 are satisfied, the staff considers that this request also demonstrates that the exemption criteria in 10 CFR 52.7, 10 CFR 70.17(a), and 10 CFR 74.7 are satisfied. Therefore, the staff finds that the exemption from 10 CFR 70.22(b), 10 CFR 70.32(c) and, in turn, 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51, is justified.

1.5.5 Receipt, Possession, Use, and Transport of Source, Byproduct and Special Nuclear Material Authorized by 10 CFR Part 52 Combined Licenses

In Part 1, "General and Financial Information," of the COL application, FPL requested material licenses for receipt, possession, and use of source, byproduct, and SNM in accordance with Commission regulations in 10 CFR Parts 30, 40, and 70. The reviews that the NRC conducted for compliance with the requirements of 10 CFR Part 52 to support the issuance of the COL

encompass those reviews necessary to support granting 10 CFR Parts 30, 40, and 70 licenses. In this respect, the 10 CFR Part 52 COLs for Turkey Point will be consistent with the approach to 10 CFR Parts 30, 40, and 70 licensing followed for operating licenses for nuclear power plants licensed in accordance with 10 CFR Part 50. The staff considered the following standard license provisions for the Turkey Point COL as it relates to authorization pursuant to the regulations in 10 CFR Parts 30, 40, and 70:¹²

Subject to the conditions and requirements incorporated herein, the Commission hereby licenses FPL:

- (1) (a) pursuant to the Act and 10 CFR Part 70, to receive and possess at any time, special nuclear material as reactor fuel, in accordance with the limitations for storage and in amounts necessary for reactor operation, described in the FSAR, as supplemented and amended;
- (b) pursuant to the Act and 10 CFR Part 70, to use special nuclear material as reactor fuel, after a Commission finding under 10 CFR 52.103(g) has been made, in accordance with the limitations for storage and amounts necessary for reactor operation, described in the FSAR, as supplemented and amended;
- (2) (a) pursuant to the Act and 10 CFR Parts 30 and 70, to receive, possess, and use, at any time before a Commission finding under 10 CFR 52.103(g), such byproduct and special nuclear material (but not uranium hexafluoride) as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts not exceeding those specified in 10 CFR 30.35(d) and 10 CFR 70.25(d) for establishing decommissioning financial assurance, and not exceeding those specified in 10 CFR 30.72 and 10 CFR 70.22(i)(1);
- (b) pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use, after a Commission finding under 10 CFR 52.103(g), any byproduct, source, and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as necessary;
- (3) (a) pursuant to the Act and 10 CFR Parts 30 and 70, to receive, possess, and use, before a Commission finding under 10 CFR 52.103(g), any byproduct or special nuclear material (but not uranium hexafluoride) that is (1) in unsealed form; (2) on foils or plated surfaces, or (3) sealed in glass, for sample analysis or instrument calibration or other activity associated with radioactive apparatus or components; in amounts not exceeding those specified in 10 CFR 30.35(d) and 10 CFR 70.25(d) for establishing

¹² These proposed standard license conditions that the staff considered are based on similar license conditions found in the draft Combined Licenses for LNP Units 1 and 2.

decommissioning funding assurance, and not exceeding those specified in 10 CFR 30.72 and 10 CFR 70.22(i)(1);

(b) pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use, after a Commission finding under 10 CFR 52.103(g), in amounts as necessary, any byproduct, source, or special nuclear material (but not uranium hexafluoride) without restriction as to chemical or physical form, for sample analysis or instrument calibration or other activity associated with radioactive apparatus or components; and

(4) pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

The staff notes that Turkey Point COL FSAR Table 13.4-201, "Operational Programs Required by NRC Regulations," provides milestones for the implementation of various operational programs. Important milestone dates for various operational programs that support issuance of the license and requirements relative to 10 CFR Parts 30, 40, and 70 include the following:

- Fire Protection Program—prior to initial receipt of byproduct, source, or SNM (excluding exempt quantities as described in 10 CFR 30.18, "Exempt quantities").
- Radiation Protection Program (including as low as is reasonably achievable [ALARA] principles) - prior to initial receipt of byproduct, source, or SNM (excluding exempt quantities as described in 10 CFR 30.18).
- Non-licensed plant staff training program associated with receipt of the radioactive material – prior to initial receipt of byproduct, source, or SNM (excluding exempt quantities as described in 10 CFR 30.18).
- Security Program including physical security, safeguards contingency program, training and qualification program – prior to receipt of fuel onsite (protected area)
- Security Program including physical security, safeguards contingency, and transportation programs – prior to transport or receipt of SNM of low strategic significance
- SNM MC&A Program – prior to receipt of SNM.

As documented in Table 1.3, below, the Turkey Point applicant endorsed VEGP standard content letters related to SNM MC&A.

Table 1-3. Turkey Point Applicant Endorsements of VEGP COL Standard Content Letters

VEGP Letter Date	VEGP Letter ADAMS Accession Number	Turkey Point Endorsement Letter Date	Turkey Point Letter ADAMS Accession Number
July 29, 2009	ML092120064	February 22, 2010	ML100560114

VEGP Letter Date	VEGP Letter ADAMS Accession Number	Turkey Point Endorsement Letter Date	Turkey Point Letter ADAMS Accession Number
October 15, 2010	ML102920120	April 20, 2011	ML11111A127
November 23, 2010	ML103300034	April 19 and 20, 2011	ML11111A127
March 3, 2011	ML110660153	September 14, 2011	ML11259A054
March 16, 2011	ML110800088	September 14, 2011	ML11259A054
March 16, 2011	ML110770137	December 16, 2011	SGI
May 6, 2011	ML11129A155	September 14, 2011	ML11259A054
June 22, 2011	ML11175A169	September 14, 2011	ML11259A054

These letters identify the portions of the Turkey Point COL application that satisfy the basis for meeting the requirements of 10 CFR Parts 30, 40, 70, and 74. Section 1.5.4 of this report addresses the exemption request from the requirements of 10 CFR 70.22(b), 10 CFR 70.32(c) and, in turn, 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point COL FSAR (and other parts of the COL application, as applicable) resulting from RAls.
- The staff confirmed that all responses to RAls identified in the corresponding standard content evaluation were endorsed.
- The staff confirmed that the Turkey Point Units 6 and 7 COL application, Part 11, contains the same SNM MC&A Program description as that submitted by Southern Nuclear Operating Company (SNC) for VEGP Units 3 and 4 in a letter dated November 23, 2010.
- The staff confirmed that the Turkey Point Units 6 and 7 COL application, Part 11, Enclosure 6 contains the same New Fuel Shipping Plan as that submitted by SNC in the VEGP Units 3 and 4 COL application.
- The staff confirmed that the supplemental information in support of 10 CFR Part 70 SNM license application found in Part 11 of the VEGP COL application is identical to the material found in Part 11 of the Turkey Point Units 6 and 7 COL application.
- The staff verified that site-specific differences were not relevant and, where the staff identified relevant differences, the staff performed additional review to determine the acceptability of the differences.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point COL application, with the site-specific exceptions noted. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 1.5.5 of the VEGP SER:

In addition to the evaluation of the implementation milestones noted above, the staff's evaluation of the radiation protection program that supports the issuance of the 10 CFR Parts 30, 40, and 70 licenses is addressed in Chapter 12 of this SER. Additional staff evaluations that support the issuance of the 10 CFR Part 70 license are addressed in Chapter 9 of this SER (i.e., new fuel storage, spent fuel storage, and fire protection programs) and in the staff's evaluation of TVA's security program. The staff finds that the information in the Bellefonte COL application to support granting of the 10 CFR Part 70 license mentioned as part of the license above is sufficient, pending resolution of the open items in this report related to new and spent fuel, fire protection program, security program, and the implementation of the fire protection and security programs. However, TVA needs to provide a discussion of which parts of its COL application other than the reference to the radiation protection program provide sufficient information to support compliance with the applicable portions of 10 CFR Part 30 and 40, prior to the 10 CFR 52.103(g) finding. This is Open Item 1.5-1.

Resolution of Standard Content Open Item 1.5-1

In letters dated July 29, 2009, July 9, 2010, and October 15, 2010, the applicant provided additional information related to source, byproduct and SNM and its purposes, radiation safety personnel, personnel training, facilities and equipment, waste management, and the radiation safety program in general.

Subsequent to the issuance of the SER with open items for the BLN application, the staff performed an additional review associated with granting the 10 CFR Parts 30, 40 and 70 licenses. For the 10 CFR Part 70 license, the staff considered SNM associated with the fuel (including security requirements) and SNM associated with non-fuel material (i.e., fission chambers). The staff also considered emergency plan requirements associated with SNM (fuel and non-fuel material). Based on these reviews, standard content Open Item 1.5-1 is resolved. These reviews are described below.

Review of Parts 30 and 40 Materials

In a letter dated March 3, 2011, the applicant provided information regarding specific types of sources and byproduct material, the chemical or physical form, and the maximum amount at any time for the requested material licenses under 10 CFR Parts 30 and 40. The applicant also stated that SNM shall be in the form of reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the VEGP COL FSAR. Byproduct material and source material shall be in the form of sealed neutron sources for reactor startup and sealed sources for reactor instrumentation, radiation monitoring equipment, calibration, and fission detectors in amounts as required. The applicant also committed that no 10 CFR Part 40 specifically licensed source material, including natural uranium, depleted uranium and uranium hexafluoride will be received, possessed, or used during the period between issuance of the COL and the Commission's 10 CFR 52.103(g) finding for each of the VEGP Units 3 and 4. The applicant also stated that the quantity of any byproduct material with atomic numbers 1 through 93 would not exceed 100 millicuries for a single source and 5 Curies total. The maximum quantity for Americium-241 would not exceed 300 millicuries for single source and 500 millicuries total. Following the 10 CFR 52.103(g) finding for each of the VEGP Units 3 and 4, byproduct material, source material, and SNM in amounts as required, without restriction to chemical forms or physical form, would be used for the following:

- *Sample analysis,*
- *Instrument and equipment calibration, and*
- *Associated with radioactive apparatus or components.*

With respect to the requirements of 10 CFR Parts 30, 40, and 70 that are related to radiation protection (including administrative controls), the applicant provided information (in letters dated July 9, and November 23, 2010) on the purpose, storage and security of sources in VEGP COL FSAR Sections 12.2 and 12.5. Information related to the radiation protection program itself, including procedures for the use of these sources, is also described in VEGP COL FSAR Chapter 12. In addition, VEGP COL FSAR Section 13.4 states that the radiation protection program will be implemented according to the milestones listed in VEGP COL FSAR Table 13.4-201, Item 10. These milestones ensure that those portions of the program necessary to comply with the requirements of 10 CFR Parts 20, 30, 40, and 70, are implemented prior to the receipt of byproduct, source, SNM, or fuel, onsite.

The staff finds that the information provided by the applicant that describes the radiation protection measures (Chapter 12 of the VEGP COL FSAR) that will be implemented prior to receipt of byproduct, source or SNM, conforms to the applicable guidance in NUREG-1556, "Consolidated Guidance about Materials Licenses," and is therefore acceptable. The radiation protection program milestones included in the VEGP COL FSAR Table 13.4-201 are evaluated in Section 12.5 of this SER.

In a letter dated July 9, 2010, the applicant provided supplemental information relative to Item 14, Emergency Planning, in VEGP COL FSAR Table 13.4-201.

In addition, the applicant proposed to revise the term 'portions applicable to SNM' to 'portions applicable to radioactive materials' for Item 14; Item 8, Fire Protection Program; Item 11, Non-Licensed Plant Staff Training Program; and Item 15, Physical Security Program. In addition, the applicant proposed to correct the references to regulatory citations of 10 CFR 30.32, "Application for specific licenses"; 10 CFR 40.31, "Application for specific licenses"; and 10 CFR 70.22, "Contents of applications." It also proposed to revise the "Requirements" column for Item 14 of the VEGP COL FSAR Table 13.4-201 to reference 10 CFR 30.32(i)(1), 10 CFR 40.31(j)(1), and 10 CFR 70.22(i)(1). It also proposed to revise Part 10 of the VEGP COL application, Proposed License Condition 3, "Operational Program Implementation," Section C, "Receipt of Materials," to include implementation of the portions of the emergency planning program applicable to SNM. In addition to the evaluation of the implementation milestones noted above, the staff's evaluation that supports the issuance of the 10 CFR Parts 30 and 40 licenses is addressed in Chapter 9 (the fire protection program).

The operational programs are specific programs that are required by regulations. VEGP COL FSAR Table 13.4-201 lists each operational program, the regulatory source for the program, the section of the FSAR in which the operational program is described, and the associated implementation milestone(s). The applicant proposed a license condition in Part 10, License Condition 3, Item C.3 of the VEGP COL application, which provides the milestones for implementing the portions of the non-licensed plant staff training program applicable to receipt of the radioactive material. However, Table 13.4-201 specifies implementation requirements (10 CFR 30.32(a), 10 CFR 40.31(a), and 10 CFR 70.22(a)) for the non-licensed plant staff training program associated with receipt of the radioactive material. Therefore, the staff determined that Item C.3 of proposed License Condition 3 is not needed because the implementation milestones for the non-licensed plant staff training program associated with receipt of radioactive material are governed by the applicable regulations.

The applicant proposed a license condition in Part 10 of the VEGP COL application to provide a schedule to support the NRC's inspection of operational programs, including the non-licensed plant staff training program applicable to receipt of the radioactive material. The proposed license condition is consistent with the policy established in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," for operational programs and is acceptable.

In response to RAI 1.5-1, the applicant stated, in a letter dated October 15, 2010, that no byproduct material will be received, possessed, or used at AP1000 units of a physical form that is in unsealed form, on foils or plated sources, or sealed in glass, that exceeds the quantities in Schedule C of 10 CFR 30.72. Since the quantities do not exceed Schedule C, an emergency plan that meets the requirements of 10 CFR 30.32(i)(3) is not required. As such, the implementation of the emergency plan prior to the receipt of byproduct material will be removed from VEGP COL FSAR Table 13.4-201 and from Part 10 proposed License Condition 3, Item C.4. The request for a 10 CFR Part 40 license does not involve

authorization to receive, possess, or use uranium hexafluoride in excess of 50 kilograms in a single container or 1000 kilograms total. However, in a letter dated March 3, 2011, the applicant revised the request for a 10 CFR Part 40 license to state that no 10 CFR Part 40 specifically-licensed source material, including natural uranium, depleted uranium and uranium hexafluoride (UF₆), will be received, possessed, and used during the period between issuance of the COL and the Commission's 10 CFR 52.103(g) finding for each of the VEGP Units 3 and 4. Since the above quantities are not exceeded, an emergency plan for responding to the radiological hazards of an accidental release of source material and to any associated chemical hazards related to the material is not required. As such, the implementation of the emergency plan prior to the receipt of source material will be removed from VEGP COL FSAR Table 13.4-201. This applicant's proposal meets the requirements of 10 CFR 30.32 and 10 CFR 40.31 and is, therefore, acceptable. The incorporation of changes into a future revision of the VEGP COL FSAR is **Confirmatory Item 1.5-1**.

Resolution of Standard Content Confirmatory Item 1.5-1

Confirmatory Item 1.5-1 is an applicant commitment to revise FSAR Table 13.4-201. The staff verified that the VEGP COL FSAR Table 13.4- 201 was appropriately revised. As a result, Confirmatory Item 1.5- 1 is now closed.

The applicant also proposed an FSAR commitment to address the limitations during the period prior to the implementation of the emergency plan. In a letter dated March 16, 2011, the applicant stated that it has no plans to process UF₆ at the plant site at any time following the Commission's 10 CFR 52.103(g) finding and consequently does not expect the requested 10 CFR Part 40 license to include receipt, storage, or use of UF₆ at the plant site. However, using the guidance of DC/COL-ISG-15, "Post-Combined License Commitments," the staff has determined that the commitment is not sufficient and instead the staff is proposing to add a restriction in the license condition related to 10 CFR Parts 30 and 40. (See License Condition 1-1,c(ii)).

Review of Part 70 Materials

The staff reviewed information related to nuclear fuel as SNM included in the VEGP COL application including the AP1000 DCD against 10 CFR Part 70 requirements. Specifically, the staff's review included:

- *General information—financial qualification, site description, hydrology, geology, meteorology, the nearby population, and potential effects of natural phenomena (Part 1 of the application, FSAR Section 1.1 and Chapter 2, Section 4.1 and Table 4.1-1 of the AP1000 DCD against the requirements of 10 CFR 70.22(a)(1) through (a)(4));*
- *Organization and Administration—the responsibilities and associated resources for the receipt, possession, inspection, and storage of the SNM in the form of fresh fuel assemblies (Part 1 of the application, Quality Assurance Program included in Part 11 (Enclosure 11A) of the*

application, VEGP COL FSAR Section 13.1 for organization against the requirements of 10 CFR 70.22(a)(6) and (a)(8));

- *Radiation Protection*—Radiation protection program implementation, organization and personnel qualification, written procedures, ALARA, radiation survey and monitoring (AP1000 DCD Section 9.1 and Chapter 12 of VEGP COL FSAR against the requirements of 10 CFR 70.22(a)(6) through (a)(8));
- *Nuclear Criticality Safety*—use of area radiation monitors in lieu of criticality accident alarms (AP1000 DCD Sections 9.1.1.3 and 11.5.6 against the requirements of 10 CFR 70.22(a)(6) through (a)(8) and 10 CFR 50.68(b));
- *Fire safety*—fire protection program (VEGP COL FSAR Section 9.5.1 and Table 13.4-201 against the requirements of 10 CFR 70.22(a)(6) through (a)(8));
- *Emergency Preparedness*—emergency preparedness program for the VEGP site (VEGP COL FSAR Section 13.3 and Table 13.4-201 and the Emergency Plan against the requirements of 10 CFR 70.22(i));
- *Environmental Protection*—organization, procedures and controls that ensures that the environment is protected during the conduct of activities (i.e., receipt, possession, inspection, and storage of SNM (VEGP COL FSAR Section 11.5 and AP1000 DCD Sections 9.1.1 and 11.5 against the requirements of 10 CFR 70.22(a)(7) and (a)(8)); and
- *MC&A Program and Security* (MC&A program included in the application against requirements of 10 CFR 70.22(b) and 10 CFR Part 74 and the Physical Security Plan (PSP) against the requirements of 10 CFR 73.67, “Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance”).

As indicated above, the applicant’s compliance with several applicable 10 CFR Part 70 requirements regarding radiation protection, nuclear criticality safety, and environmental protection is already encompassed by the design information incorporated by reference from the AP1000 DCD and evaluated by the staff as part of the design certification proceeding. As explained further below, with respect to other applicable 10 CFR Part 70 requirements to be addressed by the COL applicant, the staff finds that the information provided regarding general information, organization and administration, radiation protection, nuclear criticality safety, fire safety, emergency preparedness, and environmental protection to support receipt, storage, and possession of SNM, conforms to the applicable guidance in NUREG-1520 and NUREG-0800 and, therefore, is acceptable. First, however, the staff’s review of information regarding the MC&A program (10 CFR 70.22(b) and 10 CFR Part 74) and the PSP (10 CFR 73.67) is provided below.

MC&A Program for SNM (Fuel)

In RAI 1.5-3, the staff requested the applicant to review the requirements of 10 CFR 70.22(b) for the program addressing the control and accounting of SNM and provide descriptions of how the applicable requirements for material accounting and controls under 10 CFR Part 74 will be met for the possession and storage of SNM during construction and prior to the operation of the nuclear power plant. In addition, the staff requested the applicant to provide a proposed license condition to clearly establish full implementation of the MC&A program meeting the applicable requirements of 10 CFR Part 74 prior to receipt of SNM, consistent and concurrent with the proposed license condition for implementing the applicable security (i.e., physical protection) requirements of 10 CFR Part 73.

In response to RAI 1.5-3, the applicant, in a letter dated November 23, 2010, stated that all non-irradiated SNM for the AP1000 units is identified as Category III, SNM of low strategic significance, as defined in 10 CFR 74.4, "Definitions." No SNM at an AP1000 nuclear facility will exceed an uranium-235 isotope enrichment of 10 percent. The quantity of SNM will be documented, controlled, and communicated to the NRC as required in 10 CFR 74.13, "Material status reports"; 10 CFR 74.15, "Nuclear material transaction reports"; and 10 CFR 74.19, "Recordkeeping."

Turkey Point Units 6 and 7 COL application includes Part 11F, "Supplemental Information of 10 CFR Part 70 Special Nuclear Material License Application," acknowledging that Turkey Point Units 6 and 7 would possess uranium sources containing uranium enriched to 93 percent uranium-235 in a quantity meeting the criteria of SNM of low strategic significance.

The following portion of this technical evaluation section is reproduced from Section 1.5.5 of the VEGP SER:

In its response to RAI 1.5-3, the applicant also described the SNM MC&A program and stated that this program will be provided as an enclosure in the VEGP COL application, Part 11. The SNM MC&A program will be developed for control and accounting of SNM in accordance with the applicable requirements of 10 CFR Part 74, Subparts A and B. This program will be consistent with guidance of American National Standards Institute (ANSI) 15.8-2009, "Material Control Systems – Special Nuclear Material Control and Accounting Systems for Nuclear Power Plants." The SNM MC&A program will be implemented prior to receipt of SNM at the plant site and will remain in effect until the SNM is shipped from the plant site. The procedures constituting the SNM MC&A program will delineate the requirements, responsibilities, and methods of SNM control necessary to address the following programmatic elements:

- 1. Establish, maintain, and follow written MC&A procedures to account for SNM.*
- 2. Maintain adequate records of the initial receipt or current inventory of SNM, including records of isotopic content, material received, material shipped, and material lost (material balance reports and physical inventory listing reports).*

3. *Develop adequate inventory procedures and maintain adequate perpetual inventory records.*
4. *Inventory SNM within the 12-month prescribed frequency.*
5. *Report SNM inventories on the applicable forms.*
6. *Establish an individual responsible for the control and accountability of SNM.*
7. *Report the loss of or inability to find SNM items in a timely manner.*
8. *Control access to SNM.*
9. *Control the shipping and transfer of SNM.*

The applicant proposed to add a new FSAR Section 13.5.2.2.9, which will summarize the use of plant procedures to address MC&A of SNM. The applicant also stated that VEGP COL FSAR Table 13.4-201 will be revised to provide information related to implementation of the SNM MC&A program.

In order to address the applicable 10 CFR Part 74 MC&A requirements prior to power operation, the applicant proposed a license condition that will require implementation of a MC&A program prior to receipt of SNM on site. Implementation of the SNM MC&A program prior to SNM receipt will also address the SNM possession and storage requirements during construction and prior to operation of the nuclear power plant.

*The applicant's MC&A program for SNM is consistent with ANSI 15.8 and meets reporting and recordkeeping requirements of 10 CFR 74.11, "Reports of loss or theft or attempted theft or unauthorized production of special nuclear material"; 10 CFR 74.13; 10 CFR 74.15; and 10 CFR 74.19. The documentation, submitted by the applicant, for a program addressing the control and accounting of SNM provided descriptions of how the applicable requirements for material accounting and controls under 10 CFR Part 74 are met and, therefore, is acceptable, subject to the proposed revision to the VEGP COL application and the VEGP COL FSAR (this has been tracked as **Confirmatory Item 1.5-2**). In addition, the proposed license condition includes a provision to provide a schedule to support the NRC's inspection of the MC&A program for the SNM. This is consistent with the policy established in SECY-05-0197 and is thus acceptable.*

Resolution of Standard Content Confirmatory Item 1.5-2

Confirmatory Item 1.5-2 is an applicant commitment to revise FSAR Sections 13.4, 13.5 and Parts 7 and 11 (Enclosure 11D of its application to address the SNM MC&A program. The staff verified that the VEGP COL FSAR and Parts 7 and 11 (Enclosure D) [Part 11 of the LNP COL application] of its application were appropriately revised. As a result, Confirmatory Item 1.5-2 is now closed.

The following portion of this technical evaluation section is reproduced from Section 1.5.5 of the VEGP SER. Portions of the standard content review addressing SNM physical protection superseded by the staff's review of additional site-specific information have been deleted from the standard content review appearing below. The staff review of the additional site-specific information, including a revised Special Nuclear Material Physical Protection Program Description (SNMPPPD), appears below, following the review of the standard content material.

Security Review for 10 CFR Part 70 Materials

[Standard content deleted as noted above]

In a letter dated March 15, 2011, the NRC staff asked the applicant to provide its plan regarding the protection of new fuel as SNM at the VEGP Units 3 and 4 plant site prior to declaration of an operational protected area (PA) and implementation of the requirements of 10 CFR 73.55, as described in the SNM MC&A Program description. In addition, the staff also requested that the applicant consider the applicability of the substantive provisions of interim compensatory orders (ICMO) that were issued to Category III Fuel Cycle Facilities to ensure adequate protection when SNM is on site prior to the activation of the PA.

[Standard content deleted as noted above]

The staff raised a question regarding the licensee's ability to receive new fuel and return new fuel rods/assemblies to the fuel manufacturer. In a letter dated May 6, 2011, the applicant proposed to revise its FSAR Section 13.5.2.2.8 to include the New Fuel Shipping Plan that addresses the applicable 10 CFR 73.67 requirements in the event that unirradiated new fuel assemblies or components are returned to the supplying fuel manufacturer(s) facility. The New Fuel Shipping Plan summarizes the procedures and the written agreement that the applicant will have in place prior to shipment of new fuel back to the fuel manufacturer and this plan will be included in Part 11, Enclosures of its application. The staff finds this New Fuel Shipping Plan acceptable because it meets the applicable requirements of 10 CFR 73.67(g). The staff verified that the VEGP FSAR Section 13.5 and Part 11 (Enclosure E) are appropriately updated.

[Standard content deleted as noted above]

In addition, the applicant has adequately addressed security issues related to; security response procedures, coordination with local law enforcement for

response support, storage of hazardous materials on-site, review of emergency shutdown/cool down procedures, supplementing of the Emergency Actions Levels, site accountability and evacuation strategies, emergency communications, evaluation of computer and communications networks for vulnerabilities, capabilities to provide fire suppression, evaluation of the need for offsite medical support, emergency support, and access to Federal support, and limiting public access to sensitive plant information.

[Standard content deleted as noted above]

Non-Fuel SNM

In a letter dated, June 22, 2011, the applicant provided information regarding the name, amount, and specifications (including the chemical and physical form and, where applicable, isotopic content) of the non-fuel SNM (Fission Chambers) the applicant proposes to use (10 CFR 70.22(a)(4)). The letter also provided information to confirm that the applicable design and programmatic elements provided in the licensing basis will satisfy the requirements in 10 CFR 70.22(a)(6) through (8) prior to receipt of non-fuel SNM.

10 CFR Part 70 Requirements - Other than MC&A (10 CFR 70.22(b) and 10 CFR Part 74) and Security (10 CFR 73.67) - for Fuel and Non-Fuel Material

As noted above, in addition to MC&A and security, the staff also examined the applicant's compliance with 10 CFR Part 70 requirements regarding general information, organization and administration, radiation protection, nuclear criticality safety, fire safety, emergency preparedness, and environmental protection to support receipt, storage, and possession of SNM.

The staff's analysis follows with respect to those other requirements not already resolved via the applicant's incorporation of the AP1000 DCD. For the reasons described in Section 1.4.4 of this FSER the staff agrees that the applicant is technically qualified to engage in the proposed activities associated with this license, based on the applicant's ongoing experience in the safe operation of nuclear power plants, as presented in Section 1.4.1 of the VEGP COL FSAR. Likewise, the applicant's financial qualifications and ownership structure meet the requirements of 10 CFR 70.22 for the same reasons described above in Section 1.5.1.

Note: Turkey Point COL FSAR Section 1.4.1 has a similar discussion regarding the applicant's operation of its other nuclear power plants. The staff also concludes the applicant is technically qualified to engage in the proposed activities associated with this license based on the applicant's ongoing experience with the safe operation of its other nuclear power plants. In addition, Section 1.5.1 of this report finds that the financial qualifications for the Turkey Point COL application are acceptable.

The following portion of this technical evaluation section is reproduced from Section 1.5.5 of the VEGP SER:

Similarly, the applicant has explained the anticipated amounts, types, and uses of 10 CFR Part 70 materials at the site are consistent with the provisions of 10 CFR 70.22. The VEGP COL FSAR and Part 1 of the application provide adequate description of the VEGP Units 3 and 4 facility and the proposed activities related to 10 CFR Parts 30, 40 and 70 material. In addition the VEGP COL FSAR provides information regarding regional hydrology, geology, meteorology, the nearby population, and potential effects of natural phenomena that could occur at the facility. The applicant has described the responsibilities and associated resources (see Part 1, "General and Administration Information," and Enclosure 11A, "Nuclear Development Quality Assurance Manual" of the application) for the receipt, possession, inspection, and storage of the 10 CFR Part 70 material (fuel and non-fuel). Therefore, it meets the requirements of 10 CFR 70.22(a)(1). Furthermore, as indicated in VEGP COL FSAR Table 13.4-201, applicable portions of the Radiation Protection Program will be implemented prior to initial receipt of byproduct, source, or SNMs. In accordance with VEGP COL FSAR Table 13.4-201, Item 10, Implementation Milestone #1, and the NRC-approved template, Nuclear Energy Institute (NEI) 07-03A, "Generic FSAR Template Guidance for Radiation Protection Program Description," which is incorporated by reference into VEGP COL FSAR Appendix 12AA (see SER Section 12.5), the appropriate radiation protection program elements associated with organization, facilities, instrumentation and equipment, procedures (e.g., procurement, receipt, inventory, labeling, leak testing, surveillance, control, transfer, disposal, storage, issuance, and use of radioactive sources), and training will be in place prior to initial receipt of byproduct, source, or special nuclear materials, thereby satisfying the requirements of 10 CFR 70.22(a)(4), (6), (7), and (8). VEGP COL FSAR Section 12.2 includes the requirements for written procedures that address leak-testing of radioactive sources. The leak-test will be consistent with 10 CFR 20.1501, "General," survey and monitoring requirements for evaluating the quantities of radioactive material and the potential radiological hazard of the radioactive source.

The fission chambers will be disposed of consistent with the operating procedures that specify the processes to be followed to ship waste that complies with the waste acceptance criteria (WAC) of the disposal site, the waste classification and characteristics requirements of 10 CFR 61.55, "Waste classification," and 10 CFR 61.56, "Waste characteristics," and the requirements of third party waste processors as applicable. This process is identified in VEGP COL FSAR Section 11.4.6.1.

With respect to fire safety, prior to installation, the new fission chambers (along with the new fuel) will be stored in the Auxiliary Building fuel handling area, which is an area protected by the fire protection program and fire protection system, as discussed in the AP1000 DCD Section 9A.3.1.3.1.2. Temporary storage of these non-combustible sealed sources is not specifically addressed in the AP1000 fire protection analysis in DCD Appendix 9A; however, the approach to extinguishing fires and containing material releases associated with the fission chambers would be similar to, and bounded by, the approach considered for the fuel handling area in general. The fuel handling area has been evaluated and determined acceptable for the storage of SNM in a full core load of new fuel. The

hazards imposed by the relatively small quantity of SNM associated with the fission chambers (less than 100 grams), is not expected to be a challenge to the existing fire protection analysis for the new fuel storage (see Section 9.5.1 of this SER). The VEGP COL FSAR Section 12.2 includes the requirements for written procedures that address leak testing of radioactive sources (byproduct, source, and devices that contain SNM, as appropriate). Further, the fission chambers that contain the non-fuel SNM are sealed sources that are tested periodically to confirm their leak-tightness. Therefore, it is expected that the capabilities of the fire protection program and the fire protection equipment servicing this area are sufficient to meet the requirements of 10 CFR 70.22(a)(7) and 10 CFR 70.22(a)(8).

Emergency Plan (SNM, Fuel, and Non-Fuel)

The applicant will be storing the new fuel in the new fuel racks (stored dry) or in the spent fuel racks prior to loading into the reactor. The safety analysis included in AP1000 DCD Sections 9.1.1.3 and 9.1.2.3 provides safety analysis that indicates that: (1) the design of new fuel rack is such that K_{eff} remains less than or equal to 0.95 with full density unborated water and less than equal to 0.98 with optimum moderation and full reflection conditions; and (2) the design of spent fuel rack is such that K_{eff} remains less than or equal to 0.95 under design basis conditions. This criticality evaluation meets requirements of 10 CFR 50.68(b). Therefore, a criticality accident alarm system to meet the requirements of 10 CFR 70.24, "Criticality accident requirements," is not required. As a result, an emergency plan (to receive and possess) pursuant to 10 CFR 70.22(i) is also not required. In addition, an emergency plan for the fission chambers (to receive and possess) pursuant to 10 CFR 70.22(i) is not required due to the small quantity of SNM (less than 100 grams) associated with the fission chambers.

1.5.5.1 Physical Protection of Special Nuclear Material

1.5.5.1.1 Introduction

This section addresses the physical protection of SNM while possessed, used, and transported by the applicant, including during the period prior to implementation of the site PSP.

1.5.5.1.2 Summary of Application

The applicant submitted a SNMPPPD, Revision 7, dated September 24, 2015 (Safeguards LAN Electronic Safe (SLES) Accession No. NS113247).

1.5.5.1.3 Regulatory Basis

The regulatory requirements and guidance applicable to fixed site and in-transit physical protection are as follows:

- 10 CFR 73.67, "Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance."
- RG 5.66, "Access Authorization Program for Nuclear Power Plants," Revision 1, July 2009.

- Post-September 11, 2001, Security Orders for SNM of Low Strategic Significance.
- RG 5.59, "Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance," Revision 1, 1983.
- RIS 2005-22, "Requirements for the Physical Protection During Transportation of Special Nuclear Material of Moderate and Low Strategic Significance: 10 CFR Part 73 vs. Regulatory Guide 5.59 (1983)."

1.5.5.1.4 Technical Evaluation

The staff performed a technical evaluation of the Turkey Point Units 6 and 7 COL application against applicable 10 CFR 73.67 fixed-site and in-transit general performance objectives, general requirements, and physical protection requirements for SNM of low strategic significance. In addition, the staff requested information related to how the applicant addressed the post September 11, 2001, security order measures for SNM of low strategic significance. The staff also conducted a technical evaluation of how the order measures were addressed.

1.5.5.1.4.1 Fixed-Site General Performance Objectives

The applicable physical protection requirements specified in 10 CFR 73.67 include the following general performance objectives for fixed sites as stated in 10 CFR 73.67(a)(1):

- (1) Each licensee who possesses, uses or transports special nuclear material of moderate or low strategic significance shall establish and maintain a physical protection system that will achieve the following objectives:
 - (i) Minimize the possibilities for unauthorized removal of special nuclear material consistent with the potential consequences of such actions; and
 - (ii) Facilitate the location and recovery of missing special nuclear material.
- (2) To achieve these objectives, the physical protection system shall provide:
 - (i) Early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area containing special nuclear material;
 - (ii) Early detection of removal of special nuclear material by an external adversary from a controlled access area;
 - (iii) Assure proper placement and transfer of custody of special nuclear material; and

- (iv) Response to indications of an unauthorized removal of SNM and then notify the appropriate response forces of its removal in order to facilitate its recovery.

Therefore the fixed-site, physical protection requirements of 10 CFR 73.67(a)(1) are applicable because of the manner in which the Turkey Point Units 6 and 7 COL application described SNM of low strategic significance.

Applicable Requirement: 10 CFR 73.67(a)(1), “General performance objectives. (1) Each licensee who possesses, uses or transports special nuclear material of moderate or low strategic significance shall establish and maintain a physical protection system that will achieve the following objectives:...”

The applicant states in the “Implementation Milestone” column of FSAR Table 13.4-201, under Item 15, its commitment to meet the requirements of 10 CFR 73.67, “180 days prior to initial receipt of new fuel or non-fuel special nuclear material.” Establishment of the physical protection system is outlined in the SNMPPPD, Revision 7, dated September 24, 2015 (Safeguards LAN Electronic Safe (SLES) Accession No. NS113247). Specifically, Section 4.4.1, “Establishment of the Physical Protection System,” describes six establishment elements that pertain to the following: lighting, detection, alarm station status, communications, access control, and physical barriers of the controlled access area. In addition, Section 4.4.2, “Maintenance of the Physical Protection System,” of the SNMPPPD contains an explanation of the maintenance that will be applied to the physical protection system.

The FPL application states that FPL will fully implement the requirements of 10 CFR 73.67 before SNM is on site. Also, the application outlined establishment and maintenance elements for the physical protection system. The establishment of physical protection elements is sufficient because before the physical protection infrastructure will be considered operational: 1) the lighting necessary for human detection through visual observation will be tested and confirmed as adequate, 2) visual assessment systems will be tested as functioning as necessary to support security operations, 3) alarm stations will be validated as having the ability to adequately support physical security activities for the protection of the SNM of low strategic significance, 4) communication technologies that are to be relied upon to enable the physical security strategy to operate effectively will be tested and confirmed to allow for intelligible voice interfaces, 5) the means of access control will be tested for its performance to support the physical security strategy, and 6) the physical barriers that provide containment of the SNM of low strategic significance will be inspected to ensure a comprehensive impediment to personnel entry is in place. The development of a maintenance program for the six physical protection elements established is committed to in the application. In addition, the application states that the maintenance program will have periodicity of maintenance configured for each of the six physical protection system elements that is commensurate with each of the elements' intended function. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(1), to have a physical protection system established and maintained, would be met.

Applicable Requirement: 10 CFR 73.67(a)(1)(i), “General performance objectives. Each licensee who possesses, uses or transports special nuclear material of moderate or low strategic significance shall establish and maintain a physical protection system that will achieve the following objectives: (i) Minimize the possibilities for unauthorized removal of special nuclear material consistent with the potential consequences of such actions:...”

The applicant states in the "Implementation Milestones" column of FSAR Table 13.4-201, under Item 15, its commitment to meet the requirements of 10 CFR 73.67, "180 days prior to initial receipt of new fuel or non-fuel special nuclear material." In addition, the SNMPPPD describes in Section 5.3.1, "Monitoring SNM (Non-Fuel SNM - HEU Neutron Sources)," how this general performance objective will be met for the highly enriched uranium (HEU) sources by detailing adversary scenarios and explaining how the physical protection system will work to meet the requirement. In addition, the SNMPPP describes in Section 5.3.2, "Monitoring SNM (New Fuel Assemblies)," adversary scenarios applied to SNM reactor fuel and explains how the physical protection system will work to meet this requirement as well.

The FPL application states that FPL will fully implement the requirements of 10 CFR 73.67 before SNM is delivered. In addition, its SNMPPPD describes how the possibilities for unauthorized removal are minimized consistent with the consequences of such actions. The application describes potential adversarial scenarios for all activities involving SNM of low strategic significance and highlights how the six physical protection system elements work in a coordinated fashion to adequately minimize the risk of theft of the materials. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(1)(i), to have a physical protection system established and maintained that has the objective to minimize the possibilities for unauthorized removal of SNM consistent with the potential consequences of such actions, would be met.

Applicable Requirement: 10 CFR 73.67(a)(1)(ii), "General performance objectives. Each licensee who possesses uses or transports special nuclear material of moderate or low strategic significance shall establish and maintain a physical protection system that will achieve the following objectives: "... (ii) Facilitate the location and recovery of missing special nuclear material."

The applicant states in the "Implementation Milestone" column of FSAR Table 13.4-201, under Item 15, its commitment to meet the requirements of 10 CFR 73.67, "180 days prior to initial receipt of new fuel or non-fuel special nuclear material." In addition, its SNMPPPD describes in Section 5.10, "Contingency Response," the detection, assessment, and response strategies of the physical protection system that would facilitate the location and recovery of missing SNM.

The FPL application states that FPL will fully implement the requirements of 10 CFR 73.67 before SNM is delivered. In addition, its SNMPPP describes the detection, assessment and response attributes of the physical protection system that would facilitate the location and recovery of missing SNM. The application explicitly describes how the planned-for detection and assessment physical protection system elements function to provide adequate detection and assessment of malevolent activities in order to initiate a specific response that would enable the location and recovery of SNM of low strategic significance. Scenarios that depict adversary actions, operation of physical security system elements, and security force response activities provide assurance that the requirement of 10 CFR 73.67(a)(1)(ii) would be met. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(1)(ii), to have a physical protection system established and maintained that has the objective to facilitate the location and recovery of missing SNM, would be met.

Applicable Requirement: 10 CFR 73.67(a), "General performance objectives. (2) To achieve these objectives, the physical protection system shall provide: (i) Early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area containing special nuclear material..."

The applicant states in the "Implementation Milestone" column of FSAR Table 13.4-201 under Item 15 its commitment to meet the requirements of 10 CFR 73.67, "180 days prior to initial receipt of new fuel or non-fuel special nuclear material." In addition, its SNMPPPD Sections 5.3.1 and 5.3.2 "Monitoring SNM (New Fuel Assemblies)" describes how the physical protection system provides for early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area containing SNM.

The FPL application states that FPL will fully implement the requirements of 10 CFR 73.67 before SNM is delivered. In addition, its SNMPPP describes the physical protection strategies for early detection and assessment to address unauthorized access or activities by an external adversary within the controlled access area containing SNM. These physical protections strategies are consistent with staff guidance in RG 5.59. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(2)(i), to have a physical protection system that provides early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area containing SNM, would be met.

Applicable Requirement: 10 CFR 73.67(a)(2)(ii), "General performance objectives. To achieve these objectives, the physical protection system shall provide: ... (ii) Early detection of removal of special nuclear material by an external adversary from a controlled access area..."

The applicant states in the "Implementation Milestone" column of FSAR Table 13.4-201, under Item 15, its commitment to meet the requirements of 10 CFR 73.67, "180 days prior to initial receipt of new fuel or non-fuel special nuclear material." In addition, its SNMPPPD Sections 5.3.1 and 5.3.2 describe how the physical protection system provides for early detection of removal of SNM by an external adversary from a controlled access area.

The FPL application states that FPL will fully implement 10 CFR 73.67 before SNM is delivered. In addition, its SNMPPPD describes the physical protection strategies for early detection and assessment to address the potential for the removal of SNM by an external adversary from a controlled access area. These physical protections strategies are consistent with staff guidance in RG 5.59. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(2)(ii), to have a physical protection system that provides early detection of removal of SNM by an external adversary from a controlled access area, would be met.

Applicable Requirement: 10 CFR 73.67(a)(2)(iii), "General performance objectives. To achieve these objectives, the physical protection system shall: ... (iii) Assure proper placement and transfer of custody of special nuclear material; and..."

The applicant states in the "Implementation Milestone" column of FSAR Table 13.4-201, under Item 22, its commitment to meet the applicable requirements of 10 CFR 74, "Material Control and Accounting of Special Nuclear Material," "[p]rior to receipt of special nuclear material" as a license condition. Also, the applicant states in Enclosure 5, "Special Nuclear Material (SNM) Material Control and Accounting Program Description," of Part 11 of the COL application that the applicant will establish a criteria for the "SNM control and accounting system, including criteria for the receipt, internal control, physical inventory, and shipment of SNM."

In addition, the applicant describes in its SNMPPPD, in Section 5.1.1, "Receipt of non-fuel SNM"; Section 5.1.2, "Receipt of SNM - Fuel Assemblies/Fuel Components"; and Section 5.8, "Internal Transfers," the MC&A measures specific to the non-fuel and fuel SNM, respectively.

The FPL application states that FPL will fully implement the appropriate provisions of 10 CFR 74 before SNM is received. The application also states that: 1) notification will be made to the shipper upon receipt of the SNM of low strategic significance; 2) an investigation will be initiated as required per 10 CFR 73.67 and 10 CFR 74.11 if the shipment is not received as scheduled; 3) the NRC Operations Center will be notified within an hour after assessing that a shipment has not arrived and/or within an hour of SNM of low strategic significance recovery; 4) the licensee will conduct an inspection of tamper seal devices on containers of SNM of low strategic significance after accessing the shipment conveyance that has been received at the nuclear reactor facility; and 5) the licensee will verify that the shipment is consistent with the shipment's manifest in regard to identification markings and numbers of SNM containers.

In addition, the applicant has described in its SNMPPPD, how specific MC&A measures apply to meet this general performance objective. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(2)(iii), to assure proper placement and transfer of custody of SNM, would be met.

Applicable Requirement: 10 CFR 73.67(a)(2)(iv), "General performance objectives. To achieve these objectives, the physical protection system shall: ... (iv) Respond to indications of an unauthorized removal of special nuclear material and then notify the appropriate response forces of its removal in order to facilitate its recovery."

The applicant states in the "Implementation Milestone" column of FSAR Table 13.4-201, under Item 15, its commitment to meet the requirements of 10 CFR 73.67, "180 days prior to initial receipt of new fuel or non-fuel special nuclear material." In addition, its SNMPPPD Section 5.10 describes the detection, assessment, and response strategies that would provide indications of missing or stolen SNM and subsequently facilitate the recovery thereof. The appropriate response from offsite (i.e., the particular coordinated response with a local law enforcement agency, etc.), was identified in the SNMPPPD by discussion of the offsite response plans and by referencing Section 8, "Local Law Enforcement Liaison," of the Turkey Point Units 6 and 7 PSP, and Section 5.6, "Local Law Enforcement (LLEA)"; Section 5.7, "State Response Organizations"; and Section 5.8, "Federal Response Organizations," of the Turkey Point Units 6 and 7 Contingency Plan, Revision 2, dated November 9, 2010 (SLES Accession No. NS10824).

The FPL application states that FPL will fully implement 10 CFR 73.67 before SNM is delivered. In addition, its SNMPPPD describes the early detection, assessment and response physical protection strategies that would facilitate recovery of missing or stolen SNM. Specifically, the applicant described in the SNMPPP detection, assessment, communication, and response scenarios associated with all locations of SNM of low strategic significance. In addition, the response protocols described are consistent with both RG 5.59 and the response measure criteria in the post-September 11, 2001, SNM of low strategic significance security order. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(2)(iv), to have a physical protection system that shall respond to indications of an unauthorized removal of SNM and then notify the appropriate response forces of its removal in order to facilitate its recovery, would be met.

1.5.5.1.4.2. Fixed Site General Requirements

The applicable requirements specified in 10 CFR 73.67, "Licensee fixed site and in- transit requirements for the physical protection of special nuclear material of moderate and low strategic significance," include the following general requirements for fixed sites.

"(c) Each licensee who possesses, uses, transports, or delivers to a carrier for transport special nuclear material of moderate strategic significance, or 10 kg or more of special nuclear material of low strategic significance shall:

- (1) Submit a security plan or an amended security plan describing how the licensee will comply with all the requirements of paragraphs (d), (e), (f), and (g) of this section, as appropriate, including schedules of implementation. The licensee shall retain a copy of the effective security plan as a record for three years after the close of period for which the licensee possesses the special nuclear material under each license for which the original plan was submitted. Copies of superseded material must be retained for three years after each change.
- (2) Within 30 days after the plan submitted pursuant to paragraph (c)(1) of this section is approved, or when specified by the NRC in writing, implement the approved security plan."

Applicable Requirement: 10 CFR 73.67(c)(1), "Submit a security plan...including schedules for implementation...shall retain a copy ...for three years..." ... "Copies of the superseded material must be retained for three years after each change."

The applicant submitted a security plan termed the SNMPPPD that covered the applicable fixed site provisions of 10 CFR 73.67 (i.e., 10 CFR 73.67(f)). The applicant stated in Section 5.7, "Audits and Records," of its SNMPPPD that the security plan (i.e., the SNMPPPD) would be retained for three years and that copies of superseded material will be retained for three years after each change.

The SNMPPPD describes the required retention parameters for the SNMPPPD and changes to it. Therefore, the staff finds that the requirement of 10 CFR 73.67(c)(1); to submit a security plan, retain the security plan for three years after the specific type of SNM has been removed from the site, and to retain superseded security plan change(s) for three years after each change, would be met.

Applicable Requirement: 10 CFR 73.67(c)(2), "Within 30 days after the plan submitted pursuant to paragraph (c)(1) of this section is approved, or when specified by the NRC in writing, implement the approved security plan."

The applicant states in the "Implementation Milestone" column of FSAR Table 13.4-201, under Item 15, its commitment to meet the requirements of 10 CFR 73.67, "180 days prior to initial receipt of new fuel or non-fuel special nuclear material."

Additionally, the staff proposes to impose the following license condition, based on License Condition 6, as listed in Part 10 of the COL application:

No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of

the operational programs listed in FSAR Table 13.4-201, including the associated estimated date for initial loading of fuel. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until all the operational programs listed in FSAR Table 13.4-201 have been fully implemented.

In the application, the applicant has stated that it will implement the requirements of 10 CFR 73.67 before SNM is received. Also, a license condition has been applied to ensure the NRC staff is aware of the scheduled date for implementation of the requirements of 10 CFR 73.67. Therefore, the requirement to either implement the SNMPPPD within 30 days after NRC approval, or as designated by the NRC in writing, will be met by the required schedule for implementation of operational programs.

1.5.5.1.4.3. Fixed Site Physical Protection Requirements

The applicable requirements specified in 10 CFR 73.67 include fixed-site, physical protection requirements for SNM of low strategic significance.

The regulations of 10 CFR 73.67(f) state that, "Each licensee who possesses, stores, or uses special nuclear material of low strategic significance at a fixed site or contiguous sites, except those who are licensed to operate a nuclear power reactor pursuant to Part 50, shall:

- (1) Store or use the material only within a controlled access area,
- (2) Monitor with an intrusion alarm or other device or procedures the controlled access areas to detect unauthorized penetrations or activities,
- (3) Assure that a watchman or offsite response force will respond to all unauthorized penetrations or activities, and
- (4) Establish and maintain response procedures for dealing with threats of thefts or thefts of this material. The licensee shall retain a copy of the current response procedures as a record for three years after the close of period for which the licensee possesses the special nuclear material under each license for which the procedures were established. Copies of superseded material must be retained for three years after each change."

The fixed-site physical protection requirements of 10 CFR 73.67(f) are applicable because of the manner in which SNM of low strategic significance was described in the Turkey Point Units 6 and 7 COL application.

Applicable Requirement: 10 CFR 73.67(f)(1), "Fixed site requirements for special nuclear material of low strategic significance. Each licensee who possesses, stores, or uses special nuclear material of low strategic significance at a fixed site or contiguous sites, except those who are licensed to operate a nuclear power reactor pursuant to Part 50, shall: (1) Store or use the material only within a controlled access area..."

The applicant states in the "Implementation Milestone" column of FSAR Table 13.4-201, under Item 15, its commitment to meet the requirements of 10 CFR 73.67, "180 days prior to initial receipt of new fuel or non-fuel special nuclear material." In addition, the SNMPPPD Section 5.2

“Storage”; Section 5.8 “Internal Transfers”; and Figures 1 through 13, describe the physical characteristics of the controlled access area. The description of the controlled access area depicted in the SNMPPPD includes temporary and permanent controlled access areas to enable protection during receipt and long-term storage of SNM, respectively. In addition, the described physical characteristics of the controlled access area are consistent with the recommended penetration resistance features explained in RG 5.59. Furthermore, as described in the application, both the fuel SNM and non-fuel SNM of low strategic significance will always be protected within a controlled access area. The non-fuel SNM is described as only being removed from its controlled access area and into its functioning location after the protected area of the nuclear reactor has been established per 10 CFR 73.55(e)(8), which is an acceptable practice because when the SNM is located inside a protected area, it is provided adequate protection.

The FPL application states that FPL will fully implement 10 CFR 73.67 before SNM is delivered. In addition, the SNMPPPD describes the characteristics of their planned-for controlled access area; therefore, the staff finds that the requirement of 10 CFR 73.67(f)(1), to store or use the material only within a controlled access area, would be met.

Applicable Requirement: 10 CFR 73.67(f)(2) “Fixed site requirements for special nuclear material of low strategic significance. Each licensee who possesses, stores, or uses special nuclear material of low strategic significance at a fixed site or contiguous sites, except those who are licensed to operate a nuclear power reactor pursuant to Part 50, shall: (2) Monitor with an intrusion alarm or other device or procedures the controlled access areas to detect unauthorized penetrations or activities.”

The applicant states in the “Implementation Milestone” column of FSAR Table 13.4-201, under Item 15, its commitment to meet the requirements of 10 CFR 73.67, “180 days prior to initial receipt of new fuel or non-fuel special nuclear material.” In addition, their SNMPPPD Section 5.3, “Monitoring”; Section 5.3.1, “Monitoring SNM (Non fuel SNM...)”; and Section 5.3.2, “Monitoring SNM (New Fuel Assemblies),” describe the detection processes that would result in recognition of unauthorized penetrations or activities in the locations of SNM of low strategic significance and the controlled access area.

The FPL application states that FPL will fully implement the requirements of 10 CFR 73.67 before SNM is received. In addition, its SNMPPPD describes the detection processes that would result in recognition of unauthorized penetrations or activities in the locations of SNM and the controlled access area. Specifically, the applicant describes in its SNMPPPD the detection techniques and assessment methods that would result in a high probability of detection and accurate assessment of malevolent acts or potentially malevolent indications. In addition, in the SNMPPPD, the applicant described administrative controls that would reduce the risk of not detecting a malevolent act or indications of potential malevolent acts to an acceptable level. Therefore, the staff finds that the requirement of 10 CFR 73.67(f)(2), to monitor with an intrusion alarm or other device or procedures the controlled access areas to detect unauthorized penetrations or activities, would be met.

Applicable Requirement: 10 CFR 73.67(f)(3), “Fixed site requirements for special nuclear material of low strategic significance. Each licensee who possesses, stores, or uses special nuclear material of low strategic significance at a fixed site or contiguous sites, except those who are licensed to operate a nuclear power reactor pursuant to

part 50, shall: (3) Assure that a watchman or offsite response force will respond to all unauthorized penetrations or activities...”

The applicant states in the “Implementation Milestone” column of FSAR Table 13.4-201, under Item 15, its commitment to meet the requirements of 10 CFR 73.67, “180 days prior to initial receipt of new fuel or non-fuel special nuclear material.” In addition, their SNMPPPD Section 5.3.1, Section 5.3.2, and Section 5.10 describe the detection, assessment, and response measures for the physical protection of the material. Furthermore, the appropriate response from offsite (e.g., the specifically coordinated response with a local law enforcement agencies), was pointed out in the SNMPPPD by discussion of the offsite response plans and by referencing Section 8 of the Turkey Point Units 6 and 7 reactor PSP and Sections 5.6, 5.7, and 5.8 of the Turkey Point Units 6 and 7 reactor Contingency Plan, Revision 2, dated November 9, 2010 (SLES Accession No. NS108024).

The FPL application states that FPL will fully implement the requirements of 10 CFR 73.67 before SNM is received. In addition, their SNMPPPD and other information referenced in the SNMPPPD describe the detection, assessment, and response measures for the physical protection of the material. The applicant provided details in the SNMPPPD of the protocols of detection, assessment, communications, and response that would work to adequately protect the SNM. In addition, those protocols both onsite and offsite response actions were committed to be developed and implemented via written procedures. Therefore, the staff finds that the requirement of 10 CFR 73.67(f)(3), to assure that a watchman or offsite response force will respond to all unauthorized penetrations or activities, would be met.

Applicable Requirement: 10 CFR 73.67(f)(4), “Fixed site requirements for special nuclear material of low strategic significance. Each licensee who possesses, stores, or uses special nuclear material of low strategic significance at a fixed site or contiguous sites, except those who are licensed to operate a nuclear power reactor pursuant to Part 50, shall: (4) Establish and maintain response procedures for dealing with threats of thefts or thefts of this material. The licensee shall retain a copy of the current response procedures as a record for three years after the close of period for which the licensee possesses the special nuclear material under each license for which the procedures were established. Copies of superseded material must be retained for three years after each change.”

The applicant states in the “Implementation Milestone” column of FSAR Table 13.4-201, under Item 15, its commitment to meet the requirements of 10 CFR 73.67, “180 days prior to initial receipt of new fuel or non-fuel special nuclear material.” In addition, their SNMPPPD Section 4.1, “Procedures”; Section 5.3.1; Section 5.3.2; Section 5.7, and Section 5.10 describe the framework of and details to the development of response procedures. In addition, Section 5.7 of the SNMPPPD notes the retention provision of three years for response procedures and the changes thereof.

The FPL application states that FPL will fully implement the requirements of 10 CFR 73.67 before SNM is delivered. In addition, their SNMPPPD describes: 1) the framework of the response procedures, 2) the details on the development of response procedures, 3) and the retention actions of three years for the response procedures. Therefore, the staff finds that the requirement of 10 CFR 73.67(f)(4), to establish and maintain response procedures, would be met.

1.5.5.1.4.4. In-Transit General Performance Objectives

The applicable requirements specified in 10 CFR 73.67 include general performance objectives.

The physical protection requirements of 10 CFR 73.67(a), states, "General performance objectives.

- (1) Each licensee who possesses, uses, or transports special nuclear material of moderate or low strategic significance shall establish and maintain a physical protection system that will achieve the following objectives:
 - (i) Minimize the possibilities for unauthorized removal of special nuclear material consistent with the potential consequences of such actions; and
 - (ii) Facilitate the location and recovery of missing special nuclear material.
- (2) To achieve these objectives, the physical protection system shall provide:
 - (i) Early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area containing special nuclear material;
 - (ii) Early detection of removal of special nuclear material by an external adversary from a controlled access area;
 - (iii) Assure proper placement and transfer of custody of special nuclear material; and
 - (iv) Respond to indications of an unauthorized removal of special nuclear material and then notify the appropriate response forces of its removal in order to facilitate its recovery."

The in-transit physical protection requirements of 10 CFR 73.67(a) are applicable because of the manner in which SNM of low strategic significance was described in the Turkey Point Units 6 and 7 COL application.

Applicable Requirement: 10 CFR 73.67(a), "General performance objectives. (1) Each licensee who possesses, uses or transports special nuclear material of moderate or low strategic significance shall establish and maintain a physical protection system that will achieve the following objectives:..."

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6, "Shipment," of its SNMPPPD. The applicant also submitted a New Fuel Shipping Plan, in Enclosure 6 of Part 11 of the COL application. The SNMPPPD states that an SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has "plans and procedures" that are developed and implemented in such a manner that each general performance objective of 10 CFR 73.67 will be met. Because FPL will be using a SNM-qualified licensee to perform the shipment of SNM of low strategic significance and will

confirm that such a licensee has the physical protection measures in place to meet each general performance objective, subsequently that SNM-qualified licensee will have the ability to meet the requirement to establish and maintain a physical protection system.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has physical protection measures in place to meet each general performance objective. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(1), to establish and maintain a physical protection system, would be met.

Applicable Requirement: 10 CFR 73.67(a)(1)(i), “General performance objectives. Each licensee who possesses, uses or transports special nuclear material of moderate or low strategic significance shall establish and maintain a physical protection system that will achieve the following objectives: (i) Minimize the possibilities for unauthorized removal of special nuclear material consistent with the potential consequences of such actions;...”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of its SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that each general performance objective of 10 CFR 73.67 will be met. Because FPL will be using a SNM-qualified licensee to perform the shipment of SNM of low strategic significance and will confirm that such a licensee has the physical protection measures in place to meet each general performance objective, subsequently that SNM-qualified licensee will have the ability to meet the requirement to establish and maintain a physical protection system that has the capability to minimize the possibilities for unauthorized removal of SNM consistent with the potential consequences of such actions.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has physical protection measures in place to meet each general performance objective. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(1)(i), to minimize the possibilities for unauthorized removal of SNM consistent with the potential consequences of such actions, would be met.

Applicable Requirement: 10 CFR 73.67(a)(1)(ii), “General performance objectives. Each licensee who possesses uses or transports special nuclear material of moderate or low strategic significance shall establish and maintain a physical protection system that will achieve the following objectives: “...(ii) Facilitate the location and recovery of missing special nuclear material.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of their SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that each general performance objective

of 10 CFR 73.67 will be met. Because FPL will be using a SNM-qualified licensee to perform the shipment of SNM of low strategic significance and will confirm that such a licensee has the physical protection measures in place to meet each general performance objective, subsequently that SNM-qualified licensee will have the ability to meet the requirement of establishing and maintaining a physical protection system that has the capability to facilitate the location and recovery of missing SNM.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has physical protection measures in place to meet each general performance objective. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(1)(ii), to facilitate the location and recovery of missing SNM, would be met.

Applicable Requirement: 10 CFR 73.67(a), “General performance objectives. (2) To achieve these objectives, the physical protection system shall provide: (i) Early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area containing special nuclear material...”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of their SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that each general performance objective of 10 CFR 73.67 will be met. Because FPL will be using a SNM-qualified licensee to perform the shipment of SNM of low strategic significance and will confirm that such a licensee has the physical protection measures in place to meet each general performance objective, subsequently that SNM-qualified licensee will have the ability to meet the requirement of establishing and maintaining a physical protection system that has the capability to provide for early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area containing SNM.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has physical protection measures in place to meet each general performance objective. Therefore, the staff finds that the requirement of 10 CFR 73.67(2)(i), to provide early detection and assessment of unauthorized access or activities by an external adversary within the controlled access area containing SNM, would be met.

Applicable Requirement: 10 CFR 73.67(a)(2)(ii), “General performance objectives. To achieve these objectives, the physical protection system shall provide: ... (ii) Early detection of removal of special nuclear material by an external adversary from a controlled access area...”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of their SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that each general performance objective

of 10 CFR 73.67 will be met. Because FPL will be using a SNM-qualified licensee to perform the shipment of SNM of low strategic significance and will confirm that such a licensee has the physical protection measures in place to meet each general performance objective, subsequently that SNM-qualified licensee will have the ability to meet the requirement of establishing and maintaining a physical protection system that has the capability to provide for early detection of removal of SNM by an external adversary from a controlled access area.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has physical protection measures in place to meet each general performance objective. Therefore, the staff finds that the requirement of 10 CFR 73.67(2)(ii) to provide early detection of removal of SNM by an external adversary from a controlled access area, would be met.

Applicable Requirement: 10 CFR 73.67(a)(2)(iii), “General performance objectives. To achieve these objectives, the physical protection system shall: ... (iii) Assure proper placement and transfer of custody of special nuclear material.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of their SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that each general performance objective of 10 CFR 73.67 will be met. Also, FPL has described the process for receiving and placing SNM in Sections 5.1.1 (for non-fuel SNM) and 5.1.2 (for fuel SNM) of its SNMPPP. Furthermore, SNM to be transported from the site or received at the site will have an MC&A program applied to it as described in Part 11 of the application. Because FPL will be using a SNM-qualified licensee to perform the shipment of SNM of low strategic significance and will confirm that such a licensee has the physical protection measures in place to meet each general performance objective, has procedures for receipt/placement of SNM, and has an MC&A program that will apply to SNM, subsequently, that SNM-qualified licensed shipper and FPL will have the ability to meet the requirement of establishing and maintaining a physical protection system that has the capability to assure proper placement and transfer of custody of SNM.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has physical protection measures in place to meet each general performance objective. In addition, FPL has a described process for receiving and placing SNM and will have a material control and accounting program applied to SNM to be shipped or received. Therefore, the staff finds that the requirement of 10 CFR 73.67(2)(iii), to assure proper placement and transfer of custody of SNM, would be met.

Applicable Requirement: 10 CFR 73.67(a)(2)(iv), “General performance objectives. To achieve these objectives, the physical protection system shall: ... (iv) Respond to indications of an unauthorized removal of special nuclear material and then notify the appropriate response forces of its removal in order to facilitate its recovery.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of their SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that each general performance objective of 10 CFR 73.67 will be met. Because FPL will be using a SNM-qualified licensee to perform the shipment of SNM of low strategic significance and will confirm that such a licensee has the physical protection measures in place to meet each general performance objective, subsequently that SNM-qualified licensee will have the ability to meet the requirement of responding to indications of an unauthorized removal of SNM and then notify the appropriate response forces of its removal in order to facilitate its recovery.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has physical protection measures in place to meet each general performance objective. Therefore, the staff finds that the requirement of 10 CFR 73.67(a)(2)(iv), to respond to indications of an unauthorized removal of SNM and then notify the appropriate response forces of its removal in order to facilitate its recovery, would be met.

1.5.5.1.4.5. In-Transit General Requirements

The applicable requirements specified in 10 CFR 73.67 include the following general requirements.

- “(c) Each licensee who possesses, uses, transports, or delivers to a carrier for transport special nuclear material of moderate strategic significance, or 10 kg or more of special nuclear material of low strategic significance shall:
 - (1) Submit a security plan or an amended security plan describing how the licensee will comply with all the requirements of paragraphs (d), (e), (f), and (g) of this section, as appropriate, including schedules of implementation. The licensee shall retain a copy of the effective security plan as a record for three years after the close of period for which the licensee possesses the special nuclear material under each license for which the original plan was submitted. Copies of superseded material must be retained for three years after each change,
 - (2) Within 30 days after the plan submitted pursuant to paragraph (c)(1) of this section is approved, or when specified by the NRC in writing, implement the approved security plan.”

The in-transit physical protection requirements of 10 CFR 73.67(a) are applicable because of the manner in which SNM of low strategic significance was described in the Turkey Point Units 6 and 7 COL application.

Applicable Requirement: 10 CFR 73.67(c)(1), “Submit a security plan including schedules for implementation...shall retain a copy ...for three years...” ... “Copies of the superseded material must be retained for three years after each change.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67 (g) in Section 6 of its SNMPPPD. The SNMPPPD Section 5.7 states that the SNMPPPD would be retained for three years and that copies of superseded material will be retained for three years after each change.

The FPL application states that FPL will fully implement the requirements of 10 CFR 73.67 before SNM is received. In addition, its SNMPPPD describes the required retention parameters for the SNMPPPD and changes to it. Therefore, the staff finds that the requirement of 10 CFR 73.67(c)(1), to submit a security plan including schedules for implementation, to retain the security plan for three years after the specific type of SNM has been removed from the site, and to retain copies of the superseded material for three years after each change, would be met.

Applicable Requirement: 10 CFR 73.67(c)(2), “Within 30 days after the plan submitted pursuant to paragraph (c)(1) of this section is approved, or when specified by the NRC in writing, implement the approved security plan.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of its SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that 10 CFR 73.67(c)(2) would be met. Furthermore, the applicant stated in “Table 13.4-201,” (ADAMS Accession No. ML15301A332), under Item 15, titled “Implementation Milestone,” their commitment to meet the requirements of 10 CFR 73.67, “180 days prior to initial receipt of new fuel or non-fuel special nuclear material.” Therefore, the staff finds the requirement, of 10 CFR 73.67(c)(2) to “Within 30 days after the plan submitted pursuant to paragraph (c)(1) of this section is approved, or when specified by the NRC in writing, implement the approved security plan,” would be met.

1.5.5.1.4.6. In-Transit Physical Protection Requirements

The applicable requirements specified in 10 CFR 73.67, “Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance,” had in-transit physical protection requirements described.

The physical protection requirements of 10 CFR 73.67(g), “In-transit requirements for special nuclear material of low strategic significance,” states that,

- (1) Each licensee who transports or who delivers to a carrier for transport special nuclear material of low strategic significance shall:
 - (i) Provide advance notification to the receiver of any planned shipments specifying the mode of transport, estimated time of arrival, location of the nuclear material transfer point, name of carrier and transport identification,
 - (ii) Receive confirmation from the receiver prior to commencement of the planned shipment that the receiver will be ready to accept the shipment at the planned time and location and acknowledges the specified mode of transport,

- (iii) Transport the material in a tamper indicating sealed container,
 - (iv) Check the integrity of the containers and seals prior to shipment, and
 - (v) Arrange for the in-transit physical protection of the material in accordance with the requirements of Section 73.67(g)(3) of this part, unless the receiver is a licensee and has agreed in writing to arrange for the in-transit physical protection.
- (2) Each licensee who receives quantities and types of special nuclear material of low strategic significance shall:
- (i) Check the integrity of the containers and seals upon receipt of the shipment,
 - (ii) Notify the shipper of receipt of the material as required in Section 74.15 of this chapter, and
 - (iii) Arrange for the in-transit physical protection of the material in accordance with the requirements of Section 73.67(g)(3) of this part, unless the shipper is a licensee and has agreed in writing to arrange for the in-transit physical protection.
- (3) Each licensee, either shipper or receiver, who arranges for the physical protection of special nuclear material of low strategic significance while in transit or who takes delivery of such material free on board (f.o.b.) the point at which it is delivered to a carrier for transport shall:
- (i) Establish and maintain response procedures for dealing with threats or thefts of this material. The licensee shall retain a copy of the current response procedures as a record for three years after the close of period for which the licensee possesses the special nuclear material under each license for which the procedures were established. Copies of superseded material must be retained for three years after each change.
 - (ii) Make arrangements to be notified immediately of the arrival of the shipment at its destination, or of any such shipment that is lost or unaccounted for after the estimated time of arrival at its destination, and
 - (iii) Conduct immediately a trace investigation of any shipment that is lost or unaccounted for after the estimated arrival time and notify the NRC Operations Center within one hour after the discovery of the loss of the shipment and within one hour after recovery of or accounting for such lost shipment in accordance with the provisions of Section 73.71 of this part."

The in-transit physical protection requirements of 10 CFR 73.67(g) are applicable because of the manner in which SNM of low strategic significance was described in the Turkey Point Units 6 and 7 COL application.

Applicable Requirement: 10 CFR 73.67(g) "In-transit requirements for special nuclear material of low strategic significance. (1) Each licensee who transports or who delivers to a carrier for transport special nuclear material of low strategic significance shall: (i)

Provide advance notification to the receiver of any planned shipments specifying the mode of transport, estimated time of arrival, location of the nuclear material transfer point, name of carrier and transport identification.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of its SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that 10 CFR 73.67(g)(1)(i) will be met. FPL will be using a SNM-qualified licensee to perform the shipment of SNM of low strategic significance and will confirm that such a licensee has the physical protection measures in place to meet 10 CFR 73.67(g)(1)(i). Therefore, that SNM-qualified licensee will have the ability to meet the requirement of providing advance notification to the receiver of any planned shipments specifying the mode of transport, estimated time of arrival, location of the nuclear material transfer point, name of carrier, and transport identification.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has physical protection measures in place to meet 10 CFR 73.67(g)(1)(i). Therefore, the staff finds the requirement of 10 CFR 73.67(g)(1)(i) would be met.

Applicable Requirement: 10 CFR 73.67(g)(1)(ii) “In-transit requirements for special nuclear material of low strategic significance. (1) Each licensee who transports or who delivers to a carrier for transport special nuclear material of low strategic significance shall: ... (ii) Receive confirmation from the receiver prior to commencement of the planned shipment that the receiver will be ready to accept the shipment at the planned time and location and acknowledges the specified mode of transport.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of its SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used to transport SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that 10 CFR 73.67(g)(1)(ii) will be met. FPL will be using a SNM qualified licensee to perform the shipment of SNM of low strategic significance and will confirm that such a licensee has the physical protection measures in place to meet the requirements of 10 CFR 73.67(g)(1)(ii). Therefore, that SNM-qualified licensee will have the ability to meet the requirement of receiving confirmation from the receiver prior to commencement of the planned shipment that the receiver will be ready to accept the shipment at the planned time and location and acknowledges the specified mode of transport.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has physical protection measures in place to meet 10 CFR 73.67(g)(1)(ii). Therefore, the staff finds that the requirement of 10 CFR 73.67(g)(1)(ii), to receive confirmation from the receiver prior to commencement of the planned shipment that the receiver will be ready to accept the shipment at the planned time and location and acknowledges the specified mode of transport, would be met.

Applicable Requirement: 10 CFR 73.67(g)(1)(iii) “In-transit requirements for special nuclear material of low strategic significance. (1) Each licensee who transports or who delivers to a carrier for transport special nuclear material of low strategic significance shall: ... (iii) Transport the material in a tamper indicating sealed container.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of its SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that 10 CFR 73.67(g)(1)(iii) will be met.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has physical protection measures in place to meet 10 CFR 73.67(g)(1)(iii). Therefore, the staff finds that the requirement of 10 CFR 73.67(g)(1)(iii), to transport the material in a tamper indicating sealed container, would be met.

Applicable Requirement: 10 CFR 73.67(g)(2)(i) “In-transit requirements for special nuclear material of low strategic significance. (2) Each licensee who receives quantities and types of special nuclear material of low strategic significance shall: (i) Check the integrity of the containers and seals upon receipt of the shipment.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of its SNMPPPD. Specifically, Section 3.3 of the SNMPPPD states that for both non-fuel and fuel SNM, that the integrity of both shipping containers and tamper-seals will be checked.

The FPL application states that shipment containers and tamper-seals applied to those containers would be checked upon receipt. Therefore, the staff finds the requirement of 10 CFR 73.67(g)(2)(i), to check the integrity of the containers and seals upon receipt of the shipment, would be met.

Applicable Requirement: 10 CFR 73.67(g)(2)(ii) “In-transit requirements for special nuclear material of low strategic significance. (2) Each licensee who receives quantities and types of special nuclear material of low strategic significance shall: ... (ii) Notify the shipper of receipt of the material as required in Section 74.15 of this chapter.”

The FPL SNMPPPD, Sections 5.1.1 (for non-fuel SNM) and 5.1.2 (for fuel SNM), states that the shipper would be notified in accordance with 10 CFR 74.15. In addition, Section 4.1, “Procedures,” of the SNMPPPD states that the development of procedures for “Receiving and shipping SNM” was described.

The FPL application states that the shipper would be notified in accordance with 10 CFR 74.15 for both non-fuel and fuel SNM. Therefore, the staff finds that the requirement of 10 CFR 73.67(g)(2)(ii), to notify the shipper of receipt of SNM, as required per 10 CFR 74.15, would be met.

Applicable Requirement: 10 CFR 73.67(g)(2)(iii) “Arrange for the in- transit physical protection of the material in accordance with the requirements of Section 73.67(g)(3) of this part, unless the shipper is a licensee and has agreed in writing to arrange for the in-transit physical protection.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of its SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that 10 CFR 73.67(g)(2)(iii) will be met. Specifically, Section 6.1 “In-Transit Requirements for SNM” of the SNMPPPD states that FPL would ensure that the “SNM qualified licensee... would arrange for in-transit physical protection...in accordance with 10 CFR 73.67(g)(3), unless the shipper is a licensee and has agreed in writing to arrange for the in-transit physical protection.”

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has provisions in place to meet 10 CFR 73.67(g)(2)(iii). Therefore, the staff finds that the requirement of 10 CFR 73.67(g)(2)(iii), to arrange for the in-transit physical protection of the material in accordance with the requirements of Section 73.67(g)(3) of this part, unless the shipper is a licensee and has agreed in writing to arrange for the in-transit physical protection, would be met.

Applicable Requirement: 10 CFR 73.67(g)(3), “Each licensee, either shipper or receiver, who arranges for the physical protection of special nuclear material of low strategic significance while in transit or who takes delivery of such material f.o.b. the point at which it is delivered to a carrier for transport shall: (i) Establish and maintain response procedures for dealing with threats or thefts of this material. The licensee shall retain a copy of the current response procedures as a record for three years after the close of period for which the licensee possesses the special nuclear material under each license for which the procedures were established. Copies of superseded material must be retained for three years after each change.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of its SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that 10 CFR 73.67(g)(3)(i) will be met.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has provisions in place to meet 10 CFR 73.67(g)(3)(i). Therefore, the staff finds the requirement, of 10 CFR 73.67(g)(3)(i) to, “[e]stablish and maintain response procedures ...,” would be met.

Applicable Requirement: 10 CFR 73.67(g)(3), “Each licensee, either shipper or receiver, who arranges for the physical protection of special nuclear material of low strategic significance while in transit or who takes delivery of such material f.o.b. the point at

which it is delivered to a carrier for transport shall: ... (ii) Make arrangements to be notified immediately of the arrival of the shipment at its destination point, or of any shipment that is lost or unaccounted for after the estimated time of arrival at its destination.”

The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g)(ii) in Section 6 of its SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that 10 CFR 73.67(g)(3)(ii) will be met. Also, Sections 5.1.1 and 5.1.2 of the SNMPPPD state that the shipping vendor will be notified in accordance with 10 CFR 73.67(g)(3)(ii), for non-fuel and fuel SNM, respectively.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has provisions in place to meet 10 CFR 73.67(g)(3)(ii). In addition, the applicant states that notifications for both no-fuel and fuel SNM will be made in accordance with 10 CFR 73.67(g)(3)(ii). Therefore, the staff finds that the requirement of 10 CFR 73.67(g)(3)(ii), to make arrangements to be notified immediately of the arrival of the shipment at its destination point, or of any shipment that is lost or unaccounted for after the estimated time of arrival at its destination, would be met.

Applicable Requirement: 10 CFR 73.67(g)(3), “Each licensee, either shipper or receiver, who arranges for the physical protection of special nuclear material of low strategic significance while in transit or who takes delivery of such material f.o.b. the point at which it is delivered to a carrier for transport shall: ... (iii) Conduct immediately a trace investigation of any shipment that is lost or unaccounted for after the estimated arrival time and notify the NRC Operations Center within one hour after the discovery of the loss of the shipment and within one hour after recovery of or accounting for such lost shipment in accordance with the provisions of Section 73.71 of this part.”

In Section 6 of its SNMPPPD, the applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g). The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that 10 CFR 73.67(g)(3)(iii) will be met. FPL has committed to meeting the requirement in its SNMPPPD in Sections 5.1.1 and 5.1.2. Also, in Section 4.1 of the SNMPPPD, FPL noted that a procedure would be developed for notification processes.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has provisions in place to meet 10 CFR 73.67(g)(3)(iii). In addition, FPL has committed to meeting the 10 CFR 73.67(g)(3)(iii) trace investigation/notification requirement. Therefore, the staff finds that the requirement of 10 CFR 73.67(g)(3)(iii), to conduct immediately a trace investigation of any shipment that is lost or unaccounted for after the estimated arrival time, to notify the NRC Operations Center within one hour after the discovery of the loss of the

shipment, to notify the NRC and within one hour after recovery of or accounting for such lost shipment in accordance with the provisions of 10 CFR Section 73.71, would be met.

Applicable Requirement: 10 CFR 73.67(g)(4), “Each licensee who exports special nuclear material of low strategic significance shall comply with the appropriate requirements specified in paragraphs (c) and (g) (1) and (3) of this section. The licensee shall retain each record required by these sections for three years after the close of period for which the licensee possesses the special nuclear material under each license that authorizes the licensee to export this material. Copies of superseded material must be retained for three years after each change.”

Section 1.5.5.1.4.2 of this SER describes how the applicant would meet the requirements of 10 CFR 73.67(c). The applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g) in Section 6 of its SNMPPPD. The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that 10 CFR 73.67(g)(4) will be met.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has provisions in place to meet 10 CFR 73.67(c) requirements, as specified in Section 6 of the SNMPPPD. Section 1.5.5.1.4.6 of this SER details how the requirements of 10 CFR 73.67(g)(1) and (3) would be met. Therefore, the staff finds that the requirement of 10 CFR 73.67(g)(4), as described above, would be met.

Applicable Requirement: 10 CFR 73.67(g)(5)(i) “Each licensee who imports special nuclear material of low strategic significance shall: (i) Comply with the requirements specified in paragraphs (c) and (g) (2) and (3) of this section and retain each record required by these paragraphs for three years after the close of period for which the licensee possesses the special nuclear material under each license that authorizes the licensee to import this material. Copies of superseded material must be retained for three years after each change.”

In Section 6 of its SNMPPPD, the applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g). The SNMPPPD states that a SNM-qualified licensed shipper, other than FPL, will be used for transport of SNM of low strategic significance both to and from the site. In addition, Section 6 of the SNMPPPD states that FPL will confirm that the licensee used for transport of SNM has “plans and procedures” that are developed and implemented in such a manner that 10 CFR 73.67(g)(5) will be met.

The FPL application states that arrangements with a SNM-qualified licensed shipper would be made for the transport of SNM of low strategic significance, and that FPL will confirm that the licensed shipper has provisions in place to meet 10 CFR 73.67(c) requirements, as specified in SNMPPPD Section 6. How the requirements of 10 CFR 73.67(c) would be met by the applicant are described above in this SER. Therefore, the staff finds that the requirement of 10 CFR 73.67(g)(5), as described above, would be met.

Applicable Requirement: 10 CFR 73.67(g)(5)(ii) “Each licensee who imports special nuclear material of low strategic significance shall: (ii) Notify the person who delivered the material to a carrier for transport of the arrival of such material.”

In Section 6 of its SNMPPPD, the applicant included a description of how it intends to meet the in-transit physical protection requirements of 10 CFR 73.67(g). Specifically, Sections 5.1.1 and 5.1.2 state that the shipper would be notified upon receipt of SNM. In addition, the applicant described the development of procedures for receiving and shipping SNM in Section 4.1 of the SNMPPPD.

The staff finds that because FPL has described 1) notification actions to be made upon the receipt of SNM in their SNMPPPD, and 2) the development of procedures that would pertain to receiving and shipping SNM, the requirement of 10 CFR 73.67(g)(5)(ii), to notify the person who delivered the material to a carrier for transport of the arrival of such material, would be met.

1.5.5.1.4.7 Turkey Point Units 6 and 7 COL FSAR Section 13.5.2.2.8

The applicant included in Turkey Point Units 6 and 7 COL FSAR Section 13.5.2.2.8, “Security Procedures,” in general terms, the correct manner in which the requirements of 10 CFR 73.67 must be applied to the non-fuel HEU sources that are SNM of low strategic significance, that the applicant proposes to possess, transport, and use at the Turkey Point site. Therefore, the staff finds that the application of the correct physical protection measures, as stated in 10 CFR 73.67, to all types of SNM of low strategic significance, would be met.

1.5.5.1.4.8 Post September 11, 2001, Security Order for SNM of Low Strategic Significance

Applicable Requirement: “General Performance Objectives and Requirements,” Analysis per the order.

The applicant considered the order and assessed that only Parts C and D of the order should be addressed. Section 1 of the SNMPPPD discusses the analysis that justified only Parts C and D of the order needed to be addressed. The analysis provided by the applicant describes the details of the assessment as to whether or not the nuclear reactor would have a critical target area, as defined in the security order text. Therefore, the staff finds that the analysis requirement presented in the beginning of the order would be met

Part C of the order “Response”

Applicable Requirement: Part C.1. of the order “Develop security response procedures...”

In Section 4.1 of the SNMPPPD, the applicant described the procedures that it would develop. Among these were the response procedures.

The staff finds that, because the applicant committed to develop response implementing procedures that would be subject to NRC inspection, the order requirement of Part C.1. would be met.

Applicable Requirement: Part C.2. of the order (Part C.2. of the order contains safeguards information and is not described here).

The applicant addressed Part C.2. of the order in Section 5.10 of the SNMPPPD.

The staff finds that, because the applicant described the response attributes that aligned with Part C.2. of the order, the order requirement of Part C.2. would be met.

Part D of the Order “General”

Applicable Requirement: Part D.1. of the order “hexafluoride”

The applicant addressed this order requirement in Section 1 of the SNMPPPD. The applicant stated that uranium hexafluoride would not be brought on the nuclear power reactor site and was not at all associated with the license application.

The staff finds that, because the applicant described the conditions associated with uranium hexafluoride in regard to the Turkey Point Units 6 and 7 site, the order requirement of Part D.1. would be met.

Applicable Requirement: Part D.2. of the order “Hazardous Material”

The applicant addressed this order requirement in Section 5.9, “Chemicals and Hazardous Materials,” of the SNMPPPD. In addition, a procedure to implement the strategy outlined in Section 5.9 of the SNMPPPD was committed to be developed in Section 4.1 of the SNMPPPD.

The applicant described an acceptable means to reduce storage of hazardous material on-site to the minimal necessary in order to avoid disrupting operations. Therefore, the staff finds that, because the applicant described a strategy to address Part D.2. of the order and committed to development of a procedure to implement that strategy; the order requirement of Part D. 2. would be met.

Applicable Requirement: Part D.3. of the order “Supplement the Emergency Action Levels”

The applicant addressed Part D.3. of the order in Section 5.11, “Emergency Response,” of the SNMPPPD. The applicant committed to supplementing the Emergency Action Levels and their thresholds in response to a range of credible or imminent threats. The staff reviewed the applicant's description of the Emergency Action Level actions to be accomplished and found that the order measure was addressed in an acceptable manner.

The staff finds that, because the applicant described how the requirement of Part D.3. of the order would be addressed, the order requirement of Part D.3. would be met.

Applicable Requirement: Part D.4. of the order “Evaluate computer and communications”

The applicant addressed Part D.4. of the order in Section 5.11 of the SNMPPPD. Specifically, the applicant committed to the evaluation of computer and communication networks for vulnerabilities, including modem access vulnerabilities, and to address them as necessary.

The staff finds that, because the applicant described how the requirement of Part D.4. of the order would be addressed, the order requirement of Part D.4. would be met.

Applicable Requirement: Part D.5. of the order “Evaluate capabilities...fire suppression”

The applicant addressed Part D.5. of the order in Section 5.12, “Fire Response,” of the SNMPPPD. Specifically, the applicant coordinated with off-site fire departments and developed a response plan to notify those departments, if and when necessary, to facilitate fire suppression efforts.

The staff finds that, because the applicant described how the requirement of Part D.5. of the order would be addressed, the order requirement of Part D.5. would be met.

Applicable Requirement: Part D.6. of the order “Evaluate...medical”

The applicant addressed Part D.6. of the order in Section 5.13, “Medical Response,” of the SNMPPPD. Specifically, the applicant identified two local medical care facilities available for utilization given such a need was requested.

The staff finds that, because the applicant described how the requirement of Part D.6. of the order would be addressed, the order requirement of Part D.6. would be met.

Applicable Requirement: Part D.7. of the order “Limit...access...”

The applicant discussed in Section 5.7 how the order requirement D.7 would be addressed. This included a discussion of the restriction of public access to sensitive documents.

The staff finds that, because the applicant described how the requirement of Part D.7. of the order would be addressed, the order requirement of Part D.7. would be met.

Part 3 of the Order “Access Control and Badging”

The applicant stated in Section 5.4, “Access Control and Badging,” of the SNMPPPD that those persons afforded access to the controlled access area would be under the access authorization program as presented in Section 14.1 of their power reactor PSP. Section 14.1 of the Turkey Point Units 6 and 7 power reactor PSP describes an access authorization program in compliance with RG 5.66. The access authorization program as described in RG 5.66 includes fingerprinting and an overall more-stringent access authorization program than that described in Part 3 of the order. In addition, as stated in the SNMPPPD Section 5.4 individuals not under the subject access authorization program would be escorted into, out of, and within the controlled access area in accordance with Section 14.4.6 of the power reactor PSP which describes the escort methodologies developed for the Turkey Point Units 6 and 7 site.

The applicant described that RG 5.66 would be applied to meet Part 3 of the order and is the staff recognizes that in doing so a more stringent access authorization process would be utilized than that described in Part 3 of the order. Therefore, the staff finds that the order requirements of Part 3, which include fingerprinting and other access authorization provisions, would be met.

1.5.5.2 Conclusion and Post Combined License Activities

Based on the above, the NRC staff finds that the information regarding general information, organization and administration, radiation protection, nuclear criticality safety, fire safety, emergency preparedness, and environmental protection to support receipt, storage, and possession of fuel and non-fuel SNM (Fission Chambers), conforms to the applicable guidance in NUREG-1520 and NUREG-0800 and, therefore, is acceptable.

With respect to the applicable physical protection requirements specified in 10 CFR 73.67 and the post-September 11, 2001, security order for the possession, use, and transport of SNM of low strategic significance, the NRC staff reviewed the application and concludes that the relevant information in the application is acceptable because it meets the applicable requirements and the guidance in RG 5.59.

The license condition language in this section has been modified, per a letter from the applicant dated April 8, 2016 (ADAMS Accession No. ML16103A507), confirming the acceptability of the following license conditions proposed by the staff. These changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

License Condition (1-3) - Subject to the conditions and requirements incorporated herein, the Commission hereby licenses FPL:

- (1) (a) pursuant to the Act and 10 CFR Part 70, to receive and possess at any time, special nuclear material as reactor fuel, in accordance with the limitations for storage and in amounts necessary for reactor operation, described in the FSAR, as supplemented and amended;
- (b) pursuant to the Act and 10 CFR Part 70, to use special nuclear material as reactor fuel, after a Commission finding under 10 CFR 52.103(g) has been made, in accordance with the limitations for storage and amounts necessary for reactor operation, described in the FSAR, as supplemented and amended;
- (2) (a) pursuant to the Act and 10 CFR Parts 30 and 70, to receive, possess, and use, at any time before a Commission finding under 10 CFR 52.103(g), such byproduct and special nuclear material (but not uranium hexafluoride) as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts not exceeding those specified in 10 CFR 30.35(d) and 10 CFR 70.25(d) for establishing decommissioning financial assurance, and not exceeding those specified in 10 CFR 30.72 and 10 CFR 70.22(i)(1);
- (b) pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use, after a Commission finding under 10 CFR 52.103(g), any byproduct, source, and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as necessary;

- (3) (a) pursuant to the Act and 10 CFR Parts 30 and 70, to receive, possess, and use, before a Commission finding under 10 CFR 52.103(g), any byproduct or special nuclear material (but not uranium hexafluoride) that is (1) in unsealed form; (2) on foils or plated surfaces, or (3) sealed in glass, for sample analysis or instrument calibration or other activity associated with radioactive apparatus or components, in amounts not exceeding those specified in 10 CFR 30.35(d) and 10 CFR 70.25(d) for establishing decommissioning financial assurance, and not exceeding those specified in 10 CFR 30.72 and 10 CFR 70.22(i)(1);
- (b) pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use, after a Commission finding under 10 CFR 52.103(g), in amounts as necessary, any byproduct, source, or special nuclear material (but not uranium hexafluoride) without restriction as to chemical or physical form, for sample analysis or instrument calibration or other activity associated with radioactive apparatus or components but not uranium hexafluoride; and
- (4) pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.
- License Condition (1-4) - Prior to initial receipt of special nuclear materials onsite, the licensee shall implement the Special Nuclear Material Control and Accounting Program. No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors a schedule that supports planning for and conduct of NRC inspections of the Special Nuclear Material Control and Accounting Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the Special Nuclear Material Control and Accounting Program has been fully implemented.
 - License Condition (1-5) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors a schedule that supports planning for and conduct of NRC inspection of the non-licensed plant staff training program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the non-licensed plant staff training program has been fully implemented.
 - License Condition (1-6) – Prior to initial receipt of special nuclear material on site, the licensee shall implement the Special Nuclear Material Physical Protection Program. No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors a schedule that supports planning for and conduct of NRC inspection of the Special Nuclear Material Physical Protection Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the Special Nuclear Material Physical Protection Program has been fully implemented.

2.0 SITE CHARACTERISTICS

Chapter 2, “Site Characteristics,” of the Turkey Point Units 6 and 7 combined license (COL) final safety analysis report (FSAR) addresses the geological, seismological, hydrological, and meteorological characteristics of the Turkey Point Units 6 and 7 site and vicinity, in conjunction with present and projected population distribution and land use and site activities and controls.

2.0.1 Introduction

The site characteristics are reviewed by the U.S. Nuclear Regulatory Commission (NRC) staff to determine whether the applicant has accurately described the site characteristics and site parameters in accordance with Title 10 of the *Code of Federal Regulations* (CFR) Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants.” The review is focused on the site characteristics and site-related design characteristics needed to enable the staff to reach a conclusion on all safety matters related to siting of the Turkey Point Units 6 and 7. Because this COL application references a design certification (DC), this section focuses on the applicant’s demonstration that the characteristics of the site fall within the site parameters specified in the DC rule or, if outside the site parameters, that the design satisfies the requirements imposed by the specific site characteristics and conforms to the design commitments and acceptance criteria described in the AP1000 design control document (DCD).

2.0.2 Summary of Application

Section 2.0 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Chapter 2 of the AP1000 DCD. AP1000 DCD Chapter 2 includes Section 2. This safety evaluation report (SER) refers to the Turkey Point Units 6 and 7 COL FSAR, Revision 8, and AP1000 DCD, Revision 19, unless otherwise specified.¹

In addition, in the Turkey Point Units 6 and 7 COL FSAR Sections 2.1, 2.2, 2.4, and 2.5, the applicant provided the following:

Tier 2 Departures

- STD DEP 1.1-1

The applicant proposed numbering Sections 2.0, 2.1, 2.2, 2.4, and 2.5 of this chapter based on Regulatory Guide (RG) 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition),” down to the X.Y.Z level, rather than following the AP1000 DCD numbering and organization. In addition, Turkey Point Units 6 and 7 COL FSAR Part 7 requests an exemption from the numbering scheme in the AP1000 DCD. The applicant also requested other portions of the Turkey Point Units 6 and 7 COL FSAR be renumbered in STD DEP 1.1-1. The evaluation of STD DEP 1.1-1 can be found in SER Section 1.5.4.

¹ See Section 1.2.2 for a discussion of the staff’s review related to verification of the scope of information to be included in a COL application that references a DC. This SER refers to the Turkey Point Units 6 and 7 COL FSAR, Revision 8, and AP1000 DCD, Revision 19, unless otherwise specified. This footnote will be referenced in several places throughout the chapter of this Safety Evaluation.

- PTN DEP 2.0-2

The applicant proposed a departure from the maximum normal wet-bulb (noncoincident) air temperature in Tier 2 material of the AP1000 DCD.

- PTN DEP 2.0-4

The applicant proposed a departure from the site parameter for the population distribution exclusion area (site) in Tier 2 material of the AP1000 DCD.

Tier 1 and 2 Departures

- PTN DEP 2.0-1

The applicant proposed a departure from the operating basis wind speed in both Tier 1 and Tier 2 material of the AP1000 DCD.

- PTN DEP 2.0-3

The applicant proposed a departure from the maximum safety wet-bulb (noncoincident) air temperature in both Tier 1 and Tier 2 material of the AP1000 DCD.

In addition, Turkey Point Units 6 and 7 COL FSAR Part 7 requests an exemption from the site parameter values described in PTN DEP 2.0-1, PTN DEP 2.0-2, PTN DEP 2.0-3, and PTN DEP 2.0-4.

Supplemental Information

- PTN Supplemental (SUP) 2.0-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.0, "Site Characteristics," which describes the site characteristics of Turkey Point Units 6 and 7. The applicant also provided Turkey Point Units 6 and 7 COL FSAR Table 2.0-201, which provides a comparison of the AP1000 DCD site parameters and Turkey Point Units 6 and 7 site characteristics; Turkey Point Units 6 and 7 COL FSAR Table 2.0-202, provides control room atmospheric dispersion values expressed as χ/Q for all applicable accident analyses.

2.0.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the site characteristics are given in Section 2.0, "Site Characteristics and Site Parameters," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition."

The applicable regulatory requirements for site characteristics are as follows:

- 10 CFR 52.79(a)(1)(i)–(vi) provides requirements for the site-related contents of the application.
- 10 CFR 52.79(d)(1), as it relates to information sufficient to demonstrate that the characteristics of the site fall within the site parameters specified in the DC.
- 10 CFR Part 100, “Reactor Site Criteria,” as it relates to the siting factors and criteria for determining an acceptable site.

The related acceptance criteria from Section 2.0 of NUREG-0800 are as follows:

- The acceptance criteria associated with specific site characteristics and parameters and site-related design characteristics/parameters are addressed in the related Chapter 2 or other referenced sections of NUREG-0800.
- Acceptance is based on the applicant’s demonstration that the characteristics of the site fall within the site parameters of the certified design. If the actual site characteristics do not fall within the certified standard design site parameters, the COL applicant provides sufficient justification (e.g., by request for exemption or amendment from the DC) that the proposed facility is acceptable at the proposed site.

The regulatory requirements associated with the Tier 1 and 2 departures and the exemption request are as follows:

- 10 CFR Part 52, Appendix D, “Design Certification Rule for the AP1000 Design,” Section IV.A.2.d:

An applicant for a combined license that wishes to reference this appendix shall ...comply with the following requirements: Include, as part of its application ...Information demonstrating compliance with the site parameters and interface requirements.

- 10 CFR Part 52, Appendix D, Section VIII.A.4. This section states that exemptions from Tier 1 material are governed by 10 CFR 52.63(b)(1). The regulation in 10 CFR 52.63(b)(1) references 10 CFR 52.7, “Specific Exemptions.”
- 10 CFR Part 52, Appendix D, “Design Certification Rule for the AP1000 Design,” Section VIII, “Processes for Changes and Departures,” Item B.5.
- 10 CFR 52.7 states that the Commission may grant exemptions from the requirements of the regulations of this part as governed by 10 CFR 50.12, “Specific Exemptions,” of this chapter.
- 10 CFR 50.12(a) – Specific Exemptions:
 - (a) The Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of the regulations in Part 52, which are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security.

The Commission will not consider granting an exemption unless special circumstances are present.

- 10 CFR 52.93(a) – Exemptions and variances:
 - (a) Applicants for a combined license under Part 52, or any amendment to a combined license, may include in the application a request for an exemption from one or more of the Commission's regulations.

2.0.4 Technical Evaluation

The staff reviewed Section 2.0 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to site characteristics. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Tier 2 Departures

- STD DEP 1.1-1

The applicant's evaluation, in accordance with 10 CFR Part 52, Appendix D, Section VIII, Item B.5, determined that this departure did not require prior NRC approval. The numbering of Turkey Point Units 6 and 7 COL FSAR Chapter 2 is based on RG 1.206 down to the X.Y.Z level rather than following the AP1000 DCD organization for Chapter 2. The staff finds the Turkey Point Units 6 and 7 COL FSAR Chapter 2 numbering system proposed by the applicant to be acceptable because it provides for a logical presentation and review of the information in accordance with the guidance in RG 1.206.

The applicant renumbered the Turkey Point Units 6 and 7 COL FSAR Sections 2.0, 2.1, 2.2, 2.4 and 2.5 to include content consistent with RG 1.206, and NUREG-0800. The applicant identified the affected sections in Part 7 of the Turkey Point Units 6 and 7 COL FSAR. The departure and the exemption associated with the numbering scheme of the FSAR are closely related. The departure provided in Part 7 of the COL application provides the specific sections of the Turkey Point Units 6 and 7 COL FSAR that deviate from the DCD numbering scheme.

As required by 10 CFR 52.7, "Specific exemptions," and 10 CFR 52.93, "Exemptions and Variances," the applicant requested an exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.a, to include "a plant-specific DCD containing the same type of information and using the same organization and numbering as the generic DCD for the AP1000 design...." In Part 7, "Departures and Exemptions," of the Turkey Point Units 6 and 7 COL FSAR, the applicant stated that the exemption will not result in any significant departures from the expected organization and numbering of a typical FSAR, and the information is readily identifiable to facilitate NRC review. The applicant stated that the subject deviations are considered to be purely administrative to support a logical construction of the document.

Furthermore, the revised organization and numbering generally follows the guidance provided in RG 1.206, and NUREG-0800.

As required by 10 CFR 52.7, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 52. The regulations in 10 CFR 52.7 further state the NRC's consideration will be governed by 10 CFR 50.12, which states that an exemption may be granted when:

(1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security, and

(2) special circumstances are present. Special circumstances are present whenever, according to 10 CFR 50.12(a)(2)(ii), "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

Before considering whether this numbering exemption should be granted, the staff needed to address a threshold question regarding the review standard applicable to the request. Under 10 CFR 52.93(a)(1), if a request for an exemption is from any part of a DC rule, then the NRC may grant the exemption if the exemption complies with any exemption provisions of the referenced DC rule, or if there are no applicable exemption provisions referenced in the DC rule, if the exemption complies with 10 CFR 52.63, "Finality of Standard Design Certifications." Here, there is no applicable change provision in the referenced DC rule, so, according to Section 52.93(a)(1), the exemption must meet 10 CFR 52.63. However, the standards of the appropriate provision of 10 CFR 52.63 applicable to requests for exemptions from a DC rule in Section 52.63(b)(1), by their terms, also do not apply to this change. Specifically, Section 52.63(b)(1) applies to changes to "certification information," and not administrative or procedural DC rule provisions such as this one under consideration. In the Statements of Consideration for 10 CFR 52.63, the Commission stated that it used the "phrase 'certification information' in order to distinguish the rule language in the DCRs from the design certification information (e.g., Tier 1 and Tier 2) that is incorporated by reference in the DCRs" (72 FR 49,444). The exemption requested from the AP1000 DCD numbering scheme is an exemption from rule language, not Tier 1 or Tier 2 information; therefore, 10 CFR 52.63 should not be used to analyze this exemption.

Because there is not an applicable change provision in the referenced DC, and because 10 CFR 52.63(b)(1) does not apply to this exemption, the exemption cannot comply with the plain language of 10 CFR 52.93(a)(1). In this situation, the language of 10 CFR 52.93(a)(1) does not appear to serve the underlying purpose of the regulation as described by the Commission in the Statements of Consideration to the rule, in which the Commission stated that only changes to certification information must meet 10 CFR 52.63. Instead, this exemption should have fallen under 10 CFR 52.93(a)(2), and, thus, be analyzed under the requirements in 10 CFR 52.7. Therefore, the staff finds that, as required by 10 CFR 52.7, an exemption to Section 52.93(a)(1) should be granted.

This exemption is warranted because it meets the requirements in 10 CFR 50.12. First, because this is an administrative change regarding what exemption regulation applies, the exemption to 10 CFR 52.93(a)(1) is authorized by law, will not present an undue risk to public health or safety, and is consistent with the common defense and security. Additionally, application of the regulation in this case is not necessary to achieve the underlying purpose of the rule. The underlying purpose of the rule is to maintain the safety benefits of standardization

by requiring any exemption from certification information to meet the requirements in 10 CFR 52.63(b)(1). This underlying purpose does not apply to this exemption, because the form and organization of the application does not affect the safety benefits of standardization of the certification information. Therefore, for the purpose of determining the standards applicable to the exemption related to STD DEP 1.1-1, the staff finds an exemption to Section 52.93(a)(1) to be acceptable for the review of the exemption related to STD DEP 1.1-1.

In accordance with the exemption described above, the staff has reviewed the exemption related to STD DEP 1.1-1 to determine whether it meets the requirements in 10 CFR 52.7. This exemption would allow the applicant to provide an FSAR with numbering and topics more closely related to NUREG-0800 and RG 1.206. The staff finds that this administrative change of minor renumbering will not present an undue risk to the public health and safety and is consistent with the common defense and security. In addition, this exemption is consistent with the Atomic Energy Act of 1954, as amended, and is, therefore, authorized by law. Furthermore, the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule. Therefore, the staff finds that the exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.a, is justified. Finally, for the same reasons the staff is granting the exemption request, the staff also finds the departure from the numbering scheme in the Turkey Point Units 6 and 7 COL FSAR to be acceptable.

- PTN DEP 2.0-2

The staff reviewed PTN DEP 2.0-2 in Turkey Point Units 6 and 7 COL FSAR Section 2.0, "Site Characteristics," describing the maximum normal wet-bulb (noncoincident) air temperature. The maximum normal wet-bulb (noncoincident) air temperature in AP1000 DCD Tier 1, Table 5.0-1 and DCD Tier 2, Table 2-1 is compared to the site-specific maximum normal wet-bulb (noncoincident) air temperature in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201.

As required by 10 CFR Part 52, Appendix D, Section VIII.A.4 and 10 CFR 52.93, the applicant requested an exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.d, to include "information demonstrating compliance with the site parameters and interface requirements," related to the maximum normal wet-bulb (noncoincident) air temperature. In Part 7, "Departures and Exemptions," of the Turkey Point Units 6 and 7 COL FSAR, the applicant stated that the exemption was evaluated in accordance with Section VIII.A.4 of the DC rule. Appendix D, Section VIII.A.4, 10 CFR 52.63(b)(1), 10 CFR 52.7, and 10 CFR 50.12 govern exemptions such as requested by the applicant here. These regulations require that: (1) the Commission will deny a request for an exemption from Tier 1 information if it finds that the design change will result in a significant decrease in the level of safety otherwise provided by the design (App. D, § VIII.A.4); (2) the Commission may grant the exemption if it is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security (§ 50.12(a)(1)); (3) the Commission will not grant the exemption unless special circumstances, as defined in § 50.12(a)(2), are present; and (4) the special circumstances that are required to be present outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption (§ 52.63(b)(1)). The applicant's bases for satisfying each of the above criteria are shown below:

1. As described in Section B.3 of Part 7 of the COL application, the exemption does not have an adverse impact on the AP1000 Standard Plant design and therefore will not result in a significant decrease in the level of safety otherwise provided by the design.

2. The exemption is not inconsistent with the Atomic Energy Act or any other statute and therefore is authorized by law. As discussed above, the exemption does not have an adverse impact on the AP1000 Standard Plant design and therefore will not present an undue risk to the public health and safety. The exemption does not relate to security and does not otherwise pertain to the common defense and security.
3. Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, application of 10 CFR Part 52, Appendix D, Section IV.A.2.d and the site parameters in Tier 1 of the DCD are not necessary to achieve the underlying purpose of the rules. The analysis described above shows that the increase in the maximum normal temperature does not affect the AP1000 Standard Plant design. Consequently, granting relief from the maximum normal air temperature in the DCD would maintain the level of safety in the design, which is the underlying purpose of the rule.
4. The special circumstances outweigh any decrease in safety that may result from the reduction in standardization (due to the increase in the maximum normal temperature) caused by the exemption. Specifically, the exemption does not change the AP1000 Standard Plant design and does not affect the configuration of the plant or the manner in which the plant is operated.

The staff's evaluation of the appropriateness of the 27.5 °Celsius (C) (81.5 °Fahrenheit (F)) value for the Turkey Point Units 6 and 7 site is discussed in SER Section 2.3. The staff's evaluation of the effects that this higher temperature has on the operation of the AP1000 design is addressed in SER Sections 2.3.1, 5.4, 6.2, 6.4, 9.1.3, 9.2.2 and 9.2.7.

Based on these evaluations, the staff has determined that the proposed increase in maximum normal wet-bulb (noncoincident) air temperature will not result in a significant decrease in the level of safety otherwise provided by the design as required by 10 CFR Part 52, Appendix D, Section VIII.A.4 and will not present an undue risk to the public health and safety as required by 10 CFR 50.12(a). Granting this exemption will not adversely affect the common defense and security. Furthermore, the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule, which qualifies as a "special circumstance" under 10 CFR 50.12(a)(2), and the special circumstances outweigh any decrease in safety that may result from the reduction in standardization (due to the increase in the maximum normal wet-bulb (noncoincident) air temperature) caused by the exemption as required by 10 CFR Part 52, Appendix D, Section VIII.A.4. Specifically, the exemption does not change the AP1000 standard plant design and does not affect the configuration of the plant or the manner in which the plant is operated.

Therefore, the staff finds that the exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.b is justified and meets the requirements of 10 CFR Part 52, Appendix D, Section VIII.A.4.

- PTN DEP 2.0-4

The staff reviewed PTN DEP 2.0-4 in Turkey Point Units 6 and 7 COL FSAR Section 2.0, "Site Characteristics," describing the site parameter for the population distribution exclusion area (site). The site parameter for the population distribution exclusion areas (site) in AP1000 DCD Tier 1, Table 5.0-1 and DCD Tier 2, Table 2-1 is compared to the site-specific site parameter for

the population distribution exclusion areas (site) in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201.

As required by 10 CFR 52.7 and 10 CFR 52.93, the applicant requested a Tier 2 departure from 10 CFR Part 52, Appendix D, Section IV.A.2.d, to include “information demonstrating compliance with the site parameters and interface requirements,” related to the site parameter for the population distribution exclusion area (site).

The staff’s evaluation of the appropriateness of using a minimum distance from the source boundary to the exclusion area boundary of 0.43 km (0.27 mi) rather than the AP1000 DCD site parameter of 0.80 km (0.5 mi) for the Turkey Point Units 6 and 7 site is discussed in SER Sections 2.1.2 and 2.3.4. Based on these evaluations, the staff has determined that the applicant’s use of distances less than those provided in the AP1000 DCD would only result in more conservative (higher) χ/Q estimates. These atmospheric dispersion estimates are appropriate for the assessment of consequences from radioactive releases for design-basis accidents (DBA) in accordance with 10 CFR 52.79(a)(1)(vi), 10 CFR 100.21(c)(2), General Design Criterion (GDC) 19, “Control Room.”

This departure will not affect the design or function of any structures, systems, and components (SSCs), the resolution of a severe accident issue identified in the plant-specific DCD, and will not adversely affect the common defense and security. Therefore, the staff finds that this departure to 10 CFR Part 52, Appendix D, Section IV.A.2.d and a departure from AP1000 DCD Table 2-1 is justified and meets the requirements of 10 CFR 52.7 and 10 CFR 52.93.

Tier 1 and Tier 2 Departures and Exemptions

- PTN DEP 2.0-1

The staff reviewed PTN DEP 2.0-1 in Turkey Point Units 6 and 7 COL FSAR Section 2.0, “Site Characteristics,” describing the operating basis wind speed. The site parameter for the operating basis wind speed in AP1000 DCD Tier 1, Table 5.0-1 and DCD Tier 2, Table 2-1 is compared to the site-specific site parameter for the operating basis wind speed in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201.

As required by 10 CFR Part 52, Appendix D, Section VIII.A.4 and 10 CFR 52.93, the applicant requested an exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.d, to include “information demonstrating compliance with the site parameters and interface requirements,” related to the operating basis wind speed. In Part 7, “Departures and Exemptions,” of the Turkey Point Units 6 and 7 COL FSAR, the applicant stated that the exemption was evaluated in accordance with Section VIII.A.4 of the design certification rule. Appendix D, Section VIII.A.4, 10 CFR 52.63(b)(1), 10 CFR 52.7, and 10 CFR 50.12 govern exemptions such as requested by the applicant here. These regulations require that: (1) the Commission will deny a request for an exemption from Tier 1 information if it finds that the design change will result in a significant decrease in the level of safety otherwise provided by the design (App. D, § VIII.A.4); (2) the Commission may grant the exemption if it is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security (§ 50.12(a)(1)); (3) the Commission will not grant the exemption unless special circumstances, as defined in § 50.12(a)(2), are present; and (4) the special circumstances that are required to be present outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption (§ 52.63(b)(1)). The applicant’s bases for satisfying each of these four criteria are shown below:

1. As described in Section A.2 of Part 7 of the COL application, the exemption does not have an adverse impact on the AP1000 Standard Plant design and therefore will not result in a significant decrease in the level of safety otherwise provided by the design.
2. The exemption is not inconsistent with the Atomic Energy Act or any other statute and therefore is authorized by law. As discussed above, the exemption does not have an adverse impact on the AP1000 Standard Plant design and therefore will not present an undue risk to the public health and safety. The exemption does not relate to security and does not otherwise pertain to the common defense and security.
3. Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, application of 10 CFR Part 52, Appendix D, Section IV.A.2.d and the site parameters in Tier 1 of the DCD are not necessary to achieve the underlying purpose of the rules. The analysis described in SER Section 2.3.1, 3.3.1, and 3.3.3 shows that the increase in the operating basis wind speed does not affect the AP1000 Standard Plant design. Consequently, granting relief from the operating basis wind speed in the DCD would maintain the level of safety in the design, which is the underlying purpose of the rule.
4. The special circumstances outweigh any decrease in safety that may result from the reduction in standardization (due to the increase in the operating basis wind speed) caused by the exemption. Specifically, the exemption does not change the AP1000 Standard Plant design and does not affect the configuration of the plant or the manner in which the plant is operated.

The staff's evaluation of the appropriateness of the 150 mph operating basis wind speed for the Turkey Point Units 6 and 7 site is described in SER Sections 2.3.1, 3.3.1 and 3.3.3.

Based on these evaluations, the staff has determined that the proposed increase in operating basis wind speed will not result in a significant decrease in the level of safety otherwise provided by the design as required by 10 CFR Part 52, Appendix D, Section VIII.A.4 and will not present an undue risk to the public health and safety as required by 10 CFR 50.12(a). Granting this exemption will not adversely affect the common defense and security. Furthermore, the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule, which qualifies as a "special circumstance" under 10 CFR 50.12(a)(2), and the special circumstances outweigh any decrease in safety that may result from the reduction in standardization (due to the increase in the operating basis wind speed) caused by the exemption as required by 10 CFR Part 52, Appendix D, Section VIII.A.4. Specifically, the exemption does not change the AP1000 standard plant design and does not affect the configuration of the plant or the manner in which the plant is operated.

Therefore, the staff finds that the exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.b is justified and meets the requirements of 10 CFR Part 52, Appendix D, Section VIII.A.4.

- PTN DEP 2.0-3

The staff reviewed PTN DEP 2.0-3 in Turkey Point Units 6 and 7 COL FSAR Section 2.0, "Site Characteristics," describing the maximum safety wet-bulb (noncoincident) air temperature. The

maximum safety wet-bulb (noncoincident) air temperature in AP1000 DCD Tier 1, Table 5.0-1 and DCD Tier 2, Table 2-1 is compared to the site-specific maximum safety wet-bulb (noncoincident) air temperature in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201.

As required by 10 CFR Part 52, Appendix D, Section VIII.A.4 and 10 CFR 52.93, the applicant requested an exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.d, to include “information demonstrating compliance with the site parameters and interface requirements,” related to the maximum safety wet-bulb (noncoincident) air temperature. In Part 7, “Departures and Exemptions,” of the Turkey Point Units 6 and 7 COL FSAR, the applicant stated that the exemption was evaluated in accordance with Section VIII.A.4 of the DC rule. Appendix D, Section VIII.A.4, 10 CFR 52.63(b)(1), 10 CFR 52.7, and 10 CFR 50.12 govern exemptions such as requested by the applicant here. These regulations require that: (1) the Commission will deny a request for an exemption from Tier 1 information if it finds that the design change will result in a significant decrease in the level of safety otherwise provided by the design (App. D, § VIII.A.4); (2) the Commission may grant the exemption if it is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security (§ 50.12(a)(1)); (3) the Commission will not grant the exemption unless special circumstances, as defined in § 50.12(a)(2), are present; and (4) the special circumstances that are required to be present outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption (§ 52.63(b)(1)). The applicant’s bases for satisfying each of these four criteria are shown below:

1. As described in Section A.2 of Part 7 of the Turkey Point Units 6 and 7 COL FSAR, the exemption does not have an adverse impact on the AP1000 Standard Plant design and therefore will not result in a significant decrease in the level of safety otherwise provided by the design.
2. The exemption is not inconsistent with the Atomic Energy Act or any other statute and therefore is authorized by law. As discussed above, the exemption does not have an adverse impact on the AP1000 Standard Plant design and therefore will not present an undue risk to the public health and safety. The exemption does not relate to security and does not otherwise pertain to the common defense and security.
3. Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, application of 10 CFR Part 52, Appendix D, Section IV.A.2.d and the site parameters in Tier 1 of the DCD are not necessary to achieve the underlying purpose of the rules. The analysis described in SER Section 2.3 shows that the increase in the maximum safety temperature does not affect the AP1000 Standard Plant design. Consequently, granting relief from the maximum safety air temperature in the DCD would maintain the level of safety in the design, which is the underlying purpose of the rule.
4. The special circumstances outweigh any decrease in safety that may result from the reduction in standardization (due to the increase in the maximum safety temperature) caused by the exemption. Specifically, the exemption does not change the AP1000 Standard Plant design and does not affect the configuration of the plant or the manner in which the plant is operated.

The staff’s evaluation of the appropriateness of the 30.8 °C (87.4 °F) value for the Turkey Point Units 6 and 7 site is described in SER Section 2.3. The staff’s evaluation of the effects that this

higher temperature has on the operation of the AP1000 design is addressed in SER Sections 2.3.1, 5.4, 6.2, 6.4, 9.1.3, 9.2.2 and 9.2.7.

Based on these evaluations, the staff has determined that the proposed increase in maximum safety wet-bulb (noncoincident) air temperature will not result in a significant decrease in the level of safety otherwise provided by the design as required by 10 CFR Part 52, Appendix D, Section VIII.A.4 and will not present an undue risk to the public health and safety as required by 10 CFR 50.12(a). Granting this exemption will not adversely affect the common defense and security. Furthermore, the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule, which qualifies as a “special circumstance” under 10 CFR 50.12(a)(2), and the special circumstances outweigh any decrease in safety that may result from the reduction in standardization (due to the increase in the maximum safety wet-bulb (noncoincident) air temperature) caused by the exemption as required by 10 CFR Part 52, Appendix D, Section VIII.A.4. Specifically, the exemption does not change the AP1000 standard plant design and does not affect the configuration of the plant or the manner in which the plant is operated.

Therefore, the staff finds that the exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.b is justified and meets the requirements of 10 CFR Part 52, Appendix D, Section VIII.A.4.

Supplemental Information

- PTN SUP 2.0-1

The staff reviewed supplemental information PTN SUP 2.0-1 in Turkey Point Units 6 and 7 COL FSAR Section 2.0 describing the site characteristics of Turkey Point Units 6 and 7. The AP1000 DCD site parameters in DCD Table 2-1 are compared to the site-specific site characteristics in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201. In addition, control room atmospheric dispersion factors for accident dose analysis are presented in Turkey Point Units 6 and 7 COL FSAR Table 2.0-202.

The staff reviewed and compared the site-specific characteristics included in the Turkey Point Units 6 and 7 COL FSAR Tables 2.0-201 against AP1000 DCD Table 2-1. The staff's evaluation of the site characteristics associated with air temperature, precipitation, wind speed, atmospheric dispersion values, and control room atmospheric dispersion values is addressed in SER Section 2.3. The staff's evaluation of site characteristics associated with flood level, groundwater level, and plant grade elevation is addressed in SER Section 2.4. The staff's evaluation of seismic and soil site characteristics is addressed in SER Section 2.5. The staff's evaluation of site characteristics associated with missiles is addressed in SER Section 3.5.

With the exception of the population distribution exclusion area (site), the operating basis wind speed, maximum safety wet-bulb (noncoincident) air temperature value, and maximum normal wet-bulb (noncoincident) air temperature value, the site-specific characteristics listed in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201 are bounded by the AP1000 DCD site parameter values addressed in DCD Table 2-1.

2.0.5 Post Combined License Activities

There are no post-COL activities related to this section.

2.0.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to site characteristics, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

As set forth above, the staff reviewed the application to ensure that sufficient information was presented in PTN DEP 2.0-1, PTN DEP 2.0-2, PTN DEP 2.0-3, PTN DEP 2.0-4, and VCS SUP 2.0-1 to demonstrate that the characteristics of the site fall within the site parameters specified in the DC and adequate justification has been provided for population distribution exclusion area (site), the operating basis wind speed, maximum safety wet-bulb (noncoincident) air temperature value, and maximum normal wet-bulb (noncoincident) air temperature value falling outside the DC site parameter. Accordingly, the staff concludes that the applicant has demonstrated that the requirements of 10 CFR 52.79(d)(1) have been met. The staff also concludes that PTN DEP 2.0-1, PTN DEP 2.0-2, PTN DEP 2.0-3, and PTN DEP 2.0-4 meet the requirements for departures in 10 CFR Part 52, Appendix D, and are, therefore, acceptable.

Regarding PTN DEP 2.0-1, PTN DEP 2.0-2, PTN DEP 2.0-3, and PTN DEP 2.0-4, the staff concludes that the exemptions meets the requirements in Appendix D to 10 CFR Part 52 and 10 CFR 50.12, and are, therefore, acceptable.

2.1 Geography and Demography

2.1.1 Site Location and Description

2.1.1.1 *Introduction*

The descriptions of the site area and reactor location are used to assess the acceptability of the reactor site. The review covers the following specific areas: (1) specification of reactor location with respect to latitude and longitude, political subdivisions, and prominent natural and man-made features of the area, (2) site area map to determine the distance from the reactor to the boundary lines of the exclusion area, including consideration of the location, distance, and orientation of plant structures with respect to highways, railroads, and waterways that traverse or lie adjacent to the exclusion area, and (3) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts of 10 CFR Part 52. The purpose of the review is to ascertain the accuracy of the applicant's description for use in independent evaluations of the exclusion area authority and control, the surrounding population, and nearby man-made hazards.

2.1.1.2 *Summary of Application*

Section 2.1 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 2.1 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.1, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 2.1-1

The applicant provided additional information in PTN COL 2.1-1 to resolve COL Information Item 2.1-1 (COL Action Item 2.1.1-1), which addresses the provision of site-specific information related to site location and description, including political subdivisions, natural and man-made features, population, highways, railways, waterways, and other significant features of the area.

This site-specific information included in the Turkey Point Units 6 and 7 COL FSAR describes the following:

- Specification of State, county, and political subdivisions, in which the site is located, and location of site with respect to prominent features (natural and man-made, i.e., rivers, lakes, industrial, military and transportation facilities).
- Universal Transverse Mercator (UTM) co-ordinates (zone number, northing, easting), meters, and latitude and longitude.
- Site Area Map.

2.1.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the site location and description are given in Section 2.1.1 of NUREG-0800.

The applicable regulatory requirements for identifying site location and description are set forth in the following:

- 10 CFR 50.34(a)(1) and 10 CFR 52.79(a)(1), as they relate to the inclusion in the safety analysis report (SAR) of a detailed description and safety assessment of the site on which the facility is to be located, with appropriate attention to features affecting facility design.
- 10 CFR Part 100, as it relates to the following: (1) defining an exclusion area and setting forth requirements regarding activities in that area (10 CFR 100.3, "Definitions"), (2) addressing and evaluating factors that are used in determining the acceptability of the site as identified in 10 CFR 100.20(b), (3) determining an exclusion area such that certain dose limits would not be exceeded in the event of a postulated fission product release as identified in 10 CFR 50.34(a)(1) and 10 CFR 52.79(a)(1), as it relates to site evaluation factors identified in 10 CFR Part 100, and (4) requiring that the site location and the engineered features included as safeguards against the hazardous consequences of an accident, should one occur, would ensure a low risk of public exposure.

The related acceptance criteria from Section 2.1.1 of NUREG-0800 are as follows:

- Specification of Location: The information submitted by the applicant is adequate and meets the requirements of 10 CFR 50.34(a)(1) and 10 CFR 52.79(a)(1) if it describes highways, railroads, and waterways that traverse the exclusion area in sufficient detail to allow the reviewer to determine that the applicant has met the requirements in 10 CFR 100.3.
- Site Area Map: The information submitted by the applicant is adequate and meets the requirements of 10 CFR 50.34(a)(1) and 10 CFR 52.79(a)(1) if it describes the site location, including the exclusion area and the location of the plant within the area, in sufficient detail to enable the reviewer to evaluate the applicant's analysis of a postulated fission product release, thereby allowing the reviewer to determine (in Safety Evaluation Report (SER) Sections 2.1.2 and 2.1.3, and Chapter 15) that the applicant has met the requirements of 10 CFR 50.34(a)(1) and 10 CFR Part 100.
- In addition, in accordance with Section VIII, "Processes for Changes and Departures," of Appendix D to 10 CFR Part 52—"Design Certification Rule for the AP1000 Design," the applicant identified a Tier 2 departure, which does not require prior NRC approval. This departure is subject to the requirements in Section VIII, which are similar to the requirements in 10 CFR 50.59.

2.1.1.4 Technical Evaluation

The staff reviewed Section 2.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the site location and description. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR using the review procedures described in Section 2.1.1 of NUREG-0800.

AP 1000 COL Information Item

- PTN COL 2.1-1

The staff reviewed PTN COL 2.1-1 related to site location and description, including political subdivisions, natural and man-made features, population, highways, railways, waterways, and other significant features of the area included in Section 2.1.1 of the Turkey Point Units 6 and 7 COL FSAR. COL Information Item 2.1-1 in Section 2.1.1 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will provide site-specific information related to site location and description, exclusion area authority and control, and population distribution. Site-specific information on the site and its location will include political subdivisions, natural and man-made features, population, highways, railways, waterways, and other significant features of the area.

The staff reviewed the resolution to the site-specific items related to the site location and description included under Section 2.1 of the Turkey Point Units 6 and 7 COL FSAR.

The staff independently estimated and verified the latitude and longitude and UTM coordinates of the proposed site as provided in the Turkey Point Units 6 and 7 COL FSAR (Table 2.1.1-1).

Table 2.1.1-1: NAD83 Coordinates of proposed site provided in Turkey Point Units 6 and 7 COL FSAR

	Northing; Easting UTM coordinates in meters (feet)	Latitude; Longitude (deg/min/sec)
Unit 6	Zone 17, 2,812,087 N; 567,179 E (9,226,007 N) (1,860,823 E)	25°25'27.1" N; 80°19'55.1" W
Unit 7	Zone 17, 2,812,087 N; 566,920 E (9,226,007 N) (1,859,973 E)	25°25'27.1 N; 80°20'04.3" W

On the basis of the staff's review of the information addressed in the Turkey Point Units 6 and 7 COL FSAR, and also the staff's confirmatory review of pertinent information generally available in literature and on the internet, as well as information collected during a site visit, the staff considers the information provided by the applicant with regard to the site location and description to be adequate and acceptable.

2.1.1.5 *Post Combined License Activities*

There are no post-COL activities related to this section.

2.1.1.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to site location and description, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

As set forth above, the applicant has presented and substantiated information to establish the site location and description. The staff has reviewed PTN COL 2.1-1, and for the reasons given above, concludes that it is sufficient for the staff to evaluate compliance with the siting evaluation factors in 10 CFR Part 100.3, as well as with the radiological consequence evaluation factors in 10 CFR 50.34(a)(1) and 10 CFR 52.79(a)(1). The staff further concludes that the applicant provided sufficient details about the site location and site description to allow the staff to evaluate, as documented in Sections 2.1.2, 2.1.3, and 13.3, and Chapters 11 and 15 of this SER, whether the applicant has met the relevant requirements of 10 CFR Part 52.79(a)(1) and 10 CFR Part 100 with respect to determining the acceptability of the site. This addresses COL Information Item 2.1-1. In conclusion, the applicant has provided sufficient information for satisfying 10 CFR Part 52.79(a)(1) and 10 CFR Part 100.

2.1.2 **Exclusion Area Authority and Control**

2.1.2.1 *Introduction*

The review of the descriptions of exclusion area authority and control was used to verify the applicant's legal authority to determine and control activities within the designated exclusion area, as provided in the application, and is sufficient to enable the reviewer to assess the acceptability of the reactor site. The review covers the following specific areas:

(1) establishment of the applicant's legal authority to determine all activities within the designated exclusion area, (2) the applicant's authority and control in excluding or removing personnel and property in the event of an emergency, (3) establish that proposed or permitted activities in the exclusion area unrelated to operation of the reactor do not result in a significant hazard to public health and safety, and (4) any additional information requirements prescribed within the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.1.2.2 *Summary of Application*

Turkey Point Units 6 and 7 COL FSAR Section 2.1 incorporates by reference Section 2.1 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.1.2, the applicant provided the following:

Tier 2 Departure

- PTN DEP 2.0-4

The applicant proposed PTN DEP 2.0-4 in which the minimum distance from the source boundary to the exclusion area boundary of 0.43 km (0.27 mi) rather than the site parameter of 0.80 km (0.5 mi) specified in the AP1000 DCD be used for the Turkey Point Units 6 and 7 site. The applicant provided the distance from the Turkey Point Units 6 and 7 site's source boundary to the exclusion area boundary (EAB) at the atmospheric dispersion value (χ/Q) at the EAB in Turkey Point Units 6 and 7 COL FSAR Table 2.3.4-201.

AP1000 COL Information Item

- PTN COL 2.1-1

The applicant provided additional information in PTN COL 2.1-1 to resolve COL Information Item 2.1-1 (COL Action Item 2.1.2-1), which addresses the provision of site-specific information related to exclusion area authority and control, including size of the area, exclusion area authority and control, and activities that may be permitted within the designated exclusion area.

This site-specific information included in the Turkey Point Units 6 and 7 COL FSAR describes the following:

- establishment of authority, which determines the legal authority of land, and also mineral rights and easements,
- legal authority for all activities, including exclusion and removal of personnel and property from area,

- minimum distance of the EAB,
- description of activities unrelated to plant operation that are permitted in EAB, their location, nature of activities, number of persons involved and plans for evacuation in the event of an emergency,
- description of traffic control arrangements on highways, railroads and waterways traversing through EAB in the event of emergency, and
- procedures for abandonment, relocation and understanding with other authorities for control.

2.1.2.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the exclusion area authority and control are given in Section 2.1.2 of NUREG-0800.

The applicable regulatory requirements for verifying exclusion area authority and control are set forth in the following:

- 10 CFR 50.34(a)(1), and 10 CFR 52.79(a)(1), as it relates to the inclusion in the SAR of a detailed description and safety assessment of the site on which the facility is to be located, with appropriate attention to features affecting facility design (10 CFR 50.34(a)(1) and 10 CFR 52.79(a)(1)).
- 10 CFR Part 100, as it relates to the following: (1) defining an exclusion area and setting forth requirements regarding activities in that area (10 CFR 100.3), (2) addressing and evaluating factors that are used in determining the acceptability of the site as identified in 10 CFR 100.20(b), and (3) determining an exclusion area such that certain dose limits would not be exceeded in the event of a postulated fission product release as identified in 10 CFR 50.34(a)(1) and 10 CFR 52.79 (a)(1) as it relates to site evaluation factors identified in 10 CFR Part 100.

The related acceptance criteria from Section 2.1.2 of NUREG-0800 are as follows:

- Establishment of Authority for the Exclusion or Removal of Personnel and Property: The information submitted by the applicant is adequate and meets the requirements of 10 CFR 50.33, "Contents of Applications; General Information"; 10 CFR 50.34(a)(1); 10 CFR 52.79, "Contents of Applications; Technical Information in Final Safety Analysis Report"; and 10 CFR Part 100 if it provides sufficient detail to enable the staff to evaluate the applicant's legal authority for the exclusion or removal of personnel or property from the exclusion area.
- Proposed and Permitted Activities: The information submitted by the applicant is adequate and meets the requirements of 10 CFR 50.33, 10 CFR 50.34(a)(1),

10 CFR 52.79, and 10 CFR Part 100 if it provides sufficient detail to enable the staff to evaluate the applicant's legal authority over all activities within the designated exclusion area.

2.1.2.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.1.2 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the exclusion area authority and control. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR using the review procedures described in Section 2.1.2 of NUREG-0800.

Tier 2 Departure

- PTN DEP 2.0-4

The staff reviewed PTN DEP 2.0-4 related to the applicant's use of a minimum distance from the source boundary to the exclusion areas boundary of 0.27 mi (0.43 km) for the Turkey Point Units 6 and 7 site, rather than the site parameter of 0.80 km (0.5 mi) specified in the AP1000 DCD.

The distance from the Turkey Point Units 6 and 7 site's source boundary to the EAB and the atmospheric dispersion value (χ/Q) at the EAB are listed in Turkey Point Units 6 and 7 COL FSAR Table 2.3.4-201. The EAB for Turkey Point Units 6 and 7 lies primarily within the EAB for Turkey Point Units 3 and 4, with the exception of the eastern and southern portions. The combined EAB provides a minimum distance of 0.27 mi (43 km) from the source boundary for Turkey Point Units 6 and 7. All Turkey Point Units 6 and 7 site sector EAB distances, except for S, SSW, and SSE sectors are less than the 0.80 km (0.5 mi) site parameter, with the minimum being 0.43 km (0.27 mi) in the northeast sector. However, the Turkey Point Units 6 and 7 site's EAB resides within the current applicant's site boundary. A comparison of the Turkey Point Units 6 and 7 site boundary and EAB are shown in Turkey Point Units 6 and 7 COL FSAR Figures 2.1-202 and 2.1-204. Further evaluation of this departure is discussed in SER Section 2.3.4.

AP1000 COL Information Item

- PTN COL 2.1-1

The staff reviewed PTN COL 2.1-1 related to the exclusion area authority and control, including size of the area, exclusion area authority and control, and activities that may be permitted within the designated exclusion area included in Turkey Point Units 6 and 7 COL FSAR Section 2.1.2. COL Information Item in Section 2.1.1 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will provide site-specific information related to site location and description, exclusion

area authority and control, and population distribution. Site-specific information on the exclusion area will include the size of the area and the exclusion area authority and control. Activity that may be permitted within the exclusion area will be included in the discussion.

The applicant provided the information concerning the following:

- complete legal authority to regulate access and activity within the EAB,
- identification of any facilities within the EAB that have activities unrelated to plant operation being controlled and considered for emergency planning,
- arrangements for traffic control, and
- abandonment or relocation of roads.

Florida Power and Light (FPL) owns the property within the Turkey Point Units 6 and 7 exclusion area, subject to certain encumbrances on portions of the property, specifically, certain canal, drainage, reclamation, oil, gas and mineral rights reservations held by the Trustees of the Internal Improvement Fund of the State of Florida and a canal reservation held by Miami-Dade County. Also, a small parcel of submerged land in the southeast and south-southeast portions of the exclusion area is located in the Biscayne Bay waterway. Because of the location of the submerged land, this portion of the exclusion area cannot be reasonably accessed except through FPL property.

The staff reviewed the resolution to the site-specific items related to the exclusion area authority and control included under Turkey Point Units 6 and 7 COL FSAR Section 2.1. The staff verified the applicant's description of the exclusion area as well as the authority under which all activities within the exclusion area can be controlled. The staff also verified for consistency that the EAB is the same as that being considered by the applicant for the radiological consequences in Turkey Point Units 6 and 7 COL FSAR Chapters 15 and 13.3. The staff concludes that the applicant has acquired authority to control all activities within the designated exclusion area and meets acceptance criteria of Section 2.1.2, Exclusion Area Authority and Control," of NUREG-0800.

There are no residences, commercial activities not associated with Turkey Point Units 6 and 7, or recreational activities within the exclusion area. No public highways or railroads traverse the exclusion area. The staff verified that no public roads cross the exclusion area; and, therefore, neither relocation nor abandonment of roads is needed.

2.1.2.5 Post Combined License Activities

There are no post-COL activities related to this section.

2.1.2.6 Conclusion

The staff reviewed Section 2.1.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to the exclusion area authority and control, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

As set forth above, the applicant has provided and substantiated information concerning its legal authority and control of all activities within the designated exclusion area. The staff has reviewed PTN COL 2.1-1, and for the reasons given above, concludes that the applicant's exclusion area is acceptable to meet the requirements of 10 CFR 50.33, 10 CFR 50.34(a)(1), 10 CFR 52.79(a)(1), 10 CFR Part 100, and 10 CFR 100.3 with respect to determining the acceptability of the site. PTN DEP 2.0-4 is discussed and evaluated in SER Section 2.3.4. This conclusion is based on the applicant having appropriately described the plant exclusion area, the authority under which all activities within the exclusion area can be controlled, the methods by which the relocation or abandonment of public roads that lie within the proposed exclusion area can be accomplished, if necessary, and the methods by which access and occupancy of the exclusion area can be controlled during normal operation and in the event of an emergency situation. In addition, the applicant has the required authority to control activities within the designated exclusion area, including the exclusion and removal of persons and property, and has established acceptable methods for control of the designated exclusion area. This addresses COL Information Item 2.1-1. In conclusion, the applicant has provided sufficient information for satisfying the requirements of 10 CFR 52.79(a)(1) and 10 CFR Part 100.

2.1.3 Population Distribution

2.1.3.1 Introduction

The description of population distributions addresses the need for information about: (1) population in the site vicinity, including transient populations, (2) population in the exclusion area, (3) whether appropriate protective measures could be taken on behalf of the populace in the specified low-population zone (LPZ) in the event of a serious accident, (4) whether the nearest boundary of the closest population center containing 25,000 or more residents is at least one and one-third times the distance from the reactor to the outer boundary of the LPZ, (5) whether the population density in the site vicinity is consistent with the guidelines given in Regulatory Position C.4 of RG 4.7, "General Site Suitability Criteria for Nuclear Power Stations," and (6) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.1.3.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR Section 2.1 incorporates by reference Section 2.1 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.1.3, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 2.1-1

The applicant provided additional information in PTN COL 2.1-1 to resolve COL Information Item 2.1-1 (COL Action Item 2.1.3-1), which addresses the provision of site-specific information related to population distribution for the site environs to include:

- nearest population center boundary (having 25,000 or more residents) at least one and one-third times the distance from the reactor units to the outer boundary of LPZ,
- population density within 20 mi less than 500 people/square mile consistent with guidelines given in RG 4.7 Regulatory Position C.4,
- population data in the site vicinity including transient populations,
- a description of the population within 10 mi of the plant,
- a description of the population between 10 and 50 mi of the plant,
- a description of the seasonal and daily variations in population and population distribution from land uses,
- the low-population zone,
- the nearest population center, and
- a plot out to a distance of at least 20 mi showing the cumulative resident population (population density).

2.1.3.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for population distribution are given in Section 2.1.3 of NUREG-0800.

The applicable regulatory requirements for identifying site location and description are set forth in the following:

- 10 CFR 50.34(a)(1), as it relates to consideration of the site evaluation factors identified in 10 CFR 100.3, 10 CFR Part 100 (including consideration of population density), 10 CFR 52.79, as they relate to provision by the applicant in the SAR of the existing and projected future population profile of the area surrounding the site.

- 10 CFR 100.20, "Factors To Be Considered When Evaluating Sites," and 10 CFR 100.21, "Non-Seismic Siting Criteria," as they relate to determining the acceptability of a site for a power reactor. In 10 CFR 100.3, 10 CFR 100.20(a), and 10 CFR 100.21(b), the NRC provides definitions and other requirements for determining an exclusion area, LPZ, and population center distance.

The related acceptance criteria from Section 2.1.3 of NUREG-0800 are as follows:

- **Population Data:** The population data supplied by the applicant in the SAR is acceptable under the following conditions: (1) the FSAR includes population data from the latest census and projected population at the year of plant approval and 5 years thereafter, in the geographical format given in Section 2.1.3 of RG 1.70 and in accordance with DG-1145, (2) the FSAR describes the methodology and sources used to obtain the population data, including the projections, and (3) the FSAR includes information on transient populations in the site vicinity.
- **Exclusion Area:** The exclusion area should either not have any residents, or such residents should be subject to ready removal if necessary.
- **Low-Population Zone:** The specified LPZ is acceptable if it is determined that appropriate protective measures could be taken on behalf of the enclosed populace in the event of a serious accident.
- **Nearest Population Center Boundary:** The nearest boundary of the closest population center containing 25,000 or more residents is at least one and one-third times the distance from the reactor to the outer boundary of the LPZ.
- **Population Density:** If the population density exceeds the guidelines given in Regulatory Position C.4 of RG 4.7, the applicant must give special attention to the consideration of alternative sites with lower population densities.

2.1.3.4 Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.1.3 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to population distribution. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR using the review procedures described in Section 2.1.3 of NUREG-0800.

AP1000 COL Information Item

- PTN COL 2.1-1

The staff reviewed PTN COL 2.1-1 related to the population distribution around the site environs included in Turkey Point Units 6 and 7 COL FSAR Section 2.1.3. COL Information Item in Section 2.1.1 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will provide site-specific information related to site location and description, exclusion area authority and control, and population distribution. Site-specific information will be included on population distribution.

The staff reviewed the resolution to the COL specific items related to the population distribution around the site environs included under Section 2.1 of the Turkey Point Units 6 and 7 COL FSAR.

The staff reviewed the data on the population in the site environs, as presented in the Turkey Point Units 6 and 7 COL FSAR, to determine whether the exclusion area, LPZ, and population center distance for the proposed site comply with the requirements of 10 CFR Part 100. The staff evaluated whether, consistent with Regulatory Position C.4 of RG 4.7, the applicant should consider alternative sites with lower population densities. The staff also reviewed whether appropriate protective measures could be taken on behalf of the enclosed populace within the emergency planning zone (EPZ), which encompasses the LPZ, in the event of a serious accident. The staff compared and verified the applicant's population data against U.S. Census Bureau and county population data. The staff reviewed the projected population data provided by the applicant, including the weighted transient population for 2020, 2030, 2040, 2050, 2060, 2070, 2080, and 2090.

The populations for the years 2020 through 2090 have been projected by calculating a growth rate using State populations (by county) as the base. The projected population for the expected first year of plant operation (2022 for Unit 6 and 2023 for Unit 7) is conservatively selected as that for the year 2030. The staff also independently performed and verified the population projections based on 2010 census data, and State and county population projection data. The staff reviewed the extensive transient population data provided by the applicant. Based on this information, the staff finds that the applicant's estimate of the transient population is reasonable. The applicant stated in Turkey Point Units 6 and 7 COL FSAR Section 2.1.3.1 that Figures 2.1-207 through 2.1-215 show the total (resident and transient) population for the year 2010 through 2090. The applicant updated 2000 census data used for the original population distribution for the Turkey Point Units 6 and 7 COL FSAR Revision 0 with 2010 census data in the Turkey Point Units 6 and 7 COL FSAR Revision 5. The applicant also updated transient population data consistent with year 2010, and presented updated information in tables and figures.

The nearest population center (population of greater than 25,000 residents) to Turkey Point Units 6 and 7 site is the city of Homestead, which is 14.4 km (9 mi) west northwest of the site. Homestead's population in 2010 was 60,512. The distance to the boundary of the population center is 1.6 times the radius of the 8 km (5 mi) LPZ. The staff verified the distance to the nearest population center to be greater than one and one third times the distance from the reactor center point to the boundary of the low population zone as required by NUREG-0800 and complies with the guidance provided by RG 4.7. Therefore, the staff concludes that the proposed site meets the population center distance requirement in 10 CFR 100.21(b).

The staff evaluated the site population density against the criterion in Regulatory Position C.4 of RG 4.7, Revision 2, regarding whether it is necessary to consider alternative sites with lower population densities. The evaluation included the review and verification of population density in 2030 (more than 5 years after initial site approval), and whether it would exceed the criteria of 500 persons per square mile averaged over a radial distance of 20 mi (32 km) (cumulative population at a distance divided by the area at that distance). The applicant determined that the density based on both the land area and circular area at the 16.1 to 32.2 km (10 to 20 mi) radii exceeds the criterion of 500 people per square mile. Therefore, the applicant stated that in accordance with RG 4.7, Position C.4, it has evaluated alternative sites in Part 3 of the Turkey Point Units 6 and 7 COL FSAR and the Environmental Report. The staff has also independently verified and confirmed the applicant's calculated population density for the year 2030 exceeded the guideline value of 500 people per square mile. To adequately document the licensing basis, in a letter dated March 28, 2012, the staff requested the applicant in request for additional information (RAI) 6079, Question 02.01.03-2, to discuss the summary of results containing the rationale and justification for the selection of a high density site in the Turkey Point Units 6 and 7 COL FSAR in accordance with the guidance provided in RG 4.7 Position C.4.

In a letter April 25, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML121170467), the applicant provided the response with a general address of rationale and justification, and submitted a revision to the Turkey Point Units 6 and 7 FSAR Section 2.1.3.6. However, the applicant's response did not demonstrate the merits, benefits, or advantages of selecting the Turkey Point Units 6 and 7 site, despite a population density in excess of 500 people per square mile, over the other four alternative sites considered. Therefore, in letter dated May 20, 2014 (RAI 7467, Question 02.01.03-3), the staff requested the applicant provide supplemental information to RAI 6079, Question 02.01.03-2, to explain and document in the Turkey Point Units 6 and 7 COL FSAR, how the Turkey Point Units 6 and 7 site compared to the other four sites. In a letter dated June 18, 2014, the applicant provided discussion and rationale by clarifying the merits and advantages of Turkey Point Site over the other alternative sites considered and evaluated. The staff reviewed this information and found the applicant's address reasonable and acceptable as it meets the guidance provided in RG 4.7. The applicant also provided revision to Turkey Point Units 6 and 7 COL FSAR Section 2.1.3.6. The staff finds the proposed revisions acceptable and has confirmed that these changes have been incorporated into the Turkey Point Units 6 and 7 COL FSAR. Therefore, this RAI 7467, Question 02.01.03-03 is resolved.

2.1.3.5 Post Combined License Activities

There are no post-COL activities related to this section.

2.1.3.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to population distribution, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

As set forth above, the applicant has provided an acceptable description of current and projected population densities in and around the site. The staff has reviewed PTN COL 2.1-1,

and for the reasons given above, concludes that the population data with an exception population density guideline of 500 people per square mile, within 32 km (20 mi) from the site, meets the requirements of 10 CFR 50.34(a)(1), 10 CFR 52.79(a)(1), 10 CFR 100.20(a), 10 CFR 100.20(b), 10 CFR Part 100 based on the information provided in 10 CFR 100.3. This conclusion is based on the applicant having provided an acceptable description and safety assessment of the Turkey Point Units 6 and 7 site, which includes present and projected population densities in accordance with the guidelines of Regulatory Position C.4 of RG 4.7, and properly specified the LPZ and population center distance. In addition, the staff has reviewed and confirmed, by comparison with independently obtained population data, the applicant's estimates of the present and projected populations surrounding the Turkey Point Units 6 and 7 site, including transients. The applicant also has calculated the radiological consequences of design-basis accidents at the outer boundary of the low-population zone (SRP Chapter 15) and has provided reasonable assurance that appropriate protective measures can be taken within the low-population zone to protect the population in the event of a radiological emergency. This addresses COL Information Item 2.1-1. In conclusion, the applicant has provided sufficient information to satisfy the requirements of 10 CFR Part 52.79(a)(1), and 10 CFR Part 100.

2.2 Nearby Industrial, Transportation, and Military Facilities

2.2.1 Locations and Routes

2.2.1.1 *Introduction*

The description of locations and routes refers to potential external hazards or hazardous materials that are present or may reasonably be expected to be present during the projected lifetime of the proposed plant. The purpose is to evaluate the sufficiency of information concerning the presence and magnitude of potential external hazards so that the reviews and evaluations described in NUREG-0800, Sections 2.2.3, 3.5.1.5, and 3.5.1.6 can be performed. The review covers the following specific areas: (1) the locations of, and separation distances to, transportation facilities and routes, including airports and airways, roadways, railways, pipelines, and navigable bodies of water, (2) the presence of military and industrial facilities, such as fixed manufacturing, processing, and storage facilities, and (3) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

The staff's review of Turkey Point Units 6 and 7 COL FSAR Section 2.2.1, "Locations and Routes," and Section 2.2.2, "Descriptions," is addressed in this SER section.

2.2.1.2 *Summary of Application*

Turkey Point Units 6 and 7 COL FSAR Section 2.2 incorporates by reference Section 2.2 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.2, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 2.2-1
- PTN COL 3.3-1

- PTN COL 3.5-1

The applicant provided additional information in PTN COL 2.2-1, PTN COL 3.3-1, and PTN COL 3.5-1 to resolve COL Information Item 2.2-1 (COL Action Item 2.2-1), which addresses information about industrial, military, and transportation facilities and routes to establish the presence and magnitude of potential external hazards.

The applicant identified and addressed the potential hazard facilities and routes within the vicinity, 8 km (5 mi) of the Turkey Point Units 6 and 7 site, and airports within 16 km (10 mi) of the Turkey Point Units 6 and 7 site along with other significant facilities beyond 8 km (5 mi), in accordance with RG 1.206 and relevant sections of 10 CFR Part 50 and 10 CFR Part 100.

The applicant addressed one significant industrial facility associated with a military installation, one natural gas transmission pipeline system, and one navigable waterway for assessment within 8 km (5 mi) of the site. In addition, potential hazard analysis included chemical storage associated with Units 1 through 5 and site-specific onsite chemical storage facilities associated with Turkey Point Units 6 and 7 along with an onsite transportation route. No additional facilities other than airway and military operation areas significant enough are identified within 16 km (10 mi) of the Turkey Point Units 6 and 7 site.

2.2.1.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the nearby industrial, transportation, and military facilities are given in Sections 2.2.1-2.2.2 of NUREG-0800.

The applicable regulatory requirements for identifying locations and routes are set forth in the following:

- 10 CFR 100.20(b), which requires that the nature and proximity of man-made related hazards (e.g., airports, dams, transportation routes, and military and chemical facilities) be evaluated to establish site parameters for use in determining whether plant design can accommodate commonly occurring hazards, and whether the risk of other hazards is very low.
- 10 CFR 52.79(a)(1)(iv), as it relates to the factors to be considered in the evaluation of sites, which require the location and description of industrial, military, or transportation facilities and routes, and of 10 CFR 52.79(a)(1)(vi) as it relates to the compliance with 10 CFR Part 100.
- In addition, in accordance with 10 CFR Part 52, Appendix D, Section VIII, the applicant identified a Tier 2 departure, which does not require prior NRC approval. This departure is subject to requirements in Section VIII, which are similar to the requirements in 10 CFR 50.59, "Changes, Tests and Experiments."

The related acceptance criteria from Section 2.2.1-2.2.2 of NUREG-0800 are as follows:

- Data in the FSAR adequately describes the locations and distances from the plant for nearby industrial, military, and transportation facilities; and that such data are in agreement with data obtained from other sources, when available.
- Descriptions of the nature and extent of activities conducted at the site and in its vicinity, including the products and materials likely to be processed, stored, used, or transported, are adequate to permit identification of the possible hazards cited in Section III of Sections 2.2.1-2.2.2 of NUREG-0800.
- Sufficient statistical data with respect to hazardous materials are provided to establish a basis for evaluating the potential hazards to the plant or plants considered at the site.

The regulatory requirement associated with the Tier 2 departure request is as follows:

- 10 CFR Part 52, "Licenses, certifications, and approvals for nuclear power plants," Appendix D "Design Certification Rule for the AP1000 Design," Section VIII, "Processes for Changes and Departures," Item B.5.

2.2.1.4 Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.2 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to nearby industrial, transportation, and military facilities. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Items

- PTN COL 2.2-1
- PTN COL 3.3-1
- PTN COL 3.5-1

The staff reviewed PTN COL 2.2-1, PTN COL 3.3-1, and PTN COL 3.5-1 related to information about industrial, military, and transportation facilities and routes to establish the presence and magnitude of potential external hazards included in Turkey Point Units 6 and 7 COL FSAR Section 2.2. COL Information Item in AP1000 DCD Section 2.2.1 states:

Combined License applicants referencing the AP1000 certified design will provide site-specific information related to the identification of potential hazards within the site vicinity, including an evaluation of potential accidents and verify that the frequency of site-specific potential hazards is consistent with the criteria outlined in Section 2.2. The site-specific information will provide a review of aircraft hazards, information on nearby transportation routes, and information on potential industrial and military hazards.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR using the review procedures described in Section 2.2.1-2.2.2 of NUREG-0800.

This SER section identifies and provides the information that would help in evaluating potential effects on the safe operation of the nuclear facility by industrial, transportation, mining, and military installations in the Turkey Point Units 6 and 7 site area. The evaluation of potential effects on the safe operation of the nuclear facility is described in SER Section 2.2.3.

Locations and Routes

The applicant identified and provided information regarding potential external hazard facilities and operations within a 5 mi (8 km) radius of the Turkey Point Units 6 and 7 site.

The location of these transportation routes and facilities are shown on Turkey Point Units 6 and 7 COL FSAR Figure 2.2-201, and include the following:

- industrial and military facilities within 8 km (5 mi),
- Turkey Point Units 1 through 5,
- Homestead Air Reserve Base,
- transportation routes within 8 km (5 mi),
- onsite transportation route,
- Miami to Key West, Florida Intracoastal Waterway,
- Florida Gas Transmission Company, Turkey Point Lateral Pipeline, and Homestead Lateral Pipeline,
- airport and airway routes within 16.2 km (10 mi),
- Turkey Point Heliport,
- Ocean Reef Club Airport, and
- Airway V-3.

The staff confirmed that no major industrial activities are within 16 km (10 mi) that are significant enough to be identified as potential hazard facilities.

Description of the Facilities

Turkey Point Units 1 through 5 are located on the approximate 11,000 acre property. Units 1 and 2 are gas/oil-fired steam electric generating units; Units 3 and 4 are nuclear-powered steam electric generating units; and Unit 5 is a natural gas combined cycle plant. Units 6 and 7 are located southwest of Units 1 through 5. The center point of the Unit 6 reactor building is approximately 65.5 m (215 ft) west and 1,105 m (3,625 ft) south of the center point of the Unit 4 containment.

The Homestead Air Reserve Base is located approximately 7.7 km (4.76 mi) north-northwest of Units 6 and 7. The Homestead Air Reserve Base is a fully combat-ready unit capable of providing F-16C multipurpose fighter aircraft, along with mission-ready pilots and support personnel, for short-notice worldwide deployment. In addition, the Homestead Air Reserve Base is home to the most active North American Aerospace Defense Command alert site in the continental United States, operated by a detachment of F-15 fighter intercepts from the 125th Fighter Wing Florida Air National Guard.

Description of Highways

Miami-Dade County, Florida, is traversed by several highways (i.e., Interstate 95, U.S. Highway 1, Florida Turnpike, and U.S. Route 41). However, there are no major highways within 8 km (5 mi) of Units 6 and 7. The transportation route that approaches closer than 8 km (5 mi) to Units 6 and 7 is for chemicals transported onto the plant property.

Description of Railroads

There are no railroads within 8 km (5 mi) of Units 6 and 7.

Description of Waterways

Turkey Point Units 6 and 7 site is on the western shore of south Biscayne Bay. The Biscayne Bay contains the Miami to Key West, Florida Intracoastal Waterway. The only commodity transported on the Miami to Key West, Florida Intracoastal Waterway is residual fuel oil. In 2005, there were 611,000 short tons of residual fuel oil transported, and the entirety of this commodity was delivered to the Turkey Point plant. Residual fuel oil is delivered exclusively by barges, having a size of barge transporting approximately 18,000 barrels of oil. The residual fuel oil is stored in two 268,000 barrel tanks. The hazard determined due to these tanks is bounding compared to the residual fuel oil transported by the barge, and, therefore, it is stated by the applicant that no further analysis for barge transport is warranted.

Description of Pipelines

There are two natural gas transmission pipelines operated by Florida Gas Transmission Company within 8 km (5 mi) of the plant. Two of the pipelines, the Turkey Point Lateral and Homestead Lateral, are located within 8 km (5 mi) of Turkey Point Units 6 and 7.

The Florida Gas Transmission Company Turkey Point Lateral is a 61 cm (24 in) diameter pipeline, operating at a maximum pressure of 722 psig, providing gas service to Turkey Point's gas-fired power plants. The pipeline is buried to an approximate depth of 107 cm (42 in) below grade. At the closest approach to Turkey Point Units 6 and 7, the Turkey Point Lateral pipeline passes within approximately 1,382 m (4,535 ft) of the Unit 6 auxiliary building.

The Florida Gas Transmission Company Homestead Lateral is a 16.8 cm (6.625 in) diameter pipeline that tees off of the 61 cm (24 in) Turkey Point Lateral pipeline approximately 4.8 km (3 mi) north of the Turkey Point Units 6 and 7 site and extends in a westward direction to provide gas to the city of Homestead. Because of the proximity and diameter of the Turkey Point Lateral pipeline compared to the Homestead Lateral pipeline, the Turkey Point Lateral pipeline presents a greater hazard, and is bounding. Therefore, the applicant stated that no further analysis of the Homestead Lateral pipeline is warranted.

Description of Airports and Airways

The Turkey Point site operates its own corporate heliport. The Turkey Point heliport is in the southeast corner of the Units 3 and 4 parking lot approximately 945 m (3,100 ft) north of Units 6 and 7. Due to the weight of the aircraft (signifying a low-penetration hazard), and infrequent use of the heliport, the applicant stated that no further analysis is considered.

Homestead Air Reserve Base is approximately 7.7 km (4.76 mi) north-northwest from the proposed Units 6 and 7. The U.S. Air Force owns the airport. The Homestead Air Reserve Base has approximately 36,429 annual operations, and this number is expected to remain the same over the life of the plant.

Ocean Reef Club Airport is a privately owned airport 11.9 km (7.41 mi) south-southeast from Units 6 and 7. There are approximately 25 aircraft on the site, and the number of flight operations reasonably falls within plant-to-airport distance criteria.

The site is approximately 9.6 km (5.98 statute mi) from the center of airway V3/G439. The edge of the closest airway is located closer than 3.2 km (2 statute mi) from Units 6 and 7. Because of the proximity of airway V43/G439 and the fact that Homestead Air Reserve base airport is within 8 km (5 mi) of the site, a calculation of the probability of an aircraft accident that could possibly result in radiological consequences was performed to determine whether the accident probability is less than an order of magnitude of 1×10^{-7} per year. The details of analysis for the determination of the aircraft crash probability are addressed in Turkey Point Units 6 and 7 COL FSAR Sections 2.2.2.7 and 3.5.1.6.

Based on the review of the information addressed by the applicant pertaining to locations and routes, and the staff's independent review of the information in public domain, the staff concludes that the information provided by the applicant is adequate and acceptable.

Projections of Industrial Growth

A review of Miami-Dade County's Comprehensive Development Master Plan does not indicate any future projections of new major industrial, military, or transportation facilities located with the vicinity of the Turkey Point Units 6 and 7 site.

2.2.1.5 *Post Combined License Activities*

There are no post-COL activities related to this section.

2.2.1.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to nearby industrial, transportation, and military facilities, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

As set forth above, the applicant has presented and substantiated information to establish an identification of potential hazards in the Turkey Point Units 6 and 7 site vicinity. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided information with respect to identification of potential hazards in accordance with the requirements of 10 CFR 52.79(a)(1)(iv) and 10 CFR 52.79(a)(1)(vi) for compliance evaluation. The nature and extent of activities involving potentially hazardous materials that are conducted at nearby industrial, military, and transportation facilities have been evaluated to identify any such activities that have the potential for adversely affecting plant safety-related structures. Based on an evaluation of information in the Turkey Point Units 6 and 7 COL FSAR as well as information that the staff independently obtained, the staff has concluded that all potentially hazardous activities on site and in the vicinity of the plant have been identified. The hazards associated with these activities have been reviewed and are discussed in SER Sections 2.2.3, 3.5.1.5, and 3.5.1.6. This addresses PTN COL Information Item 2.2-1. In conclusion, the applicant has provided sufficient information for satisfying the relevant portions of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities"; 10 CFR Part 52; and 10 CFR Part 100.

2.2.2 Descriptions

The staff's review of the Turkey Point Units 6 and 7 COL FSAR Section 2.2.2, "Descriptions," is addressed in SER Section 2.2.1.

2.2.3 Evaluation of Potential Accidents

2.2.3.1 Introduction

The evaluation of potential accidents considers the applicant's probability analyses of potential accidents involving hazardous materials or activities on site and in the vicinity of the proposed site to confirm that appropriate data and analytical models have been used. The review covers the following specific areas: (1) hazards associated with nearby industrial activities, such as manufacturing, processing, or storage facilities, (2) hazards associated with nearby military activities, such as military bases, training areas, or aircraft flights, and (3) hazards associated with nearby transportation routes (aircraft routes, highways, railways, navigable waters, and pipelines). Each hazard review area includes consideration of the following principal types of hazards: (1) toxic vapors or gases and their potential for incapacitating nuclear plant control room operators, (2) overpressure resulting from explosions or detonations involving materials such as munitions, industrial explosives, or explosive vapor clouds resulting from the atmospheric release of gases (such as propane and natural gas or any other gas) with a potential for ignition and explosion, (3) missile effects attributable to mechanical impacts, such as aircraft impacts, explosion debris, and impacts from waterborne items such as barges, and (4) thermal effects attributable to fires.

2.2.3.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR Section 2.2 incorporates by reference Section 2.2 of the AP1000 DCD.

This section of the Turkey Point Units 6 and 7 COL FSAR addresses the need for evaluation of potential accidents.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.2, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 2.2-1

The applicant provided additional information in PTN COL 2.2-1 to resolve COL Information Item 2.2-1 (COL Action Item 2.2-1), which addresses information about industrial, military, and transportation facilities and routes to establish the presence and magnitude of potential external hazards, including the following accident categories: explosions, flammable vapor clouds (delayed ignition), toxic chemicals, fires, and airplane crashes.

- PTN COL 6.4-1

The applicant provided additional information in PTN COL 6.4-1 to address COL Information Item 6.4-1 (COL Action Item 6.4-1) related to the evaluation of potential accidents involving hazardous materials that may impact the control room habitability.

- STD COL 6.4-1

The applicant addressed STD COL 6.4-1 in the Turkey Point Units 6 and 7 COL FSAR, related to the onsite chemicals expected to be standard to all AP1000 COLs by providing Turkey Point Units 6 and 7 COL FSAR Table 6.4-201.

The applicant identified, evaluated, and provided information for potential accidents considered as DBAs that may affect the nuclear plant in terms of design parameters (e.g., overpressure, missile energies) and physical phenomena (e.g., concentration of flammable or toxic vapor clouds outside building structures). DBAs internal and external to the nuclear plant are defined as those accidents that have a probability of occurrence on an order of magnitude of 10^{-7} per year or greater and potential consequences serious enough to affect the safety of plant to the extent that the guidelines of 10 CFR Part 100 could be exceeded.

2.2.3.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the evaluation of potential accidents are given in Section 2.2.3 of NUREG-0800.

The applicable regulatory requirements for evaluation of potential accidents are set forth in the following:

- 10 CFR 100.20(b), which requires that the nature and proximity of man-made related hazards (e.g., airports, dams, transportation routes, military and chemical facilities) be evaluated to establish site parameters for use in determining whether plant design can accommodate commonly occurring hazards, and whether the risk of other hazards is very low.

- 10 CFR 52.79(a)(1)(iv), as it relates to the factors to be considered in the evaluation of sites, which require the location and description of industrial, military, or transportation facilities and routes, and the requirements of 10 CFR 52.79(a)(1)(vi) as they relate to compliance with 10 CFR Part 100.

The related acceptance criteria from Section 2.2.3 of NUREG-0800 are as follows:

- Event Probability: The identification of design-basis events (DBEs) resulting from the presence of hazardous materials or activities in the vicinity of the plant or plants of specified type is acceptable if all postulated types of accidents are included for which the expected rate of occurrence of potential exposures resulting in radiological dose in excess of the 10 CFR 50.34(a)(1) limits as it relates to the requirements of 10 CFR Part 100 is estimated to exceed the staff's objective of an order of magnitude of 10^{-7} per year.
- Design-Basis Events (DBE): The effects of DBEs have been adequately considered, in accordance with 10 CFR 100.20(b), if analyses of the effects of those accidents on the safety-related features of the plant or plants of specified type have been performed and measures have been taken (e.g., hardening, fire protection) to mitigate the consequences of such events.

In addition, the toxic gas evaluations should be consistent with appropriate sections from RG 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room during a Postulated Hazardous Chemical Release," Revision 1 (December 2001).

2.2.3.4 Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.2 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the evaluation of potential accidents. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.2-1
- PTN COL 6.4-1
- STD COL 6.4-1

The staff reviewed the resolution to the PTN COL 2.2-1 (related to COL Information Item 2.2-1), which addresses specific items related to the identification and evaluation of potential accidents resulting from external hazards or hazardous materials included in Turkey Point Units 6 and 7 COL FSAR Section 2.2.1.

The staff reviewed PTN COL 2.2-1 related to information about industrial, military, and transportation facilities and routes to establish the presence and magnitude of potential external

hazards, including the following accident categories: explosions, flammable vapor clouds (delayed ignition), toxic chemicals, fires, and airplane crashes included in Turkey Point Units 6 and 7 COL FSAR Section 2.2.3. COL Information Item in Section 2.2 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will provide site-specific information related to the identification of potential hazards within the site vicinity, including an evaluation of potential accidents and verify that the frequency of site-specific potential hazards is consistent with the criteria outlined in Section 2.2. The site-specific information will provide a review of aircraft hazards information on nearby transportation routes, and information on potential industrial and military hazards.

The applicant analyzed postulated accidents for various types considering the identified sources and locations in Turkey Point Units 6 and 7 COL FSAR Section 2.2.1, which include the following:

- explosions,
- flammable vapor clouds (delayed ignition),
- toxic chemicals,
- fires,
- collision with intake structure
- liquid spills, and
- radiological hazards.

The applicant considered hazards involving potential explosions resulting in blast overpressure due to detonation of explosives, munitions, chemicals, liquid fuels, and gaseous fuels for facilities and activities either onsite or within the vicinity of the Turkey Point Units 6 and 7 site. The applicant evaluated potential explosions from nearby highways, navigable waterways, pipelines, or facilities using 1 psi overpressure as a criterion for adversely effecting plant operation or preventing safe shutdown of the plant. In accordance with RG 1.91, "Evaluations of Explosions Postulated To Occur at Nearby Facilities and on Transportation Routes near Nuclear Power Plants," peak positive incident overpressures below 1 psi are considered to cause no significant damage.

The Turkey Point Units 6 and 7 site is close to existing Units 1 through 5 chemical storage locations. The applicant determined that the minimum safe distances for the storage of chemicals associated with Units 1 through 5 and Units 6 and 7 presented in Turkey Point Units 6 and 7 COL FSAR Table 2.2-213, are less than the minimum separation distance from the nearest safety-related structure, the Unit 6 auxiliary building to each chemical storage location. The staff performed independent confirmatory calculations and verified the applicant's determined minimum safe distances for all chemicals stored onsite.

The applicant determined that the minimum safe standoff distances for hazardous chemicals gasoline, hydrazine, jet fuel, and propane stored at the Homestead Air Base are less than the minimum separation distance from the Unit 6 auxiliary building. Therefore, the overpressure resulting from an explosion due to chemicals stored at Homestead Air Base would not adversely affect the safe operation or shutdown of Units 6 and 7. The staff performed independent calculations and confirmed the applicant's determined values.

The applicant determined a minimum safe standoff distance of 81 m (266 ft), which is less than closest point of approach of 626 m (2,054 ft) to onsite truck transport, using conservative assumptions and RG 1.91 methodology. The staff performed independent calculations that confirmed the applicant's results. Therefore, the staff concludes that the applicant's assumptions and methodology are acceptable.

The applicant determined a minimum safe distance of 944 m (3,097 ft) to 1 psi overpressure due to an explosion from instantaneous release of natural gas from a pipeline at a separation distance of 1,382 m (4,535 ft) from the Unit 6 auxiliary building. Therefore, the overpressure from an explosion from a rupture in the Florida Gas Transmission Company Turkey Point Lateral natural gas transmission will not adversely affect the safe operation or shutdown of Units 6 and 7. The staff performed independent calculations and verified the applicant's results.

Flammable Vapor Clouds (Delayed Ignition)

The applicant evaluated potential flammable vapor clouds using the ALOHA air dispersion model to determine the distance that the chemical vapor cloud could exist in the flammable range between Lower Flammable Limit (LFL) to Upper Flammable Limit (UFL), thus having potential for ignition, explosion, or thermal hazard. The results of this evaluation are presented in Turkey Point Units 6 and 7 COL FSAR Table 2.2-214. The results of the analyses indicate that the calculated distance to LFL and minimum safe distance to 1 psi due to vapor cloud explosion is less than the distance to the nearest safety-related structure for each chemical from its source location. The maximum incident heat flux is less than level of concern 5 kW/m². The staff performed confirmatory calculations independently by using the ALOHA computer model, and found the applicant-determined values to be comparable. Based on the review and independent analyses, the staff finds the applicant's results acceptable.

Toxic Chemicals

Accidents involving the release of toxic or asphyxiating chemicals from onsite storage facilities and nearby mobile and stationary sources were considered and evaluated. The ALOHA air dispersion model was used to predict the concentrations of toxic or asphyxiating chemical clouds as they disperse downwind from all facilities and sources. The maximum distance a cloud could travel to reach the immediately dangerous to life and health (IDLH) concentration or other toxicity limit concentration level was determined by using the ALOHA model.

The effects of toxic chemical releases from standard AP1000 chemicals are summarized in Turkey Point Units 6 and 7 COL FSAR Table 6.4-201. The applicant stated that these standard AP1000 chemicals are stored at the Turkey Point Units 6 and 7 site at distances greater than the minimum safe distances indicated in Table 6.4-201. The effects of toxic chemical releases from the Turkey Point Units 6 and 7 site-specific chemicals, onsite chemicals (Units 1 through 5), and external nearby sources are summarized in Turkey Point Units 6 and 7 COL FSAR Table 2.2-215. The staff performed independent confirmatory analyses to determine the concentration of each chemical from the onsite storage sources and nearby facilities addressed

in Turkey Point Units 6 and 7 COL FSAR Table 2.2-215 using the ALOHA computer model. The staff's determined values are comparable to those that are presented by the applicant in Turkey Point Units 6 and 7 COL FSAR Table 2.2-215.

Based on the concentration information in Turkey Point Units 6 and 7 COL FSAR Table 2.2-215, the concentration of ammonium hydroxide (30 percent) and chlorine due to potential accidental release from onsite storage for Units 1 through 5; and the concentration of carbon dioxide (CO₂), hydrazine (35 percent), and sodium hypochlorite (10.8 percent) due to potential release from onsite storage for Units 6 and 7, is observed to exceed the respective chemical IDLH concentration at the inlet to the control room. Therefore, the staff requested the applicant in RAI 5655, Questions 02.02.03-2 and 02.02.03-3, to provide the ALOHA model determined concentration of these chemicals at the inlet to control room as well as the concentration inside the control room for easy comparison.

In a letter August 4, 2011 (ADAMS Accession No. ML11217A224), the applicant provided the response with adequate information. The applicant explained that the inlet to the control room is conservatively assumed to be ground level concentration. Although the concentration of these chemicals exceeds the respective IDLH concentration inlet to control room, the concentration inside the control room is lower than the respective IDLH concentration. However, these chemicals that exceed respective IDLH concentration at the inlet to the control room are further evaluated for concentration inside the control room in accordance with the criteria for the control room habitability in SER Section 6.4.

Fires

The heat fluxes determined from potential fires originating from accidents at any of the facilities are found to be much less than the level concern of 5 kW/m² for heat from fires. In addition, the safety zone around Units 6 and 7 greatly exceeds recommended distances of 30 to 100 ft, and therefore, the staff concludes that there will be no effect to Units 6 and 7 from fires and heat fluxes from fires.

Collision with Intake Structure

The Turkey Point Units 6 and 7 makeup water system consists of either reclaimed water provided from the Miami-Dade Water and Sewer Department or saltwater makeup water from the radial collector wells. There is no intake structure associated with either the reclaimed water pipeline or radial collector well system that would be damaged as a result of navigable waterway activities.

Liquid Spills

Only fuel oil shipped by barge may potentially spill, but has a specific gravity less than unity, will float on the surface of the Biscayne Bay, and is not likely to be drawn into the makeup water system. The staff agrees with the applicant's assumption and conclusion.

Radiological Hazards

The hazard due to the release of radioactive material from Turkey Point Units 3 and 4 as a result of normal operations or an unanticipated event will not threaten the safety of the new units. Smoke detectors, radiation detectors, and associated control equipment are installed at various plant locations as necessary to provide the appropriate operation of the systems.

Radiation monitoring of the main control room environment is provided by the radiation monitoring system. The habitability systems for Turkey Point Units 6 and 7 are capable of maintaining the main control room environment suitable for prolonged occupancy throughout the duration of the postulated accidents that require protection from external fire, smoke, and airborne radioactivity. The staff agrees that the applicant rationale reasonable and acceptable.

2.2.3.5 Post Combined License Activities

There are no post-COL activities related to this section.

2.2.3.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to evaluation of potential accidents, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the COL application are documented in NUREG-1793 and its supplements.

As discussed above, the applicant has presented and substantiated information to identify potential hazards in the Turkey Point Units 6 and 7 site vicinity. The staff has reviewed the information provided and concludes that the applicant has provided sufficient information with respect to the identification of potential hazards in accordance with the requirements of 10 CFR 52.79(a)(1)(iv) and 10 CFR 52.79(a)(1)(vi). The nature and extent of activities involving potentially hazardous materials that are conducted at nearby industrial, military, and transportation facilities have been evaluated to identify any such activities that have the potential for adversely affecting plant safety-related structures. Based on an evaluation of information in the Turkey Point Units 6 and 7 COL FSAR as well as information that the staff independently evaluated, the staff has concluded that potentially hazardous activities on site and in the vicinity of the Turkey Point Units 6 and 7 site have been identified. This addresses and resolves COL Information Item 2.2-1. In conclusion, the applicant has provided sufficient information for satisfying 10 CFR Part 50.34(a)(1), 10 CFR Part 52.79(a)(1)(iv), 10 CFR Part 52.79(a)(1)(vi), and 10 CFR Part 100.

2.3 Meteorology

To ensure that a nuclear power plant or plants can be designed, constructed, and operated on an applicant's proposed site in compliance with NRC regulations, the staff evaluates regional and local climatological information, including climate extremes and severe weather occurrences that may affect the design and siting of a nuclear plant. The staff reviews information on the atmospheric dispersion characteristics of a nuclear power plant site to determine whether the radioactive effluents from postulated accidental releases, as well as routine operational releases, comply with NRC regulations. The staff has prepared SER Sections 2.3.1 through 2.3.5 in accordance with the review procedures described in NUREG-0800, using information presented in Turkey Point Units 6 and 7 site COL FSAR Section 2.3 (which references the AP1000 DCD, responses to staff RAIs, and generally available reference materials (as cited in applicable sections of NUREG-0800)).

2.3.1 Regional Climatology

2.3.1.2 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.3.1, “Regional Climatology,” addresses averages and extremes of climatic conditions and regional meteorological phenomena that could affect the safe design and siting of the plant, including information describing the general climate of the region, seasonal and annual frequencies of severe weather phenomena, and other meteorological conditions to be used for design- and operating-basis considerations.

This SER section also addresses the supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.3.6 related to regional climatology.

2.3.1.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR Section 2.3 incorporates by reference Section 2.3 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.3, the applicant provided the following:

Tier 2 Departure

- PTN DEP 2.0-2

Tier 1 and 2 Departures

- PTN DEP 2.0-1
- PTN DEP 2.0-3

The applicant proposed a departure (PTN DEP 2.0-1) from the operating basis wind speed in the AP1000 DCD Tier 2, Table 2-1. The 150 mph, 50-year return period, 3-second gust wind speed identified in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201 exceeds the value in AP1000 DCD Tier 2 Table 2-1 of 145 mph. The applicant also proposed a departure (PTN DEP 2.0-2) from the maximum normal air temperature wet bulb (noncoincident) in the AP1000 DCD Tier 2, Table 2-1. The 81.5 °F maximum normal wet-bulb temperature (noncoincident) identified in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201 exceeds the value in AP1000 DCD Tier 2, Table 2-1 of 80.1 °F. The applicant also proposed a departure (PTN DEP 2.0-3) from the maximum safety wet-bulb (noncoincident) air temperature in both Tier 1 and Tier 2 material of the AP1000 DCD. The 87.3 °F maximum safety wet-bulb (noncoincident) air temperature identified in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201 exceeds the value in AP1000 DCD Tier 1 Table 5.0-1 and DCD Tier 2 Table 2-1.

AP1000 COL Information Item

- PTN COL 2.3-1

The applicant provided additional information in PTN COL 2.3-1 to address COL Information Item 2.3-1 (COL Action Item 2.3.1-1). PTN COL 2.3-1 addresses site-specific information related to regional climatology.

Supplemental Information

- PTN SUP 2.3-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.3, discussing regional climatology and local meteorological conditions, the onsite meteorological measurements program, and short-term and long-term diffusion estimates.

- PTN SUP 2.3.6-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.3.6.1, discussing climatological characteristics of the site region.

2.3.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for regional climatology are given in Section 2.3.1 of NUREG-0800.

The applicable regulatory requirements for identifying regional meteorology are:

- 10 CFR 52.79(a)(1)(iii), as it relates to identifying the more severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and time in which the historical data have been accumulated.
- 10 CFR 100.20(c)(2), and 10 CFR 100.21(d), with respect to the consideration given to the regional meteorological characteristics of the site.

The climatological and meteorological information assembled in compliance with the above regulatory requirements are necessary to determine a proposed facility's compliance with the following requirements in Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants":

- GDC 2, "Design Bases for Protection Against Natural Phenomena," which requires that SSCs important to safety be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunamis, and seiches without loss of capability to perform their safety functions.
- GDC 4, "Environmental and Dynamic Effects Design Bases," which requires that SSCs important to safety be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents.

The related acceptance criteria from Section 2.3.1 of NUREG-0800 are as follows:

- The description of the general climate of the region should be based on standard climatic summaries compiled by the National Oceanic and Atmospheric Administration (NOAA).
- Data on severe weather phenomena should be based on standard meteorological records from nearby representative U.S. National Weather Service (NWS), military, or other stations recognized as standard installations that have long periods of data on record.
- The tornado parameters should be consistent with Regulatory Guide (RG) 1.76, "Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants," Revision 1. Alternatively, an applicant may specify any tornado parameters that are appropriately justified, provided that a technical evaluation of site-specific data is conducted.
- The basic (straight-line) 100-year return period 3-second gust wind speed should be based on appropriate standards, with suitable corrections for local conditions.
- Consistent with RG 1.27, "Ultimate Heat Sink for Nuclear Power Plants," Revision 2, the ultimate heat sink (UHS) meteorological data that would result in the maximum evaporation and drift loss of water and minimum water cooling should be based on long-period regional records that represent site conditions. (Not applicable to a passive containment system design that does not utilize a cooling tower or cooling pond).
- The weight of the 100-year return period snowpack should be based on data recorded at nearby representative climatic stations or obtained from appropriate standards with suitable corrections for local conditions. The weight of the 48-hour probably maximum winter precipitation (PMWP) should be determined in accordance with reports published by NOAA's Hydrometeorological Design Studies Center.
- Ambient temperature and humidity statistics should be derived from data recorded at nearby representative climatic stations or obtained from appropriate standards with suitable corrections for local conditions.
- High air pollution potential information should be based on U.S. Environmental Protection Agency (EPA) studies.
- All other meteorological and air quality conditions identified by the applicant as design and operating bases should be documented and substantiated.

The information should be consistent with acceptable practices, data from NOAA, industry standards, and NRC regulatory guides.

Interim staff guidance (ISG) document DC/COL-ISG-7, "Interim Staff Guidance on Assessment of Normal and Extreme Winter Precipitation Loads on the Roofs of Seismic Category I Structures," was issued subsequent to the publication of NUREG-0800, Section 2.3.1. The ISG clarifies the staff's position that the applicant should identify winter precipitation events as site characteristics and site parameters for determining normal and extreme winter precipitation loads on the roofs of seismic Category I structures.

2.3.1.4 *Technical Evaluation*

The staff reviewed Section 2.3.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed the information relating to regional climatology. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Tier 2 Departure

- PTN DEP 2.0-2

Tier 1 and 2 Departures

- PTN DEP 2.0-1
- PTN DEP 2.0-3

The staff reviewed PTN DEP 2.0-1 related to the applicant's use of an operating basis wind of a 150 mph, 50-year return period, 3-second gust wind speed which exceeds the value in the AP1000 DCD Tier 2 Table 2-1 of 145 mph. The staff's evaluation of the appropriateness of the applicant's values for the operating basis wind speed for the Turkey Point Units 6 and 7 site is in SER Sections 2.3.1, 3.3.1 and 3.3.3

In addition, the staff reviewed PTN DEP 2.0-2 related to the applicant's use the maximum normal air temperature wet bulb (noncoincident) of 81.5 °F which exceeds the value in AP1000 DCD Tier 2, Table 2-1 of 80.1 °F and PTN DEP 2.0-3 related to the applicant's use of a maximum safety wet-bulb (noncoincident) air temperature of 87.3 °F that exceeds the value in AP1000 DCD Tier 1 Table 5.0-1 and DCD Tier 2 Table 2-1. The staff's evaluation of the appropriateness of the applicant's values for the maximum normal and maximum safety wet-bulb (noncoincident) air temperature for the Turkey Point Units 6 and 7 site is in SER Section 2.3.1.4.5.

AP1000 COL Information Item

- PTN COL 2.3-1

The staff reviewed PTN COL 2.3-1 related to the provision of regional climatology included in Turkey Point Units 6 and 7 COL FSAR Section 2.3.1. The COL Information Item in Section 2.3.6.1 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will address site-specific information related to regional climatology.

Evaluation of the information provided in PTN COL 2.3-1 is discussed below.

Supplemental Information

- PTN SUP 2.3-1

The staff reviewed supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.3, discussing regional climatological conditions and local meteorological conditions, the onsite meteorological measurements program, and short-term and long-term diffusion estimates.

- PTN SUP 2.3.6-1

The staff reviewed supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.3.6.1, discussing climatological characteristics in the Turkey Point Units 6 and 7 site region.

The staff relied upon the review procedures presented in NUREG-0800, Section 2.3.1, to independently assess the technical sufficiency of the information presented by the applicant.

2.3.1.4.1 *Data Sources*

The applicant used several sources of data in its discussion describing the regional climatology. They used a total of 16 stations within an approximately 50 mi radius of the Turkey Point Units 6 and 7 site, including the Miami International Airport, Florida's NWS first-order reporting station. The non-NWS sites were located in Broward, Collier, Miami-Dade, and Monroe Counties, FL. The applicant chose these sites to accurately depict the conditions that might be expected at the Turkey Point Units 6 and 7 site. The staff used the first-order NWS station at Miami International Airport to independently confirm the representativeness of the applicant's description of the regional climate.

2.3.1.4.2 *General Climate*

The applicant described the general climate of the Turkey Point Units 6 and 7 site by discussing the terrain in southern Florida, as well as the general synoptic conditions historically observed. The applicant noted that the Turkey Point Units 6 and 7 site is in the southern portion of Climate Division 6 (lower east coast), which includes a majority of Miami-Dade, Palm Beach, and Martin counties.

The staff compared the applicant's general climate description to a similar National Climatic Data Center (NCDC) narrative description of the climate of Florida and confirmed its accuracy and completeness; thus, the staff accepts the applicant's description of the general climate. (NCDC, Climates of the States #60).

2.3.1.4.3 *Severe Weather*

Extreme Winds

Using the American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI) Standard 7-05, "Minimum Design Loads for Buildings and Other Structures," the applicant found that the basic wind speed is about 150 mph. The staff confirmed this value using ASCE/SEI Standard 7-05. ASCE/SEI Standard 7-05 describes the basic wind speed to be the "[t]hree second wind gust speed at 33 ft (10 m) above the ground in Exposure Category C." Exposure Category C relies on the surface roughness categories as defined in Chapter 6, "Wind Loads," of ASCE/SEI Standard 7-05. Exposure Category C is acceptable at the Turkey Point Units 6 and 7 site due to scattered obstructions of various sizes in the immediate site area. Exposure

Category B specifies that there must be urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger, prevailing in the upwind direction for a distance of at least 792 m (2,600 ft) or 20 times the height of the building, whichever is greater. Exposure Category D specifies that there must be flat, unobstructed areas and water surfaces prevailing in the upwind direction for a distance greater than 1,525 m (5,000 ft) or 20 times the building height, whichever is greater. Neither Exposure Category B nor Exposure Category D accurately describes the conditions at the Turkey Point Units 6 and 7 meteorological tower. ASCE/SEI Standard 7-05 states that Exposure Category C shall apply for all cases where Exposures B or D does not apply.

Consistent with NUREG-0800, Section 2.3.1, the applicant chose the 100-year return period 3-second wind gust site characteristic based on ASCE/SEI Standard 7-05, "Minimum Design Loads for Buildings and Other Structures," for the Turkey Point Units 6 and 7 site. The applicant stated that the 50-year return period 3-second gust is 150 mph. The applicant used a scaling factor of 1.07, consistent with ASCE/SEI Standard 7-05, Table C6-7, to determine the 100-year return period 3-second gust of 161 mph.

In RAI 5908, Question 02.03.01-2 (ADAMS Accession No. [ML11276A100](#)), the staff asked the applicant to update the Turkey Point Units 6 and 7 COL FSAR to include additional justification regarding how the proposed 100-year return period 3-second gust wind speed site characteristic value for safety-related structures suitably accounts for the historically reported hurricanes. The applicant responded by explaining that the highest recorded 3-second gust wind speed in the Turkey Point Units 6 and 7 site area was a result of Hurricane Andrew in 1992. Hurricane Andrew made landfall as a Category 5 storm with sustained 1-minute winds of 167 mph. Using a conversion factor from Figure C6-4 of ASCE/SEI Standard 7-05, the associated 3-second gust wind speed is estimated to be 204 mph. The applicant updated Turkey Point Units 6 and 7 COL FSAR Table 2.0-201 to include the maximum hurricane wind speed (as recorded during Hurricane Andrew [August 1992]) as a footnote (m) to the site characteristic tornado wind speed.

The staff accepts the applicant's response to RAI 5908, Question 02.03.01-2 (ADAMS Accession No. [ML11276A100](#)) and the continued use of 161 mph as the site characteristic operating basis wind speed because the AP1000 operating basis wind speed is based on the 100-year return period wind, not the historic maximum wind. AP1000 design basis winds are the 10^{-2} /year and the 10^{-7} /year wind. The operating basis wind should be considered a severe environmental load that could infrequently be encountered during the plant life, and therefore, can be expected to be exceeded. The applicant, through the inclusion of footnote (m), has included the maximum historic wind gust of 204 mph in comparison to the maximum tornado wind speed. The AP1000 DCD site parameter tornado wind speed is 300 mph, and therefore bounds the maximum hurricane wind speed. The staff reviewed the changes proposed and based on the above discussion, finds them to be acceptable. Therefore, the staff considers RAI 5908, Question 02.03.01-2 to be resolved.

In RAI 6251, Question 02.03.01-3, the staff asked the applicant to describe how the Turkey Point Units 6 and 7 COL FSAR satisfies the Combined License Information requirement of AP1000 DCD Section 3.5.4 in consideration of RG 1.221, "Design-Basis Hurricane and Hurricane Missiles for Nuclear Power Plants." The applicant responded by providing an updated analysis of the design-basis missile spectrum for a hurricane wind speed of 260 mph. The applicant determined the 10^{-7} per year 3-second wind gust to be 260 mph. Based on this wind speed, the applicant updated Turkey Point Units 6 and 7 COL FSAR Section 3.5.1.4 with an analysis of the site-specific hurricane generated missiles. The applicant added Table 3.5-

201 to provide a comparison between the AP1000 DCD and site-specific hurricane-missile parameters. The applicant also added Section 3.5.2, "Protection from Externally Generated Missiles" as a discussion on the missile spectrum derived from RG 1.221. The staff reviewed the changes proposed and based on the above discussion, finds them to be acceptable. Therefore, the staff considers RAI 6251, Question 02.03.01-3 to be resolved.

A comparison between the AP1000 site parameters and the Turkey Point Units 6 and 7 site characteristics for the maximum 3-second wind gust is presented in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201. The applicant's site characteristics for extreme winds were found to not be bounded by the AP1000 DCD site parameters.

The applicant has stated that an exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.d, in accordance with 10 CFR 52.7 and 10 CFR 52.93, and a departure from AP1000 DCD Table 2-1 is necessary. Details on the departure (PTN DEP 2.0-1) and associated exemption from the 3-second gust wind speed value of 150 mph can be found in Part 7.A.2, of the Turkey Point Units 6 and 7 COL application. The staff has determined that the applicant's stated 50-year maximum 3-second gust wind speed value of 150 mph is appropriate for the Turkey Point Units 6 and 7 site. Additional staff evaluation of this departure and associated exemption is in SER Section 2.0. This departure is also discussed in the context of hurricane missiles in SER Section 3.5.

Tornadoes

Turkey Point Units 6 and 7 COL FSAR Section 2.3.1.3.2 lists the number of tornadoes by Fujita Scale strength for a 2-degree box surrounding the Turkey Point Units 6 and 7 site.

The applicant chose tornado site characteristics based on RG 1.76, Revision 1, and NUREG/CR-4461, "Tornado Climatology of the Contiguous United States," Revision 2. RG 1.76, Revision 1, provides design-basis tornado characteristics for three tornado intensity regions throughout the United States, each with a 10^{-7} per year probability of occurrence. The proposed COL site is in tornado intensity Region II. Tornado intensity Region II is primarily characterized by lower maximum wind speeds and lower pressure drops. The applicant proposed the following tornado site characteristics, which are listed in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201:

Maximum Wind Speed	200 mi per hour
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Because the applicant has correctly identified those design-basis tornado site characteristics presented in RG 1.76, Revision 1, the staff has verified and concluded that the applicant has chosen acceptable tornado site characteristics. RG 1.76, Revision 1 relies on the Enhanced-Fujita (EF) scale to relate the degree of damage from a tornado to the tornado maximum wind speed.

Tropical Cyclones

The applicant discussed a history of hurricanes that have passed within 100 nautical mi of the Turkey Point Units 6 and 7 site between 1851 and 2007. The applicant stated during this timeframe, 53 tropical cyclone (hurricanes and tropical storms) storm tracks have passed within 100 nautical mi of the Turkey Point Units 6 and 7 site. In addition to three historical extratropical cyclones, approximately 50 hurricanes have passed within 100 nautical mi of the Turkey Point

Units 6 and 7 site; 16 were Category 1, 8 were Category 2, 13 were Category 3, 10 were Category 4, and 3 were Category 5.

Section 3.3.1 of the AP1000 DCD states that the operating basis wind speed site parameter value of 145 mph (3-second gust) is based on an annual probability of occurrence of 0.02 (i.e., 50-year return period). Higher winds with an annual probability of occurrence of 0.01 (i.e., 100-year return period) were used in the design of seismic Category I structures by using an importance factor of 1.15. This is equivalent to designing the seismic Category I structures to a wind speed of 155 mph by using a 1.07 scaling factor from Table C6-7 of ASCE 7-05 to convert a 50-year return period gust wind speed to a 100-year return period gust wind speed. The most extreme tropical cyclone reported for the area was Hurricane Andrew (August 1992). This Category 5 storm is estimated to have had a 1-minute sustained wind speed of 167 mph. Using a conversion factor from ASCE/SEI 7-05, Figure C6-4, this is converted to a 3-second gust wind speed of 204 mph. As discussed in SER Section 2.3.1.4.3, this extreme wind speed associated with Hurricane Andrew is bounded by the 10^{-7} wind speed value of 260 mph derived from RG 1.221 for the FPL site. Both the wind speeds recorded during Hurricane Andrew and the wind speeds derived from RG 1.221 are bounded by the AP1000 10^{-7} wind speed site parameter value of 300 mph.

The staff evaluated data from NOAA Coastal Services Center for hurricanes making landfall in or passing near Homestead, FL, between 1851 and 2009. The staff finds hurricane totals acceptably close to what the applicant provided in Turkey Point Units 6 and 7 COL FSAR Section 2.3.1.3.3

Precipitation Extremes

The applicant stated that precipitation can vary significantly from one station to another because precipitation is a point measurement. The staff agrees with this assessment because extreme precipitation events are generally short lived and confined to a small region. Because of this, one station may report extreme precipitation; whereas, a nearby station may report much less. Based on observations from 17 nearby climatological observing stations, the applicant presented historical precipitation extremes for the region. The applicant stated that the highest 24-hour rainfall total in the area was 15.1 in on August 26, 2005, about 38 mi to the northwest of the Turkey Point Units 6 and 7 site. The highest monthly rainfall total in the Turkey Point Units 6 and 7 site area was 34.4 in recorded during October 1965, at a site about 57 mi to the north-northeast of the Turkey Point Units 6 and 7 site. Site characteristic values corresponding to the site parameter precipitation (rain) rates for 1-hour and 5-minute rainfall rates are addressed in Turkey Point Units 6 and 7 COL FSAR Section 2.4.2.

The applicant stated that winter storms that produce measurable amounts of frozen precipitation near the Turkey Point Units 6 and 7 site are rare. The record snowfall for the region was at Homestead, FL, which received a trace (0.05 in) of snow in January 1977. The staff issued DC/COL-ISG-007, which clarifies the staff's position on identifying winter precipitation events as site characteristics and site parameters for determining normal and extreme winter precipitation loads on the roofs of Seismic Category I structures. The ISG revises the previously issued staff guidance as discussed in NUREG-0800, Section 2.3.1.

The ISG states that normal and extreme winter precipitation events should be identified in NUREG-0800, Section 2.3.1 as COL site characteristics for use in NUREG-0800, Section 3.8.4 in determining the normal and extreme winter precipitation loads on the roofs of seismic Category I structures. The normal winter precipitation roof load is a function of the normal

winter precipitation event; whereas, the extreme winter precipitation roof loads are based on the weight of the antecedent snowpack resulting from the normal winter precipitation event plus the larger resultant weight from either: (1) the extreme frozen winter precipitation event, or (2) the extreme liquid winter precipitation event. The extreme frozen winter precipitation event is assumed to accumulate on the roof on top of the antecedent normal winter precipitation event; whereas, the extreme liquid winter precipitation event may or may not accumulate on the roof, depending on the geometry of the roof and the type of drainage provided. The ISG further states:

- The normal winter precipitation event should be the highest ground-level weight (in pounds per square foot (lb/ft²)) among: (1) the 100-year return period snowpack, (2) the historical maximum snowpack, (3) the 100-year return period two-day snowfall event, or (4) the historical maximum two-day snowfall event in the site region.
- The extreme frozen winter precipitation event should be the higher ground-level weight (in lb/ft²) between: (1) the 100-year return period two-day snowfall event, and (2) the historical maximum two-day snowfall event in the site region.
- The extreme liquid winter precipitation event is defined as the theoretically greatest depth of precipitation (in in of water) for a 48-hour period that is physically possible over a 25.9 km² (10 mi²) area at a particular geographical location during those months with the historically highest snowpacks.

The staff evaluated the normal winter precipitation event and the extreme frozen and liquid winter precipitation events in accordance with the ISG. Due to the location of the proposed units along Biscayne Bay, large snow and ice events are rare. The normal and extreme winter precipitation loads for the Turkey Point Units 6 and 7 site were determined to be significantly less than the AP1000 DCD site parameter value of 75 lb/ft². The staff agrees with the applicant that the normal and extreme winter precipitation roof loads are not significant; therefore the staff accepts the applicant's discussion as adequate.

Hail, Snowstorms, and Ice Storms

The following discussion on hail, snowstorms, and ice storms is intended to provide a general understanding of the severe weather phenomena in the Turkey Point Units 6 and 7 site region but does not result in the generation of site characteristics for use as design or operating bases.

The applicant stated that hail can occur any time of the year, but has been observed primarily during late spring and the summer months. Hail stone diameters greater than 0.75 in. have been recorded in the site area. Consistent with the guidance provided in NUREG-0800, Section 2.3.1, the applicant compiled this information from the NCDC. The applicant noted that the number of reported hail events is not consistent across each of the counties. This pattern in hail reports is likely due to the increased number of targets because of urbanization. This is because there are more targets damaged by hail in an urban area than in a rural area. The applicant stated that the largest hailstone observed in the surrounding counties was 4.0–4.5 in in diameter. Using data from the National Severe Storms Laboratory, the staff was able to confirm that the Turkey Point Units 6 and 7 site area experiences hail, on average, 0-1 days per year. The staff was able to confirm the applicant's hail statistics provided in Turkey Point Units 6 and 7 COL FSAR Section 2.3.1.3.5.

The applicant stated that the largest snow accumulation for the region was a trace (0.05 in.) at the Homestead Experiment Station. The applicant also stated that there have been no reports of ice storms in the counties surrounding the Turkey Point Units 6 and 7 site. The staff has confirmed these statements by using the NCDC Storm Events Database.

Thunderstorms and Lightning

The following discussion on thunderstorms and lightning is intended to provide a general understanding of the severe weather phenomena in the Turkey Point Units 6 and 7 site region but does not result in the generation of site characteristics for use as design or operating bases.

The applicant stated that thunderstorms have been observed on an average of 73 days per year. Thunderstorms have occurred most frequently during the months of June, July, and August. Consistent with NUREG-0800 Section 2.3.1, the applicant compiled this information from the 2009 Miami, FL, NCDC Local Climatological Data (LCD).

Using the 2009 NCDC LCD for Miami, FL, the staff confirmed that thunderstorms have been observed on an average of 73 days per year. The staff agrees with the applicant that thunderstorms have occurred most frequently in the months of June, July, and August at the observation location.

The applicant stated that there are approximately 14–16 flashes to Earth per year per square kilometer, based on the data from Miami, FL. The staff independently evaluated the applicant's estimate based on the 2009 LCDs from the same weather reporting station and a method attributed to the Electric Power Research Institute (8.3 flashes to Earth per square kilometer), a 10-year flash density map (Vaisala, 2009) (6–8 flashes to earth per square kilometer), and a 1999 paper by G. Huffines and R.E. Orville, titled "Lightning Ground Flash Density and Thunderstorm Duration in the Continental United States: 1989–96" (7–9 flashes to Earth per square kilometer). Thus, the staff concludes that the applicant has provided a reasonable and conservative estimate of the frequency of lightning flashes.

Based on a mean frequency of 23 flashes to Earth per year per square mile and an exclusion area for the proposed Units 6 and 7 of 0.047 square-mi, the applicant predicted that 1.1 lightning flashes per year can be expected within the exclusion area of the two proposed units. The staff has confirmed the applicant's calculation and finds it to be a reasonable estimate.

Consistent with the guidance provided in NUREG-0800, Section 2.3.1, the applicant has provided the necessary information regarding thunderstorms, hail, and lightning. As previously discussed, the staff has independently confirmed the descriptions provided by the applicant and accepts them as adequate.

Droughts and Dust (Sand) Storms

Droughts are defined as a period of abnormally dry weather sufficiently long enough to cause a serious hydrological imbalance. The applicant stated that the southeastern coastal region of Florida is occasionally affected by drought conditions. Turkey Point Units 6 and 7 COL FSAR Subsection 2.4.11 describes the effects of droughts on the Turkey Point Units 6 and 7 site's cooling system and the historical frequency of droughts affecting the Turkey Point Units 6 and 7 site area.

Dust and sandstorms are an unusual severe weather condition characterized by strong winds and dust-filled air over an extensive area. Generally, a prerequisite for a dust storm is a period of drought over an area of normally arable land.

The applicant stated that the NCDC Storm Events database indicates that there have been no occurrences of dust storms near the Turkey Point Units 6 and 7 site dating back to 1950. Using the same NCDC database, the staff finds that there have been no dust storms reported in Miami-Dade County, FL during the period of January 1, 1950 through July 31, 2010.

2.3.1.4.4 Meteorological Data for Evaluating the Ultimate Heat Sink

The applicant stated that meteorological conditions will not affect the passive containment cooling system in the AP1000 design. The staff agrees with this statement for the reasons discussed below.

Many plants use a cooling tower as a UHS to dissipate residual heat after an accident. Instead of using a cooling tower to release heat to the atmosphere, the AP1000 design uses a passive containment cooling system (PCS) to provide the safety-related UHS. The PCS is designed to withstand the maximum safety dry-bulb and coincident wet-bulb air temperature site parameters specified in the AP1000 DCD. Therefore, the applicant need not identify meteorological characteristics for evaluating the design of a UHS cooling tower.

2.3.1.4.5 Design-Basis Dry- and Wet-Bulb Temperatures

The AP1000 DCD site parameters for ambient air temperature are defined as follows:

- Maximum Safety Dry-Bulb Temperature and Coincident Wet-Bulb Temperature: These site parameter values represent a maximum dry-bulb temperature that exists for 2 hours or more, combined with the maximum wet-bulb temperature that exists in that population of dry-bulb temperatures.
- Minimum Safety Dry Bulb Temperature: This site parameter value represents a minimum dry-bulb temperature that exists within a set of hourly data for duration of 2 hours or more.
- Maximum Safety Noncoincident Wet-Bulb Temperature: This site parameter value represents a maximum wet-bulb temperature that exists within a set of hourly data for duration of 2 hours or more.
- Maximum Normal Dry-Bulb Temperature and Coincident Wet-Bulb Temperature: The maximum normal value is the 1-percent seasonal exceedance temperature. The maximum temperature is for the months of June through September in the Northern Hemisphere. The 1-percent seasonal exceedance is approximately equivalent to the annual 0.4-percent exceedance.
- Minimum Normal Dry-Bulb Temperature: The minimum normal value is the 99-percent seasonal exceedance temperature. The minimum temperature is for the months of December, January, and February in the Northern Hemisphere. The 99-percent seasonal exceedance is approximately equivalent to the annual 99.6-percent exceedance.

- Maximum Normal Noncoincident Wet-Bulb Temperature: The maximum normal value is the 1-percent seasonal exceedance temperature. The maximum temperature is for the months of June through September in the Northern Hemisphere. The 1-percent seasonal exceedance is approximately equivalent to the annual 0.4-percent exceedance.

The applicant's safety temperature site characteristic values are based on conservative 100-year estimates. The ambient air temperatures used for comparison against the AP1000 site parameters are listed in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201.

As shown in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201, most of the applicant's site characteristics for ambient air temperature are conservatively bounded by the AP1000 DCD site parameters. The applicant stated that two departures were necessary regarding the site characteristic ambient temperatures. The two site-characteristic temperatures that did not fall within the bounds of the AP1000 DCD site parameters were the maximum normal noncoincident wet-bulb temperature (PTN DEP 2.0-2) and the maximum safety noncoincident wet-bulb temperature (PTN DEP 2.0-3).

The applicant stated that an exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.d, in accordance with 10 CFR 52.7 and 10 CFR 52.93 and a departure from AP1000 DCD Table 2-1 is necessary. Details on the departure (PTN DEP 2.0-2) and associated exemption for the maximum normal wet-bulb (noncoincident) air temperature of 81.5 °F can be found in Turkey Point Units 6 and 7 COL FSAR Part 7.A.1. The staff has determined that the applicant's stated normal safety wet-bulb (noncoincident) air temperature of 81.5 °F is appropriate for the Turkey Point Units 6 and 7 site. Additional staff evaluation of this departure and associated exemption is in SER Section 2.0.

The applicant stated that an exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.d, in accordance with 10 CFR 52.7 and 10 CFR 52.93 and a departure from AP1000 DCD Table 2-1 is necessary. Details on the departure (PTN DEP 2.0-3) and associated exemption for the maximum safety wet-bulb (noncoincident) air temperature of 87.4 °F can be found in Turkey Point Units 6 and 7 COL FSAR Part 7.A.2. The staff has determined that the applicant's stated maximum safety wet-bulb (noncoincident) air temperature of 87.4 °F is appropriate for the Turkey Point Units 6 and 7 site. Additional staff evaluation of this departure and associated exemption is in SER Section 2.0.

Using NCDC hourly data from Homestead AFB in Homestead, FL, (1973–2009) and climate data from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the staff was able to verify the applicant's site-characteristic temperatures presented in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201.

2.3.1.4.6 *Restrictive Dispersion Conditions*

The following discussion on inversions and high air pollution potential is intended to provide a general understanding of the phenomena in the Turkey Point Units 6 and 7 site region but does not result in the generation of site characteristics for use as design or operating basis.

The applicant used model-derived mixing height data to characterize the potential for inversions at the Turkey Point Units 6 and 7 site. These data were determined by using an interactive, spatial database developed by the U.S. Department of Agriculture—Forest Service, referred to

as the U.S. Department of Agriculture (USDA) Ventilation Climate Information System (VCIS). Turkey Point Units 6 and 7 COL FSAR Table 2.3.1-204 lists the maximum, mean, and minimum monthly mixing depths during the AM and PM hours, as derived from the interactive database. The lowest mean monthly mixing height occurs during the morning hours of July (474 m) and the greatest mean mixing height occurs in afternoon hours of April (1,412 m). The staff verified the results in Turkey Point Units 6 and 7 COL FSAR Table 2.3.1-204 by using data published in documents referenced in NUREG-0800, Section 2.3.1 (Holzworth, 1972; Wang and Angell, 1999) and the VCIS database.

2.3.1.4.7 *Climate Changes*

The applicant presented a discussion on the potential effects of global climate change on the regional climatology of the Turkey Point Units 6 and 7 site. The applicant stated that any changes to the local climate are speculative and become even less certain for specific areas or locations.

NUREG-0800, Section 2.3.1, states that historical data used to characterize a site should extend over a significant time interval to capture cyclical extremes. During the course of the technical review the staff made an effort to obtain the longest period of data available to determine the adequacy of the applicant's proposed site characteristics. For example, snow load was based on a 100-year return period, ambient design temperatures were based on a minimum of 65 years of hourly data and an estimated 100-year return period value. Tornadoes were based on a 10^{-7} per year return interval and extreme winds were based on a 100-year return period, including 157 years of historical hurricane data (1851–2008).

The U.S. Global Change Research Program (USGCRP) released a report to the President and Members of Congress in June 2009 titled "Global Climate Change Impacts in the United States." This report, produced by an advisory committee chartered under the Federal Advisory Committee Act, summarizes the science of climate change and the impacts of climate change on the United States.

The USGCRP report found that the average annual temperature of the Southeast (which includes the Florida coastline where the Turkey Point Units 6 and 7 site is located) did not change significantly over the past century as a whole, but the annual average temperature has risen about 2 °F since 1970 with the greatest seasonal increase in temperature occurring during the winter months. Climate models predict continued warming in all seasons across the Southeast and an increase in the rate of warming through the end of the 21st century. Average temperatures in the Southeast are projected to rise by 2–5 °F by the end of the 2050's, depending on assumptions regarding global greenhouse gas emissions.

The USGCRP report also states that there has been no discernable change in observed annual average precipitation from 1958 to 2008 in the region where the Turkey Point Units 6 and 7 site is located. Future changes in total precipitation are more difficult to project than changes in temperature. Model projections of future precipitation generally indicate that southern areas of the United States will become drier. Except for indications that the amount of rainfall from individual hurricanes will increase, climatic models provide divergent results for future precipitation for most of the Southeast.

The USGCRP reports that the power and frequency of Atlantic hurricanes has increased substantially in recent decades, but the number of North American mainland land-falling hurricanes does not appear to have increased over the past century. The USGCRP reports that

likely future changes for the United States and surrounding coastal waters include more intense hurricanes with related increases in wind and rain, but not necessarily an increase in the number of these storms that make landfall.

The USGCRP further states that there is no clear trend in the frequency or strength of tornadoes since the 1950s for the United States as a whole. The applicant stated that the number of recorded tornado events has generally increased since detailed records were routinely kept beginning around 1950. However, some of this increase is attributable to a growing population, greater public awareness and interest, and technological advances in detection. The USGCRP reaches the same conclusion.

The USGCRP reports that the distribution by intensity for the strongest 10 percent of hail and wind reports is little changed, providing no evidence of an observed increase in the severity of such events. Climate models project future increases in the frequency of environmental conditions favorable to severe thunderstorms. But the inability to adequately model the small-scale conditions involved in thunderstorm development remains a limiting factor in projecting the future character of severe thunderstorms and other small-scale weather phenomena.

There is a level of uncertainty in projecting future conditions because the assumptions regarding the future level of emissions of heat trapping gases depend on projections of population, economic activity, and choice of energy technologies. If it becomes evident that long-term climatic change is influencing the most severe natural phenomena reported at the Turkey Point Units 6 and 7 site, the COL holders have a continuing obligation to ensure that their plants stay within the licensing basis.

2.3.1.5 Post Combined License Activities

There are no post COL activities associated with this FSAR section.

2.3.1.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to regional climatology, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to regional climatology remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

AP1000 DCD, Section 2.3.6.1 states that a COL applicant shall address the site-specific regional climatological information. As set forth above, the applicant has presented and substantiated information to establish the regional meteorological characteristics. The staff has reviewed the information provided in PTN COL 2.3-1 and PTN SUP 2.3-1 and concludes that the applicant has established the meteorological characteristics at the Turkey Point Units 6 and 7 site and in the surrounding area acceptable to meet the requirements of 10 CFR 100.20(c)(2) and 10 CFR 100.21(d) with respect to determining the acceptability of the Turkey Point Units 6 and 7 site. The staff has reviewed PTN DEP 2.0-1, PTN DEP 2.0-2, and PTN DEP 2.0-3 and has determined that the applicant's stated site characteristics are acceptable for the Turkey

Point Units 6 and 7 site. The staff finds that the applicant has provided a sufficient description to meet the requirements of the AP1000 DCD. PTN COL 2.3-1 has been adequately addressed by the applicant and is resolved.

The staff also finds that the applicant has considered the most severe natural phenomena historically reported for the Turkey Point Units 6 and 7 site and surrounding area in establishing the site characteristics. Specifically, the staff has accepted the methodologies used to analyze these natural phenomena and determine the severity of the weather phenomena reflected in these site characteristics. Because the applicant has adequately implemented these methodologies, as described above, the staff finds that the applicant has considered these historical phenomena with margin sufficient for the limited accuracy, quantity, and period of time in which the data have been accumulated in accordance with 10 CFR 52.79(a)(1)(iii).

2.3.2 Local Meteorology

2.3.2.1 Introduction

Section 2.3.2, "Local Meteorology," of the Turkey Point Units 6 and 7 COL FSAR addresses the local (site) meteorological parameters, the assessment of the potential influence of the proposed plant and its facilities on local meteorological conditions and the impact of these modifications on plant design and operation, and a topographical description of the Turkey Point Units 6 and 7 site and its environs.

2.3.2.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR Section 2.3 incorporates by reference Section 2.3 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.3, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 2.3-2

The applicant provided additional information in PTN COL 2.3-2 to address COL Information Item 2.3-2. PTN COL 2.3-2 addresses the provision of local meteorology.

2.3.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for local meteorology are given in Section 2.3.2 of NUREG-0800.

The applicable regulatory requirements for identifying local meteorology are:

- 10 CFR 52.79(a)(1)(iii), as it relates to identifying the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and time in which the historical data have been accumulated.
- 10 CFR 100.20(c)(2), and 10 CFR 100.21(d) with respect to the consideration given to the local meteorological characteristics of the site.

The related acceptance criteria from Section 2.3.2 of NUREG-0800 are as follows:

- Local summaries of meteorological data based on onsite measurements in accordance with RG 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants," Revision 1, and NWS station summaries or other standard installation summaries from appropriate nearby locations (e.g., within 80 km (50 mi)) should be presented as specified in RG 1.206, Section 2.3.2.1.
- A complete topographical description of the site and environs out to a distance of 80 km (50 mi) from the plant, as described in RG 1.206, Section 2.3.2.2, should be provided.
- A discussion and evaluation of the influence of the plant and its facilities on the local meteorological and air quality conditions should be provided. Applicants should also identify potential changes in the normal and extreme values resulting from plant construction and operation. The acceptability of the information is determined through comparison with standard assessments.
- The description of local site airflow should include wind roses and annual joint frequency distributions of wind speed and wind direction by atmospheric stability for all measurement levels using the criteria provided in RG 1.23, Revision 1.

2.3.2.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.3.2 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to local meteorology. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information contained in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.3-2

The applicant provided additional information in PTN COL 2.3-2 to resolve COL Information Item 2.3-2, which addresses the provision of local meteorology.

The staff reviewed PTN COL 2.3-2, related to the provision of local meteorology included under Turkey Point Units 6 and 7 COL FSAR Section 2.3. The specific text of this COL Information Item in Section 2.3.6.2 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will address site-specific local meteorology information.

The staff relied upon the review procedures presented in NUREG-0800, Section 2.3.2, to independently assess the technical sufficiency of the information presented by the applicant.

2.3.2.4.1 Normal, Mean, and Extreme Values of Meteorological Parameters

Local meteorology data for the Turkey Point Units 6 and 7 site was provided by the first-order NWS station at Miami, FL, and 16 other nearby cooperative network observing stations, and measurements from the onsite meteorological measurements program operated in support of Units 3 and 4.

Measurements from the tower-mounted meteorological monitoring system that supports Units 3 and 4 include wind direction, wind speed, and atmospheric stability. These measurements are used as the basis for determining and characterizing atmospheric dispersion conditions in the vicinity of the site. The measurements from this tower were taken over three annual cycles in 2002, 2005, and 2006.

Average Wind Direction and Wind Speed Conditions

The applicant produced monthly and annual wind summaries from the onsite meteorological data during 2002, 2005, and 2006. Turkey Point Units 6 and 7 COL FSAR Tables 2.3.2-205 and 2.3.2-206 presented the average joint frequency distribution of wind speed and direction by Pasquill Stability Category (i.e., stability class) for both the lower-level (10-m) and upper-level (60-m) measurement heights. The 3-year joint frequency distribution, based on the lower-level measurement height, was used as input to the atmospheric dispersion models discussed in Turkey Point Units 6 and 7 COL FSAR Sections 2.3.4 and 2.3.5. Using the hourly meteorological data provided by the applicant, the staff independently produced the 3-year joint frequency distributions at both the lower-level and upper-level measurement heights and has confirmed the applicant's wind summaries as correct and acceptable.

Graphical illustrations of the wind summaries (i.e., wind roses) from the same observation period were also produced by the applicant in Turkey Point Units 6 and 7 COL FSAR Figures 2.3.2-201 through 2.3.2-212. These figures show the average monthly wind speed and direction for 16 radial compass directions over all stability classes during the 3-year period of record. Using the hourly meteorological data provided by the applicant, the staff independently produced the same wind roses and has confirmed the applicant's figures as correct and acceptable.

Wind Direction Persistence

The applicant presented wind persistence data from the Turkey Point onsite meteorological monitoring program, as described in Turkey Point Units 6 and 7 COL FSAR Section 2.3.3, during 2002, 2004, and 2005. As the applicant stated, wind persistence is an indicator of the duration of atmospheric transport from a specific sector to a corresponding downwind sector that is 180 ° opposite. The applicant provided detailed information on the wind persistence that

was observed by the onsite meteorological measurements in Turkey Point Units 6 and 7 COL FSAR Tables 2.3.2-202 and 2.3.2-203. The staff has independently confirmed the wind persistence at the Turkey Point Units 6 and 7 site, and thus accepts the application's data and discussion.

Atmospheric Stability

The applicant classified atmospheric stability in accordance with the guidance provided in RG 1.23, Revision 1. Atmospheric stability is a critical parameter for estimating dispersion characteristics in Turkey Point Units 6 and 7 COL FSAR Sections 2.3.4 and 2.3.5. Dispersion of effluents is greatest for extremely unstable atmospheric conditions (i.e., Pasquill Stability Class A) and decreases progressively through extremely stable conditions (i.e., Pasquill Stability Class G). The applicant based its stability classification on temperature change with height (i.e., delta-temperature or $\Delta T/\Delta Z$) between the 60 m and 10 m height, as measured by the Turkey Point Units 6 and 7 onsite meteorological measurements program during 2002, 2005, and 2006.

Frequency of occurrence for each stability class is one of the inputs to the dispersion models used in Turkey Point Units 6 and 7 COL FSAR Sections 2.3.4 and 2.3.5. The applicant included these data in the form of a joint frequency distribution (JFD) of wind speed and direction data as a function of stability class. A comparison of a JFD developed by the staff from the hourly data submitted by the applicant with the JFD developed by the applicant showed reasonable agreement.

Based on the staff's past experience with stability data at various sites, a predominance of neutral (Pasquill Stability Class D) and slightly stable (Pasquill Stability Class E) conditions at the proposed Turkey Point Units 6 and 7 site is generally consistent with expected meteorological conditions. Using a JFD of wind speed, wind direction, and atmospheric stability, and comparing it against the applicants JFD, the staff was able to independently confirm that the 3-year statistics presented by the applicant are adequate.

Temperature

The applicant characterized normal and extreme temperatures for the site based on the 16 surrounding observation stations listed in Turkey Point Units 6 and 7 COL FSAR Table 2.3.2-207, as well as the Miami International Airport NWS reporting station. The extreme maximum temperatures recorded near the site range from 96 °F to 104 °F and the extreme minimum temperatures recorded near the site range from 21 °F to 42 °F. Annual average temperatures for the 17 surrounding sites range from 73.8 °F to 78.4 °F. The applicant stated that the annual average diurnal (day-to-night) temperature differences in the site vicinity range from 9.0 °F to 19.8 °F. The applicant stated that this difference in diurnal temperature ranges is due mainly to proximity of each station to the Atlantic Ocean.

Atmospheric Water Vapor

The applicant presented wet-bulb temperatures, dew-point temperatures, and relative humidity data summaries from the Miami International Airport NWS observation station to characterize the typical atmospheric moisture conditions near the proposed Turkey Point Units 6 and 7 site.

Based on a 25-year period of record, the applicant stated that the mean annual wet-bulb temperature is 69.6 °F. The highest monthly mean wet-bulb temperature is 76.4 °F during August and the lowest monthly mean wet-bulb temperature is 62.0 °F during January.

According to the applicant, the mean annual dew-point temperature at Miami International Airport is 67.7 °F, which also reaches its maximum during summer and minimum during winter. The applicant gives the highest monthly mean dew-point temperature as 74.4 °F during August and the lowest monthly mean dew point temperature as 59.1 °F during January.

Based on a 30-year period of record, the applicant indicates that relative humidity averages 73 percent on an annual basis. The average early morning relative humidity levels exceed 85 percent during August, September, October, and January. Typically, the relative humidity values reach diurnal maximum in the early morning and diurnal minimum during the early afternoon.

The staff reviewed the data listed in the NCDC “Miami, Florida 2008 Local Climatological Data, Annual Summary with Comparative Data” to verify the wet-bulb temperatures, dew-point temperatures, and relative humidity statistics presented by the applicant and discussed above. The staff concludes that the applicant’s values are correct and appropriate.

Precipitation

Based on data from the 17 surrounding observation stations, the applicant stated that the average annual precipitation (water equivalent) totals vary by approximately 21.2 in, ranging from 44.8 in to 66.0 in. The applicant stated that there are two seasonal maximums, the highest during the early summer (June) and the second during the late summer and early autumn (August and September). The applicant stated that the long-term average annual total rainfall at the Turkey Point Units 6 and 7 site could reasonably be expected to be within this range.

Using daily snowfall and rainfall data from the NCDC, the staff has independently verified the precipitation statistics presented in Turkey Point Units 6 and 7 COL FSAR Section 2.3.2.1.6 and accepts them as adequate.

Fog

Miami International Airport is the closest station to the proposed Turkey Point Units 6 and 7 site that makes fog observations. The applicant stated that, based on a 45-year period of record, Miami International Airport averages about 4.7 days per year of heavy fog conditions (e.g., visibility is reduced to one-quarter mile or less).

According to the applicant, the frequency of typical fog conditions at Miami International Airport is expected to be similar to that at the proposed Turkey Point Units 6 and 7 site because of the proximity and similarity of topographic features between the two locations. Both sites are located in relatively flat terrain and are both located close to the Atlantic Ocean.

The staff confirmed the applicant’s assertion that the Miami International Airport reports approximately 4.7 days per year with heavy fog observations. The staff agrees that the frequency of fog conditions at Miami International Airport is expected to be similar to that at the proposed Turkey Point Units 6 and 7 site because of the proximity and similarity of topographic features at both locations.

2.3.2.4.2 Potential Influence of the Plant and Related Facilities on Meteorology

The applicant stated that the potential exists for changes to the micrometeorology as a result of minor changes to the topography, vegetation, and the construction of additional building and

infrastructure. Wind flow may be altered immediately adjacent to and downwind of larger site structures, but these effects will likely dissipate within 10 structure heights downwind. SER Section 2.3.3 discusses the effects of these larger structures on wind flow.

The applicant stated that although temperature may increase above altered surfaces, the effects will be too limited in their vertical profile and horizontal extent to alter local- or regional-scale ambient temperature changes. Site clearing, grubbing, excavation, leveling, and landscape activities associated with plant construction will be localized, and will not represent a significant change to the gently rolling topographic character of the site and its surrounding site area.

Turkey Point Units 6 and 7 will use mechanical draft cooling towers to dissipate heat to the atmosphere. Potential meteorological effects due to operation of the cooling towers may include enhanced ground-level fogging and icing, cloud shadowing and precipitation enhancement, and increased ground-level humidity.

The staff agrees that the activities discussed above are too small-scale to impact the local meteorological characteristics of the site.

In response to RAI 02.03.02-2, the applicant provided a discussion of the effects of salt and moisture deposition on the Turkey Point Units 6 and 7 transformers, switchyard equipment, or transmission lines. The applicant provided an electronic copy of the input and output files from the AERMOD computer model. The staff reviewed the model input and output files to assure that the applicant made conservative assumptions. The AERMOD results indicate that nearly two months of salt accumulation would result in 0.08 mg/cm², which is the upper end of the "Light Contamination Level" range defined by the Institute of Electrical and Electronic Engineers (IEEE) standard. The applicant stated that the vapor plume from the mechanical draft cooling towers would only be expected to intersect the switchyard under high wind speeds (greater than 10 m/s) and with winds from the SSE, S, or SSW sectors. Turkey Point Units 6 and 7 COL FSAR Table 2.3.2-205 shows that these conditions exist for only about 7 hours per year. The staff has independently verified the sources and data cited by the applicant. The staff agrees that total salt accumulation reaching amounts that require mitigation is unlikely due to local precipitation removing any salt deposits before it reaches a level of concern.

The applicant also addressed the potential for the cooling tower plume to increase the temperature and humidity levels at the control room HVAC intakes. Since the cooling tower plumes are only marginally higher than the 100-year return period dry-bulb temperature at the site, the plume is not hot enough to exceed the HVAC design temperature, as shown in AP1000 DCD Table 2-1. The temperature difference, combined with the distance that the plume must travel, leads to the conclusion that there is little potential for the cooling tower plume to adversely impact the HVAC intakes.

Topographic Description

The applicant stated that the Turkey Point site and surrounding area is relatively flat, with no significant terrain features that will otherwise be expected to adversely or unusually impact natural dispersion downwind of the plant. In Turkey Point Units 6 and 7 COL FSAR Sections 2.3.4 and 2.3.5, the applicant discussed that due to the location of the site adjacent to Biscayne Bay, there is a potential for recirculation of flow due to land-water boundaries. The results of the short- and long-term atmospheric dispersion analyses are discussed in Turkey Point Units 6 and 7 COL FSAR Sections 2.3.4 and 2.3.5. Turkey Point Units 6 and 7 COL FSAR Figure

2.3.2-213, "Terrain Elevation Profiles Within 50 Miles of the Units 6 & 7 Site," shows topographic features within an 80 km (50 mi) radius of the Turkey Point Units 6 and 7 site. The staff has independently verified the topographical assessment provided by the applicant and accepts the description as correct and adequate.

Fogging and Icing Effects Attributable to Cooling Tower Operation

Ground fogging could occur if ground elevations in the plant vicinity were comparable to expected heights of the cooling tower plumes. The applicant stated that the expected cooling towers for Units 6 and 7 are mechanical draft towers. The applicant stated that ground-level fogging could occur in the immediate vicinity of the mechanical draft cooling towers. However, those events would be expected only at on-site locations and under relatively cold and moist atmospheric conditions and when building wake and downwash effects have an adverse influence on the dispersion of the cooling tower plumes. The staff agrees and accepts the applicant's discussion.

The applicant stated that there are no large safety-related plant structures or other nearby structures that are expected to be affected by icing from cooling tower plumes due to the meteorological conditions that could reasonably be expected to occur. Because of the small number of days with ambient temperatures below freezing at the Miami, FL, reporting station, the staff agrees that the threat of ice formation is sufficiently low. The staff agrees and accepts the applicant's discussion.

Assessment of Heat Dissipation Effects on the Atmosphere

The topics discussed in this section of the Turkey Point Units 6 and 7 COL FSAR are addressed elsewhere in SER Section 2.3.2.4.2.

Current and Projected Site Air Quality

This section discusses Turkey Point Units 6 and 7 COL FSAR Sections 2.3.2.2.5 and 2.3.2.2.6. The applicant stated that the proposed Turkey Point Units 6 and 7 site is located in the Southeast Florida Intrastate Air Quality Control Region, which includes Broward, Miami-Dade, Indian River, Martin, Monroe, Okeechobee, Palm Beach, and St. Lucie counties. The Southeast Florida Intrastate Air Quality Control Region has been designated as being in attainment, or unclassified for all EPA criteria air pollutants (i.e., ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead) (40 CFR 81.310, "Florida," and 40 CFR 81.49, "Southeast Florida Intrastate Air Quality Control Region").

According to the applicant, the proposed nuclear steam supply system (NSSS) and other radiological systems related to the proposed facility will not be sources of criteria pollutants or other hazardous air pollutants. Other proposed supporting equipment such as diesel generators, fire pump engines, auxiliary boilers, emergency station-blackout generators, and other nonradiological emission-generating sources are not expected to be, in the aggregate, a significant source of criteria pollutant emissions. The staff agrees with this assessment because these systems will be used on an infrequent basis.

2.3.2.5 Post Combined License Activities

There are no post-COL activities related to this section

2.3.2.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to regional climatology, and no outstanding information related to regional climatology remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

COL Information Item 2.3-2 states that a COL applicant shall address the site-specific local meteorological information. As set forth above, the applicant has presented and substantiated information describing the local meteorological conditions and topographic characteristics important to evaluating the adequacy of the design and siting of this plant. The staff has reviewed the information provided and for the reasons given above, concludes that the identification and consideration of the meteorological and topographical characteristics of the site and the surrounding area are acceptable and meet the requirements of 10 CFR 100.20(c) and 10 CFR 100.21(d). The staff finds that the applicant has provided a sufficient description to adequately address COL Information Item 2.3-2 (COL Action Item 2.3.2-1).

The staff also finds that the applicant has considered the appropriate site phenomena in establishing the site characteristics. Specifically, the staff has accepted the methodologies used to determine the meteorological and topographic characteristics. Because the applicant has correctly implemented these methodologies, as described above, the staff has determined that the site characteristics including margin, are sufficient for the limited accuracy, quantity, and period of time in which the data have been accumulated in accordance with 10 CFR 52.79(a)(iii).

2.3.3 Onsite Meteorological Measurements Program

2.3.3.1 Introduction

The Turkey Point Units 6 and 7 onsite meteorological measurement program addresses the need for onsite meteorological monitoring and the resulting data. The staff review covers the following specific areas: (1) meteorological instrumentation, including siting of sensors, sensor type and performance specifications, methods and equipment for recording sensor output, the quality assurance program for sensors and recorders, data acquisition and reduction procedures, and special considerations for complex terrain sites, and (2) the resulting onsite meteorological database, including consideration of the period of record and amenability of the data for use in characterizing atmospheric dispersion conditions.

This section verifies that the applicant successfully implemented an appropriate onsite meteorological measurements program and that data from this program provide an acceptable basis for estimating atmospheric dispersion for DBAs and routine releases from an AP1000 design.

2.3.3.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR Section 2.3 incorporates by reference Section 2.3 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.3, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 2.3-3

The applicant provided additional information in PTN COL 2.3-3 to address COL Information Item 2.3-3. PTN COL 2.3-3 addresses the onsite meteorological measurements program.

In addition, this Turkey Point Units 6 and 7 COL FSAR section addresses interface item No. 2.9 related to the onsite meteorological measurement program.

2.3.3.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the onsite meteorological measurements program are given in Section 2.3.3 of NUREG-0800.

The applicable regulatory requirements for identifying onsite meteorological measurements program are as follows:

- 10 CFR 100.20(c)(2), with respect to the meteorological characteristics of the site that are necessary for safety analysis or that may have an impact upon plant design in determining the acceptability of a site for a nuclear power plant.
- 10 CFR 100.21(c), with respect to the meteorological data used to evaluate site atmospheric dispersion characteristics and establish dispersion parameters such that: (1) radiological effluent release limits associated with normal operation can be met for any individual located offsite, and (2) radiological dose consequences of postulated accidents meet prescribed dose limits at the exclusion area boundary (EAB) and the outer boundary of the low population zone (LPZ).
- 10 CFR Part 50, Appendix A, GDC 19, with respect to the meteorological considerations used to evaluate the personnel exposures inside the control room during radiological and airborne hazardous material accident conditions.
- 10 CFR Part 50.47(b)(4), 10 CFR 50.47(b)(8), and 10 CFR 50.47(b)(9), as well as Section IV.E.2 of 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," with respect to the onsite meteorological information available for determining the magnitude and continuously assessing the impact of the releases of radiological materials to the environment during a radiological emergency.

- 10 CFR Part 50, Appendix I, “Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion ‘As Low As Is Reasonably Achievable’ for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents,” with respect to meteorological data used in determining the compliance with numerical guides for design objectives and limiting conditions for operation to meet the requirement that radioactive material in effluents released to unrestricted areas be kept as low as reasonably achievable (ALARA).
- 10 CFR Part 20, “Standards for Protection against Radiation,” Subpart D, “Radiation Dose Limits for Individual Members of the Public,” with respect to the meteorological data used to demonstrate compliance with dose limits for individual members of the public.

The following RG is applicable to this section:

- RG 1.23, “Meteorological Monitoring Programs for Nuclear Power Plants,” Revision 1.

The related acceptance criteria from Section 2.3.3 of NUREG-0800 are as follows:

- The preoperational and operational monitoring programs should be described, including: (1) a site map (drawn to scale) that shows tower location and true north with respect to man-made structures, topographic features, and other features that may influence site meteorological measurements, (2) distances to nearby obstructions of flow in each downwind sector, (3) measurements made, (4) elevations of measurements, (5) exposure of instruments, (6) instrument descriptions, (7) instrument performance specifications, (8) calibration and maintenance procedures and frequencies, (9) data output and recording systems, and (10) data processing, archiving, and analysis procedures.
- Meteorological data should be presented in the form of JFDs of wind speed and wind direction by atmospheric stability class in the format described in RG 1.23, Revision 1. An hour-by-hour listing of the hourly averaged parameters should be provided in the format described in RG 1.23, Revision 1. If possible, evidence of how well these data represent long-term conditions at the site should also be presented, possibly through comparison with offsite data.
- At least two consecutive annual cycles (and preferably 3 or more whole years), including the most recent 1-year period, should be provided with the application. These data should be used by the applicant to calculate: (1) the short-term atmospheric dispersion estimates for accident releases discussed in SER Section 2.3.4, and (2) the long-term atmospheric dispersion estimates for routine releases discussed in SER Section 2.3.5.

The applicant should identify and justify any deviations from the guidance provided in RG 1.23, Revision 1. Deviations from guidance are discussed in further detail in SER Chapter 1.

2.3.3.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.3.3 and checked the referenced DCD to ensure that the combination of the DCD and the COL applications represents the complete scope of information relating to this review topic.¹ The staff’s review

confirmed that the information in the application and incorporated by reference addresses the required information relating to the onsite meteorological measurements program. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.3-3

The staff reviewed PTN COL 2.3-3 related to the onsite meteorological measurements program included under Section 2.3 of the Turkey Point Units 6 and 7 COL FSAR. The specific text of this COL information item in Section 2.3.6.3 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will address the site-specific onsite meteorological measurements program.

The staff's evaluation is based on the descriptions provided by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.3.3 and a NRC site audit held June 7-11, 2010. The purpose of the site audit was to: (1) become familiar with the prospective applicant's site and site selection process, plans, schedules, and initiatives, (2) observe and review the preoperational onsite meteorological monitoring program, and (3) review the prospective applicant's plans for its operational onsite meteorological monitoring program.

The staff relied upon the review procedures presented in NUREG-0800, Section 2.3.3, to independently assess the technical sufficiency of the information presented by the applicant.

2.3.3.4.1 *Preoperational and Operational Monitoring Programs*

The onsite meteorological monitoring program at the Turkey Point site is a continuation of the current program supporting existing Turkey Point Units 3 and 4. Turkey Point Units 6 and 7 COL FSAR Figures 2.3.3-201 and 2.3.3-202 show the location of the 60 m (196 ft) and 10 m (33 ft) meteorological towers, respectively. Regulatory Guide 1.23, Revision 1, Section 3, describes an acceptable method for siting of the onsite meteorological observation tower. The Turkey Point Units 6 and 7 site is supported by two meteorological towers; the 60 m (196 ft) South Dade tower and the 10 m (33 ft) land utilization (LU) tower. The 60 m (196 ft) South Dade meteorological tower serves as the data collection system and source of onsite meteorological data for the COL application. As stated by the applicant, the 10 m (33 ft) wind speed and wind direction data from the LU tower is primarily used in emergency situations. Data from the South Dade tower is used as backup during a plant emergency.

The South Dade meteorology tower is a 60 m (196 ft), open latticed meteorological tower located approximately 8.9 km (5.5 mi) southwest of Turkey Point Units 3 and 4. The tower design is consistent with the guidance provided in RG 1.23, Revision 1; therefore, it is acceptable to the staff.

Meteorological Tower Location and Siting

General Location

Turkey Point Units 6 and 7 COL FSAR Figures 2.3.3-201 and 2.3.3-202 show the location of the 60 m (196 ft) South Dade tower and the 10 m (33 ft) LU tower in relation to the existing and proposed units. These figures also show the towers in relation to the Units 6 and 7 cooling towers, existing cooling canals, and Biscayne Bay.

The applicant stated that the South Dade tower is approximately 7.6 m (25 ft) below the elevation of the expected finished grade of the Turkey Point Units 6 and 7. However, because of the large distance between the proposed units and the South Dade tower, and the minimal terrain variations, the South Dade tower and the Turkey Point Units 6 and 7 will likely have similar meteorological exposures.

The applicant stated that the base of the LU tower is approximately 6.7 m (22 ft) below the finished grade of Units 6 and 7. However, due to the proposed location of Turkey Point Units 6 and 7, the LU tower requires relocation.

Tower Location Relative to Potential Obstructions to Airflow

According to RG 1.23, Revision 1, the wind sensors should be located over level, open terrain at a distance of at least 10 times the height of any nearby natural and man-made obstructions. There is an emergency generator shelter mound located approximately 6.6 m (21.5 ft) north of the tower. The height of the mound is 2.9 m (9.5 ft) above ground level, and the height of the shelter is 3.3 m. Combined, the height of the emergency generator shelter is 6.2 m (20.4 ft). Due to the location of the emergency generator shelter in relation to the South Dade tower, the shelter does not meet the guidance provided in RG 1.23, Revision 1. However, the staff finds this deviation from the regulatory guidance acceptable because of the relative infrequency of winds from the north (approximately 6.50 percent).

The applicant stated that at least 3 months before the start of Turkey Point Units 6 and 7, a replacement LU tower will be installed and made operational at an appropriate site location on the Turkey Point property.

Tower Location Relative to Potential Sources of Heat and Moisture

The applicant evaluated heat and moisture sources that might influence ambient temperature and relative humidity measurements. These included vegetation, cooling towers, and water bodies. Heat reflection characteristics of the surface underlying the meteorological tower were also considered.

The applicant stated that the ground surrounding the South Dade tower is a grainy, light colored material with patches of low-cut grass or weeds that are typical of ground cover in the area. The applicant further stated that the heat reflection characteristics of the surface underlying the meteorological tower that could have localized influence on the measurements are expected to be minimal. Based on the NRC site audit, the staff agrees with the applicant's characterization.

The applicant discussed the possibility that the extensive cooling canals may have some effect on the lower level temperature readings, which could affect the stability measurements. The applicant provided the average water temperatures recorded in the cooling basins and stated that warmer waters near the meteorological tower could create thermal instability. However, thermal instability would enhance the dispersion capability for releases occurring near the plant site.

Based on the applicant's description of the site, and the staff's site audit, the staff has confirmed that the applicant applied the siting guidance provided in RG 1.23, Revision 1, or has justified any deviations from the guidance. The staff, therefore, finds the siting of the meteorological towers acceptable.

Tower Location Relative to Biscayne Bay

The applicant stated that the South Dade tower is located approximately 4.8 km (3 mi) inland from Biscayne Bay. Due to the location of the tower near Biscayne Bay, it is frequently subjected to the land/sea breeze circulation, otherwise known as the thermal internal boundary layer (TIBL). The TIBL develops at or near the land-water interface based on the rate of differential heating between the land and water surfaces, wind conditions and other factors. The potential effects of the TIBL on the site's atmospheric dispersion estimates are discussed in Turkey Point Units 6 and 7 COL FSAR Sections 2.3.4 and 2.3.5.

The staff accepts the applicant's discussion on the location of the meteorological tower and its potential to be affected by the TIBL.

Meteorological Instrumentation and Siting

This section of the SER discusses Turkey Point Units 6 and 7 COL FSAR Sections 2.3.3.1.2.1, 2.3.3.1.2.2, and 2.3.3.1.2.3.

Turkey Point Units 6 and 7 COL FSAR Table 2.3.3-204 provides information on each of the meteorological instruments in the monitoring system. The meteorological parameters measured at the South Dade tower during 2002, 2005, and 2006 were wind speed, wind direction, air temperature, solar radiation, barometric pressure, and precipitation.

Ambient temperature and delta-temperature are monitored at both the lower- (10-m) and upper-level (60-m) of the tower. Two channels of differential temperature are monitored simultaneously between the lower- and upper-levels. The temperature probes are mounted in fan aspirated solar radiation shields attached to a 1.2-m retractable boom. There are no atmospheric moisture parameters recorded at the Turkey Point Units 6 and 7 site.

As shown in Turkey Point Units 6 and 7 COL FSAR Table 2.3.3-204, the temperature systems are based on RG 1.23, Revision 1; therefore the temperature systems are acceptable to the staff.

Wind direction, wind speed, and wind direction variance (i.e., sigma theta) are monitored at both the lower- (10-m) and upper-level (60-m) of the tower. The wind sensors are mounted on a 1.8-m retractable boom oriented perpendicular to the prevailing wind flow. As shown in Turkey Point Units 6 and 7 COL FSAR Table 2.3.3-204, these measurements are based on RG 1.23, Revision 1; therefore, the wind systems are acceptable to the staff.

Precipitation and solar radiation are measured near ground-level by a sensor located near the base of the tower. As shown in Turkey Point Units 6 and 7 COL FSAR Table 2.3.3-204, the precipitation sensor is based on RG 1.23, Revision 1. RG 1.23, Revision 1 does not provide specifications for solar radiation sensors. The RG states that solar radiation measurements are not required, but should be provided if available. These measurements are not required because they are not used as part of the application for any site parameter. Therefore, the staff

has no basis on which to evaluate a licensee's use of solar radiation sensors. In accordance with the current regulatory guidance, the precipitation and solar radiation systems are acceptable to the staff.

Turkey Point Units 6 and 7 COL FSAR Table 2.3.3-204 summarizes the accuracy of the measurements taken as part of the Turkey Point onsite meteorological measurements program. The accuracy of the 3-year record for the data provided was consistent with the requirements of RG 1.23, Revision 1. Therefore, the accuracy of the measurements is acceptable to the staff.

System Operation, Maintenance, and Calibration

This section of the SER discusses Turkey Point Units 6 and 7 COL FSAR Sections 2.3.3.1.3.1 and 2.3.3.1.3.2.

The applicant stated that the meteorological equipment is checked and calibrated on a routine basis in accordance with NRC guidance. To achieve the required level of system reliability, as specified in RG 1.23, Revision 1, the applicant employs the following maintenance techniques: (1) calibrating the datalogger input channels semiannually, (2) channel checks are performed daily in order to achieve maximum data recovery, (3) checking the consistency between the two ambient/differential temperature channels, (4) checking the guide wires and the tower anchors annually.

The instrument maintenance and calibration techniques comply with the guidance provided in RG 1.23, Revision 1; therefore, they are acceptable to the staff.

Data Acquisition and Recording

Data from each of the meteorological towers are processed through computers in the respective equipment shelters. These computers are used to receive, process, manage, and archive all of the data collected from the monitoring towers. The microprocessors used for data collection sample the meteorological processor modules once per second for each parameter measured, except for precipitation. Water from the precipitation gauge is automatically drained and counted each time an internal bucket fills with 0.01 in. of rainfall.

Data Processing and Validation

Data Reduction and Review

The applicant stated that the hourly average data is downloaded and formatted monthly for review and editing. Missing or invalid data from the 60-m tower, such as 10-m wind speed, wind direction, and ΔT data, are deleted or manually replaced with backup tower data.

Data Validation

The applicant described the rigid system of checks and procedures that are applied to the meteorological data on the monthly, quarterly, and annual data files. The applicant described the computer programs that are used to validate the data recorded at the meteorological towers. The applicant, in Turkey Point Units 6 and 7 COL FSAR Section 2.3.3.1.5.2, presented the acceptance criteria that are used for the onsite meteorological measurement system.

Data Recovery and Representativeness

This section of the SER addresses Turkey Point Units 6 and 7 COL FSAR Sections 2.3.3.1.5.3 and 2.3.3.1.6.

The applicant stated that historical data from the onsite meteorological monitoring system can be retrieved, archived, displayed, or printed as needed. This data includes the 15- and 60-minute averaged meteorological data that is recorded at the site.

As discussed in SER Section 2.3.2, the applicant provided JFDs of wind speed, wind direction, and atmospheric stability for both the 10-meter and 60-meter levels based on hourly measurements taken during 2002, 2005, and 2006.

The staff performed a quality review of the 2002, 2005, and 2006 hourly meteorological database using the methodology described in NUREG-0917, "Nuclear Regulatory Commission Staff Computer Programs for Use with Meteorological Data," issued July 1982. The staff used computer spreadsheets to perform further review. As expected, the staff's examination of the data revealed generally stable and neutral atmospheric conditions at night and unstable conditions during the day. Wind speed, wind direction, and stability class frequency distributions for each measurement channel were reasonable. As discussed in SER Section 2.3.2, the staff verified and accepts the lower- and upper-level JFDs and wind roses provided by the applicant.

Turkey Point Units 6 and 7 COL FSAR Table 2.3.3-205 summarizes the annual data recovery rate for the Turkey Point Units 6 and 7 site's meteorological monitoring system. The applicant has shown in the table, and stated, that the recovery rate meets the requirements of RG 1.23, Revision 1. Since the 3-year composite recovery rate for all of the parameters is above 90 percent for the period submitted, they are acceptable to the staff.

Emergency Preparedness Support

The applicant described the onsite meteorological monitoring system and stated that this data is also used to represent meteorological conditions in the 10-mile EPZ radius. The staff agrees with the information presented in this section of the Turkey Point Units 6 and 7 COL FSAR.

Need of Additional Data Sources for Airflow Projections.

The applicant described the local topographic features and how they may affect the dispersion characteristics determined through the use of the XOQDOQ computer model. The staff will discuss this information in SER Section 2.3.5.

2.3.3.5 Post Combined License Activities

Turkey Point Units 6 and 7 COL FSAR Part 10 describes proposed COL conditions, including inspection, test, analysis, and acceptance criteria (ITAAC). Table 3.8-1 in Part 10 of the COL application includes the emergency planning (EP) ITAAC. The following EP ITAAC involve demonstrating that the operational onsite meteorological monitoring program appropriately supports the Turkey Point Units 6 and 7 site's emergency plan:

- Acceptance Criteria 5.2.3: Radiological data identified in each Plan Annex, meteorological data, and plant system data pertinent to determining offsite protective measures are displayed in the Emergency Operations Facility (EOF), when activated.
- EP Program Element 6.3: The means exist to continuously assess the impact of the release of radioactive materials to the environment, accounting for the relationship between effluent monitor readings, and onsite and offsite exposures and contamination for various meteorological conditions.
- EP Program Element 6.4: The means exist to acquire and evaluate meteorological information.

The EP, including EP ITAAC, are addressed in SER Section 13.3, "Emergency Planning."

2.3.3.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to the onsite meteorological measurements program, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the COL application are documented in NUREG-1793 and its supplements.

COL Information Item 2.3-3 states that a COL applicant shall address the site-specific onsite meteorological measurements program. As set forth above, the applicant has presented and substantiated information pertaining to the onsite meteorological measurements program and the resulting database. The staff has reviewed the information provided in PTN COL 2.3-3 and, for the reasons given above, concludes that the applicant has established consideration of the onsite meteorological measurements program and the resulting database are acceptable and meet the requirements of 10 CFR 100.20 with respect to determining the acceptability of the site. The staff also finds that the onsite data provide an acceptable basis for making estimates of atmospheric dispersion for DBA and routine releases from the plant to meet the requirements of 10 CFR 100.21, GDC 19, 10 CFR Part 20, and Appendix I to 10 CFR Part 50. Finally, the equipment provided for measurement of meteorological parameters during the course of accidents is sufficient to provide reasonable prediction of atmospheric dispersion of airborne radioactive materials in accordance with Appendix E to 10 CFR Part 50. The staff finds that the applicant has provided a sufficient description to adequately address COL Information Item 2.3-3.

2.3.4 Short-Term Dispersion Estimates for Accident Releases

2.3.4.1 *Introduction*

The short-term diffusion estimates are used to determine the amount of airborne radioactive materials expected to reach a specific location during an accident situation. The diffusion estimates address the requirement for conservative atmospheric dispersion (relative concentration) factor (χ/Q value) estimates at the EAB, the outer boundary of the LPZ, and at the control room for postulated design-basis accidental radioactive airborne releases. The review covers the following specific areas: (1) atmospheric dispersion models to calculate atmospheric dispersion factors for postulated accidental radioactive releases, (2) meteorological

data and other assumptions used as input to atmospheric dispersion models, (3) derivation of diffusion parameters (e.g., σ_y and σ_z), (4) cumulative frequency distributions of χ/Q values, (5) determination of conservative χ/Q values used to assess the consequences of postulated design-basis atmospheric radioactive releases to the EAB, LPZ, and control room, and (6) any additional information requirements prescribed within the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.3.4.2 *Summary of Application*

Turkey Point Units 6 and 7 COL FSAR Section 2.3.4 incorporates by reference Section 2.3.4 of the AP1000 DCD.

Tier 2 Departure

- PTN DEP 2.0-4

The applicant proposed a departure from the population distribution exclusion area (site) of 0.5 mi in Tier 2 material of the AP1000. The 0.27-mi minimum distance from the source boundary to the exclusion area boundary identified in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201 is less than the value in the AP1000 DCD Tier 2 Table 2-1. The evaluation of the appropriateness of the 0.27 mi value for the Turkey Point Units 6 and 7 site is in SER Section 2.3.4.4.3.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.3, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 2.3-4

The applicant provided additional information in PTN COL 2.3-4 to address COL Information Item 2.3-4. PTN COL 2.3-4 addresses the provision of site-specific short-term diffusion estimates for NRC Review to ensure that the envelope values (Table 2-1 and Appendix 15A from the AP1000 DCD) of relative concentrations are not exceeded.

In addition, this Turkey Point Units 6 and 7 COL FSAR section addresses Interface Item No. 2.4 related to the limiting meteorological parameters (χ/Q) for DBAs.

2.3.4.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the short-term diffusion estimates are given in Section 2.3.4 of NUREG-0800.

The applicable regulatory requirements for the applicant's description of atmospheric diffusion estimates for accidental releases are as follows:

- 10 CFR Part 50, Appendix A, GDC 19, with respect to the meteorological considerations used to evaluate the personnel exposures inside the control room during radiological and airborne hazardous material accident conditions.
- 10 CFR 52.79(a)(1)(vi), with respect to a safety assessment of the site, including consideration of major SSCs of the facility and site meteorology, to evaluate the offsite radiological consequences at the EAB and LPZ.
- 10 CFR 100.21(c)(2), with respect to the atmospheric dispersion characteristics used in the evaluation of the EAB and LPZ radiological dose consequences for postulated accidents.

The following RGs are applicable to this section:

- RG 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," Revision 1
- RG 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants," Revision 1
- RG 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants"

The related acceptance criteria from Section 2.3.4 of NUREG-0800 indicate that the following information should be provided:

- A description of the atmospheric dispersion models used to calculate χ/Q values for accidental releases of radioactive and hazardous materials to the atmosphere.
- Meteorological data used for the evaluation (as input to the dispersion models) that represent annual cycles of hourly values of wind direction, wind speed, and atmospheric stability for each mode of accidental release.
- A discussion of atmospheric diffusion parameters, such as lateral and vertical plume spread (σ_y and σ_z) as a function of distance, topography, and atmospheric conditions, should be related to measured meteorological data.
- Hourly cumulative frequency distributions of χ/Q values from the effluent release point(s) to the EAB and LPZ should be constructed to describe the probabilities of these χ/Q values being exceeded.
- Atmospheric dispersion factors used for the assessment of consequences related to atmospheric radioactive releases to the control room for design basis, other accidents and for onsite and offsite releases of hazardous airborne materials should be provided.
- For control room habitability analysis, a site plan drawn to scale should be included showing true North and potential atmospheric accident release pathways, control room intake, and unfiltered in leakage pathways.

2.3.4.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.3.4 and checked the referenced DCD to ensure that the combination of the DCD and the COL represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the short-term diffusion estimates. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information contained in the Turkey Point Units 6 and 7 COL FSAR:

Tier 2 Departure

- PTN DEP 2.0-4

The staff reviewed PTN DEP 2.0-4 related to the impact on the short-term dispersion estimates for accident releases potentially caused by applicant's use of a minimum distance from the source boundary to the exclusion areas boundary of 0.43 km (0.27 mi) rather than the site parameter of 0.80 km (0.5 mi) specified in the AP1000 DCD is used for the Turkey Point Units 6 and 7 site.

Evaluation of the information provided in PTN DEP-2.0-4 related to the impact of the applicant's use of a minimum distance from the source boundary to the exclusion area boundary of 0.43 km (0.27 km) on the short-term dispersion estimates for accident releases is discussed below.

AP1000 COL Information Item

- PTN COL 2.3-4

The staff reviewed PTN COL 2.3-4 related to the short-term diffusion estimates included under Section 2.3.4 of the Turkey Point Units 6 and 7 COL FSAR. The COL information item in Section 2.3.6.4 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will address the site-specific χ/Q values specified in subsection 2.3.4. For a site selected that exceeds the bounding χ/Q values, the Combined License applicant will address how the radiological consequences associated with the controlling design basis accident continue to meet the dose limits given in General Design Criteria 19 using site-specific χ/Q values. The Combined License applicant should consider topographical characteristics in the vicinity of the site for restrictions of horizontal and/or vertical plume spread, channeling or other changes in airflow trajectories, and other unusual conditions affecting atmospheric transport and diffusion between the source and receptors. No further action is required for sites within the bounds of the site parameters for atmospheric dispersion.

With regard to assessment of the postulated impact of an accident on the environment, the COL applicant will provide χ/Q values for each cumulative frequency distribution that exceeds the median value (50-percent of the time).

The staff relied upon the review procedures presented in NUREG-0800, Section 2.3.4, to independently assess the technical sufficiency of the information presented by the applicant.

2.3.4.4.1 *Atmospheric Dispersion Models*

Offsite Dispersion Estimates

The applicant used the computer code PAVAN (NUREG/CR-2858, "PAVAN: An Atmospheric-Dispersion Program for Evaluating Design-Basis Accidental Releases of Radioactive Materials from Nuclear Power Stations") to estimate χ/Q values at the EAB and at the outer boundary of the LPZ for potential accidental releases of radioactive material. The PAVAN model implements the methodology outlined in RG 1.145, Revision 1.

The PAVAN code estimates χ/Q values for various time-average periods ranging from 2 hours to 30 days. The meteorological input to PAVAN consists of a JFD of hourly values of wind speed and wind direction by atmospheric stability class. The χ/Q values calculated through PAVAN are based on the theoretical assumption that material released to the atmosphere will be normally distributed (Gaussian) about the plume centerline. A straight-line trajectory is assumed between the point of release and all distances for which χ/Q values are calculated.

For each of the 16 downwind direction sectors (e.g., N, NNE, NE, ENE), PAVAN calculates χ/Q values for each combination of wind speed and atmospheric stability at the appropriate downwind distance (i.e., the EAB and the outer boundary of the LPZ). The χ/Q values calculated for each sector are then ordered from greatest to smallest and an associated cumulative frequency distribution is derived based on the frequency distribution of wind speed and stabilities for each sector. The smallest χ/Q value in a distribution will have a corresponding cumulative frequency equal to the wind direction frequency for that particular sector. PAVAN determines for each sector an upper envelope curve based on the derived data (plotted as χ/Q versus probability of being exceeded), such that no plotted point is above the curve. From this upper envelope, the χ/Q value, which is equaled or exceeded 0.5 percent of the total time, is obtained. The maximum 0.5 percent χ/Q value from the 16 sectors becomes the 0–2 hour "maximum sector χ/Q value."

Using the same approach, PAVAN also combines all χ/Q values independent of wind direction into a cumulative frequency distribution for the entire site. An upper envelope curve is determined, and the program selects the χ/Q value that is equaled or exceeded 5.0 percent of the total time. This is known as the 0–2 hour "5-percent overall site χ/Q value."

The larger of the two χ/Q values, either the 0.5-percent maximum sector value or the 5-percent overall site value, is selected to represent the χ/Q value for the 0–2 hour time interval (note that this resulting χ/Q value is based on 1-hour averaged data but is conservatively assumed to apply for 2 hours).

To determine χ/Q values for longer time periods (i.e., 0–8 hour, 8–24 hour, 1–4 days, and 4–30 days), PAVAN performs a logarithmic interpolation between the 0–2 hour χ/Q values and the annual average (8,760-hour) χ/Q values for each of the 16 sectors and overall site. For each time period, the highest among the 16 sectors and overall site χ/Q values is identified and becomes the short-term site characteristic χ/Q value for that time period.

Control Room Dispersion Estimates

The applicant used the computer code ARCON96 (NUREG/CR-6331, "Atmospheric Relative Concentrations in Building Wakes") to estimate χ/Q values at the control room for potential accidental releases of radioactive material. The ARCON96 model implements the methodology outlined in RG 1.194.

The ARCON96 code estimates χ/Q values for various time-averaged periods ranging from 2 hours to 30 days. The meteorological input to ARCON96 consists of hourly values of wind speed, wind direction, and atmospheric stability class. The χ/Q values calculated through ARCON96 are based on the theoretical assumption that material released to the atmosphere will be normally distributed (Gaussian) about the plume centerline. A straight-line trajectory is assumed between the release points and receptors. The diffusion coefficients account for enhanced dispersion under low wind speed conditions and in building wakes.

The hourly meteorological data are used to calculate hourly relative concentrations. The hourly relative concentrations are then combined to estimate concentrations ranging in duration from 2 hours to 30 days. Cumulative frequency distributions, prepared from the average relative concentrations and the relative concentrations that are exceeded no more than five percent of the time for each averaging period, are determined.

2.3.4.4.2 Meteorological Data Input

Offsite Dispersion Estimates

The meteorological input to PAVAN used by the applicant consisted of a JFD of wind speed, wind direction, and atmospheric stability based on hourly onsite data from a 3-year period during 2002, 2005, and 2006. The wind data were obtained from the 10-m level of the onsite meteorological tower, and the stability data were derived from the vertical temperature difference (delta-temperature) measurements taken between the 60-m and 10-m levels on the onsite meteorological tower.

The staff has completed a detailed review related to the acceptability and representativeness of the hourly meteorological data as discussed in SER Sections 2.3.2 and 2.3.3. Based on this review, the staff considers the onsite meteorological database suitable for input to the PAVAN model.

Control Room Dispersion Estimates

The meteorological input to ARCON96 used by the applicant consisted of wind speed, wind direction, and atmospheric stability data based on hourly onsite data from a 3-year period during 2002, 2005, and 2006. The wind data were obtained from the 10 m and 60 m levels of the onsite meteorological tower, and the stability data were derived from the vertical temperature difference (delta-temperature) measurements taken between the 60 m and 10 m levels on the onsite meteorological tower.

The staff has completed a detailed review related to the acceptability and representativeness of the hourly meteorological data as discussed in SER Section 2.3.3. Based on this review, the staff considers the onsite meteorological database suitable for input to the ARCON96 model.

2.3.4.4.3 Diffusion Parameters

Offsite Dispersion Estimates

The applicant chose to implement the diffusion parameter assumptions outlined in RG 1.145, Revision 1, as a function of atmospheric stability for its PAVAN model runs. The staff evaluated the applicability of the PAVAN diffusion parameters and concluded that no unique topographic features (such as rough terrain, restricted flow conditions, or coastal or desert areas) preclude the use of the PAVAN model for the Turkey Point Units 6 and 7 site. However, in accordance with the guidance in RG 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, terrain adjustment factors were used for the annual average calculations for the airflow recirculation effect generated by the local land-sea breeze circulation. Therefore, the staff finds that the applicant's use of diffusion parameter assumptions, as outlined in RG 1.145, Revision 1, acceptable.

The applicant stated that an exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.d, in accordance with 10 CFR 52.7 and 10 CFR 52.93 and a departure from AP1000 DCD Table 2-1 is necessary. Details on the departure (PTN DEP 2.0-4) can be found in Part 7.B.3, of the Turkey Point Units 6 and 7 COL FSAR. This departure is a result of the applicant choosing an EAB distance less than the site parameter provided in AP1000 DCD Table 2.-1. The staff has determined that the applicant's use of distances less than those provided in the AP1000 DCD would only result in more conservative (higher) χ/Q estimates. The staff confirmed the resulting χ/Q estimates provided in PTN DEP 2.0-4 and determined that they are correct.

Control Room Dispersion Estimates

The diffusion coefficients used in ARCON96 have three components. The first component is the diffusion coefficient used in other NRC models such as PAVAN. The other two components are corrections to account for enhanced dispersion under low wind speed conditions and in building wakes. These components are based on analysis of diffusion data collected in various building wake diffusion experiments under a wide range of meteorological conditions. Because the diffusion occurs at short distances within the plant's building complex, the ARCON96 diffusion parameters are not affected by nearby topographic features such as bodies of water. Therefore, the staff finds the applicant's use of the ARCON96 diffusion parameter assumptions acceptable.

2.3.4.4.4 Relative Concentration for Accident Consequences Analysis

Conservative Short-Term Atmospheric Dispersion Estimates for EAB and LPZ

The applicant modeled one ground-level release point and used the AP1000 DCD dimensions for the minimum building cross section and containment heights for building wake effects. Including the building wake effects for a ground-level release has little influence on the predicted χ/Q values. A ground-level release assumption that assumes the appropriate building dimensions is acceptable to the staff. This is acceptable because the PAVAN model includes both plume meander and building wake effects, which are mutually exclusive. The applicant uses a source boundary that encloses all potential release points for both Turkey Point Units 6 and 7. As a result of this method, the minimum distance to the EAB and LPZ was used as input to PAVAN. The use of the shortest distance results in higher (more conservative) χ/Q values for ground level releases and is therefore acceptable to the staff.

In accordance with AP1000 DCD Section 2.3.6.4, Turkey Point Units 6 and 7 COL FSAR Section 2.3.4.2 compared the site-specific EAB and LPZ χ/Q values to the corresponding site parameters provided in the AP1000 DCD. This comparison showed that the AP1000 DCD EAB and LPZ χ/Q values conservatively bounded the site-specific values. The staff notes that smaller χ/Q values are associated with greater dilution capability, resulting in lower radiological doses. When comparing a DCD site parameter χ/Q value and a site characteristic χ/Q value, the site is acceptable for the design if the site characteristic χ/Q value is smaller than the site parameter χ/Q value. The staff notes that such a comparison shows that the site has better dispersion characteristics than that required by the reactor design.

Using the information provided by the applicant, including the 10 m level joint frequency distributions of wind speed, wind direction, and atmospheric stability presented in Turkey Point Units 6 and 7 COL FSAR Table 2.3.2-205, the staff confirmed the applicant's χ/Q values by running the PAVAN computer code and obtaining consistent results. The staff accepts the short-term χ/Q values presented by the applicant.

Short-Term Atmospheric Dispersion Estimates for the Control Room

The applicant provided the following as the necessary input to ARCON96:

- Onsite Hourly Meteorological Data: 2002, 2005, and 2006,
- AP1000 DCD Table 15A-7: Control Room Source / Receptor Data,
- AP1000 DCD Figure 15A-1: Site Plan with Release and Intake Locations,
- Turkey Point Units 6 and 7 COL FSAR Table 2.3.4-205: Release/Receptor Azimuthal Angles, and
- Turkey Point Units 6 and 7 COL FSAR Figure 2.1-204: Plant Layout on the Turkey Point Units 6 and 7 Site.

Two receptor (i.e., air intake) points, the control room heating, ventilation, and air conditioning (HVAC) intake and control room door, were modeled for the following eight release points:

- containment shell,
- fuel building blowout panel,
- fuel building rail bay door,
- steam vent,
- power-operated relief valve (PORV)/safety valves,
- condenser air removal stack,
- plant vent, and
- PCS air diffuser.

Turkey Point Units 6 and 7 COL FSAR Tables 2.3.4-205 and 2.3.4-206 compared the site-specific control room χ/Q values to the corresponding site parameters provided in the DCD. This comparison showed that the AP1000 control room χ/Q values conservatively bounded the site-specific values. This comparison is reproduced in Turkey Point Units 6 and 7 COL FSAR Table 2.0-202.

The staff confirmed the applicant's atmospheric dispersion estimates by running the ARCON96 computer model and obtaining similar results (i.e., values on average within ± 0.14 percent). Both the staff and applicant used a ground-level release assumption for each of the

release/receptor combinations as well as other conservative assumptions. Based on its confirmatory analysis, the staff finds the applicant's control room χ/Q values acceptable.

2.3.4.4.5 Onsite and Offsite Hazardous Materials

A review of the identification of onsite and off-site hazardous materials that could threaten control room habitability is performed in SER Sections 2.2.1, 2.2.2, and 2.2.3. The accident scenarios, including release characteristics and atmospheric dispersion model descriptions are also found in these sections.

2.3.4.5 Post Combined License Activities

There are no post-COL activities related to this section.

2.3.4.6 Conclusion

The staff reviewed the application including PTN COL 2.3-4 and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to short-term diffusion estimates, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

COL Information Item 2.3-4 states that a COL applicant shall address the site-specific χ/Q values as specified in AP1000 DCD Section 2.3.4. The staff concludes that the applicant's atmospheric dispersion estimates are acceptable and meet the relevant requirements of 10 CFR 100.21(c)(2). This conclusion is based on the conservative assessments of post-accident atmospheric dispersion conditions that have been made by the applicant and the staff from the applicant's meteorological data and appropriate diffusion models. The staff has reviewed PTN DEP 2.0-4 and has determined that the applicant's use of distances less than those provided in the AP1000 DCD is acceptable for the Turkey Point Units 6 and 7 site.

The atmospheric dispersion estimates provided in this SER section are appropriate for the assessment of consequences from radioactive releases for DBAs in accordance with 10 CFR 52.79(a)(1)(vi), 10 CFR 100.21(c)(2), and GDC 19. The staff finds that the applicant has provided sufficient information to adequately address COL Information Item 2.3-4.

2.3.5 Long-Term Atmospheric Diffusion Estimates for Routine Releases

2.3.5.1 Introduction

The long-term diffusion estimates are used to determine the amount of airborne radioactive materials expected to reach a specific location during normal operations. The diffusion estimates address the requirement concerning atmospheric dispersion and dry deposition estimates for routine releases of radiological effluents to the atmosphere. The review covers the following specific areas: (1) atmospheric dispersion and deposition models used to calculate concentrations in air and amount of material deposited as a result of routine releases of radioactive material to the atmosphere, (2) meteorological data and other assumptions used as input to the atmospheric dispersion models, (3) derivation of diffusion parameters (e.g., σ_z), (4) atmospheric dispersion (relative concentration) factors (χ/Q values) and deposition factors (D/Q values) used for assessment of consequences of routine airborne radioactive releases, (5) points of routine release of radioactive material to the atmosphere, the characteristics of each release mode, and the location of potential receptors for dose computations, and (6) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.3.5.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR Section 2.3 incorporates by reference Section 2.3 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.3, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 2.3-5

The applicant provided additional information in PTN COL 2.3-5 to address COL Information Item 2.3-5. PTN COL 2.3-5 addresses long-term χ/Q and D/Q estimates for calculating concentrations in air and the amount of material deposited on the ground as a result of routine releases of radiological effluents to the atmosphere during normal plant operation.

In addition, this Turkey Point Units 6 and 7 COL FSAR section addresses Interface Item No. 2.4 related to the limiting meteorological parameters (χ/Q values) for routine releases.

2.3.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the regulations for long-term diffusion estimates are given in Section 2.3.5 of NUREG-0800.

The applicable regulatory requirements for the applicant's description of atmospheric dispersion and dry deposition estimates for routine releases of radiological effluents to the atmosphere are as follows:

- 10 CFR Part 20, Subpart D, with respect to demonstrating compliances with dose limits for individual members of the public.
- 10 CFR 50.34a, "Design Objectives for Equipment to Control Releases of Radioactive Material in Effluents—Nuclear Power Reactors." and Sections II.B.1, II.C, and II.D of Appendix I to 10 CFR Part 50, with respect to the numerical guides for design objectives and limiting conditions for operation to meet the requirements that radioactive material in effluents released to unrestricted area be kept ALARA.
- 10 CFR 100.21(c)(1) with respect to establishing atmospheric dispersion site characteristics such that radiological effluent release limits associated with normal operation can be met for any individual located offsite.

The following RGs are applicable to this section:

- RG 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants," Revision 1
- RG 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1
- RG 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1
- RG 1.112, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors," Revision 1

The related acceptance criteria from Section 2.3.5 of NUREG-0800 are as follows:

- A detailed description of the atmospheric dispersion and deposition models used by the applicant to calculate annual average concentrations in air and amount of material deposited as a result of routine releases or radioactive materials to the atmosphere.
- A discussion of atmospheric diffusion parameters, such as vertical plume spread (σ_z) as a function of distance, topography, and atmospheric conditions.
- Meteorological data summaries (onsite and regional) used as input to the dispersion and deposition models.
- Points of routine release of radioactive material to the atmosphere, including the characteristics (e.g., location, release mode) of each release point.
- The specific location of potential receptors of interest (e.g., nearest vegetable garden, nearest resident, nearest milk animal, and nearest meat cow in each 22½ degree direction sector within a 5-mi (8 km) radius of the site).

- The χ/Q and D/Q values to be used for assessment of the consequences of routine airborne radiological releases as described in Section C.I.2.3.5.2 of RG 1.206: (1) maximum annual average χ/Q values and D/Q values at or beyond the site boundary and at specified locations of potential receptors of interest utilizing appropriate meteorological data for each routine venting location, and (2) estimates of annual average χ/Q values and D/Q values for 16 radial sectors to a distance of 50 mi (80 km) from the plant using appropriate meteorological data.

2.3.5.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.3.5 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the long-term diffusion estimates. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information contained in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.3-5

The staff reviewed PTN COL 2.3-5 related to the long-term diffusion estimates included in Turkey Point Units 6 and 7 COL FSAR Section 2.3.5. The specific text of this COL information item in Section 2.3.6.4 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will address long-term diffusion estimates and χ/Q values specified in subsection 2.3.5. The Combined License applicant should consider topographical characteristics in the vicinity of the site for restrictions of horizontal and/or vertical plume spread, channeling or other changes in airflow trajectories, and other unusual conditions affecting atmospheric transport and diffusion between the source and receptors. No further action is required for sites within the bounds of the site parameter for atmospheric dispersion.

With regard to environmental assessment, the COL applicant will also provide estimates of annual average χ/Q values for 16 radial sectors to a distance of 50 mi from the plant.

Evaluation of the information provided in PTN COL 2.3-5 related to the long-term diffusion estimates at the Turkey Point Units 6 and 7 site is discussed below.

2.3.5.4.1 *Atmospheric Dispersion Model*

The applicant used the NRC-sponsored computer code XOQDOQ (described in NUREG/CR-2919, "XOQDOQ Computer Program for the Meteorological Evaluation of Routine Releases at Nuclear Power Stations") to estimate χ/Q and D/Q values resulting from routine

releases. The XOQDOQ model implements the constant mean wind direction methodology outlined in RG 1.111, Revision 1.

The XOQDOQ model is a straight-line Gaussian plume model based on the theoretical assumption that material released to the atmosphere will be normally distributed (Gaussian) about the plume centerline. In predictions of χ/Q and D/Q values for long time periods (i.e., annual averages), the plumes horizontal distribution is assumed to be evenly distributed within the downwind direction sector (e.g., "sector averaging"). A straight-line trajectory is assumed between the release point and all receptors.

2.3.5.4.2 Release Characteristics and Receptors

The applicant modeled one ground-level release point, assuming a minimum building cross-sectional area of 2,636 m² and a building height of 69.7 m, which is smaller than the height of the entire containment building at 71.4 m. This difference of height is acceptable to the staff because the applicant's use of a smaller building height directly leads to assuming a smaller building cross-section. This is a conservative assumption because a smaller building cross-section will lead to less air turbulence and higher χ/Q values.

The applicant assumed a ground-level release to model routine releases. A ground-level release is a conservative assumption at a relatively flat terrain site such as the Turkey Point Units 6 and 7 site, resulting in higher χ/Q and D/Q values when compared to a mixed-mode (e.g., part-time ground, part-time elevated) release or a 100-percent elevated release, as discussed in RG 1.111, Revision 1. A ground-level release assumption is therefore acceptable to the staff.

The distances to the receptors of interest (i.e., residence, meat animal, vegetable garden, school) were presented in Turkey Point Units 6 and 7 COL FSAR Section 2.3.5.2. Directional sectors without a receptor within 5 mi were not modeled. The applicant calculated the distances to each of the receptors from a location defined as the mid-point of the two proposed units. As depicted in Turkey Point Units 6 and 7 COL FSAR Figure 2.1-201, the Turkey Point Units 6 and 7 EAB does not extend beyond the Turkey Point plant boundary, except for in the SSE and SE sectors. However, the staff believed that because these sectors are located over Biscayne Bay they are not expected to have any long duration population near the boundary. These assumptions are acceptable to the staff.

2.3.5.4.3 Meteorological Data Input

The meteorological input to XOQDOQ used by the applicant consisted of a JFD of wind speed, wind direction, and atmospheric stability based on hourly onsite data from three 1-year periods including 2002, 2005, and 2006. The wind data were obtained from the 10-m level of the onsite meteorological tower, and the stability data were derived from the vertical temperature difference (delta-temperature) measurements taken between the 60-m and 10-m levels on the onsite meteorological tower.

As discussed in SER Section 2.3.3, the staff considers the 2002, 2005, and 2006 onsite meteorological database suitable for input to the XOQDOQ model.

2.3.5.4.4 Diffusion Parameters

The applicant chose to implement the diffusion parameter assumptions outlined in RG 1.111, Revision 1, as a function of atmospheric stability for the XOQDOQ model runs. The staff evaluated the applicability of the XOQDOQ diffusion parameters and concluded that no unique topographic features preclude the use of the XOQDOQ model for the Turkey Point site. Therefore, the staff finds that the applicant's use of diffusion parameter assumptions, as outlined in RG 1.111, Revision 1 was acceptable.

The applicant stated that in order to account for possible land-water recirculation effects due to the close proximity of Biscayne Bay, default correction factors were implemented in the XOQDOQ model. The staff agrees that these correction factors were necessary for the location of the plant and has implemented them for the independent confirmatory analysis.

2.3.5.4.5 *Resulting Relative Concentration and Relative Deposition Factors*

Turkey Point Units 6 and 7 COL FSAR Table 2.3.5-207 lists the long-term atmospheric dispersion and deposition estimates for the EAB, LPZ, and special receptors of interest that the applicant derived from its XOQDOQ modeling results. Turkey Point Units 6 and 7 COL FSAR Tables 2.3.5-203 through 2.3.5-206 also describe the applicant's long-term atmospheric dispersion and deposition estimates for 16 radial sectors from the site boundary to a distance of 50-mi from the proposed facility.

The χ/Q values presented in Turkey Point Units 6 and 7 COL FSAR Tables 2.3.5-203 through 2.3.5-207 reflect several plume radioactive decay and deposition scenarios. Section C.3 of RG 1.111, Revision 1, states that radioactive decay and dry deposition should be considered in radiological impact evaluations of potential annual radiation doses to the public, resulting from routine releases of radioactive materials in gaseous effluents. Section C.3.a of RG 1.111, Revision 1, states that an overall half-life of 2.26 days is acceptable for evaluating the radioactive decay of short-lived noble gases and an overall half-life of 8-days is acceptable for evaluating the radioactive decay for all iodine released to the atmosphere. Definitions for the χ/Q categories are as follows:

- Undepleted/No Decay χ/Q values are χ/Q values used to evaluate ground-level concentrations of long-lived noble gases, tritium, and carbon-14. The plume is assumed to travel downwind, without undergoing dry deposition or radioactive decay.
- Depleted/2.26-Day Decay χ/Q values are χ/Q values used to evaluate ground-level concentrations of short-lived noble gases. The plume is assumed to travel downwind, without undergoing dry deposition, but is decayed, assuming a half-life of 2.26 days, based on the half-life of xenon-133.
- Depleted/8.00-Day Decay χ/Q values are χ/Q values used to evaluate ground-level concentrations of radioiodine and particulates. The plume is assumed to travel downwind, with dry deposition, and is decayed assuming a half-life of 8.00 days, based on the half-life of iodine-131.

Using the information provided by the applicant, including the 10-m level JFDs of wind speed, wind direction, and atmospheric stability presented in Turkey Point Units 6 and 7 COL FSAR Table 2.3.2-205, the staff confirmed the applicant's χ/Q and D/Q values by running the XOQDOQ computer code and obtaining similar results (i.e., values on average within about 6-percent). In light of the foregoing, the staff accepts the long-term χ/Q and D/Q values presented by the applicant.

COL Information Item 2.3-5 also states that with regard to environmental assessment estimates of annual average χ/Q values for 16 radial sectors to a distance of 50-mi from the plant should be provided. The applicant provided these values in Turkey Point Units 6 and 7 COL FSAR Tables 2.3.5-203 through 2.3.5-206. Using the staff-generated JFDs and the XOQDOQ computer code, these χ/Q values were confirmed by the staff and were found to be adequate and acceptable.

2.3.5.5 *Post Combined License Activities*

There are no post-COL activities related to this Section.

2.3.5.6 *Conclusion*

The staff reviewed the application including PTN COL 2.3-5 and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to long-term diffusion estimates, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

COL Information Item 2.3-5 states that a COL applicant shall address the site-specific diffusion estimates and χ/Q values as specified in AP1000 DCD Section 2.3.5. Based on the meteorological data provided by the applicant and an atmospheric dispersion model that is appropriate for the characteristics of the site and release points, the staff concludes that representative atmospheric dispersion and deposition factors have been calculated for 16 radial sectors from the site boundary to a distance of 50 mi (80 km) as well as for specific locations of potential receptors of interest. The characterization of atmospheric dispersion and deposition conditions are acceptable to meet the criteria described in RG 1.111, Revision 1, and are appropriate for the evaluation to demonstrate compliance with the numerical guides for doses in Subpart D of 10 CFR Part 20 and Appendix I to 10 CFR Part 50. The staff finds that the applicant has provided sufficient information to adequately address COL Information Item 2.3-5.

2.4 Hydrologic Engineering

To ensure that a nuclear power plant or plants can be designed, constructed, and safely operated on an applicant's proposed site and in accordance with the NRC regulations, the staff evaluates the hydrologic characteristics of the proposed site. These site characteristics describe the potential for flooding due to precipitation, riverine processes (runoff, dam breach discharge, channel blockage or diversion), coastal effects (storm surges and tsunamis), and combined events (e.g., from coincident wind waves). In addition, the staff reviewed the maximum elevation of surface water during floods and combined events, associated static and dynamic characteristics, minimum water-surface elevation during low-water events, maximum elevation of groundwater, and the characteristic ability of the site to attenuate a postulated accidental release of radiological material into surface water and groundwater. The surface water hydrologic site characteristics determine the design-basis flood for the proposed Turkey Point Units 6 and 7 site, and provide the basis for determining whether flood protection will be required. The groundwater hydrologic site characteristics determine the design-basis groundwater loadings and provide the basis for radiological dose analysis for a potential

receptor from the postulated accidental release of radioactive liquid effluents in surface and ground waters.

The staff has prepared SER Sections 2.4.1 through 2.4.14 in accordance with the review procedures described in NUREG-0800, using information presented in Section 2.4, "Hydrologic Engineering," of the Turkey Point Units 6 and 7 Final Safety Analysis Report (FSAR), responses to the staff RAIs, and generally available reference materials (e.g., as cited in applicable sections of NUREG-0800).

2.4.1 Hydrologic Description

2.4.1.1 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.4.1, "Hydrologic Description," describes the site and all safety-related elevations, structures, and systems from the standpoint of hydrologic considerations and provides a topographic map showing any proposed changes to natural drainage features.

This SER section provides hydrologic description of the of the following specific review areas: (1) the interface of the plant with the hydrosphere including descriptions of site location, major hydrological features in the site vicinity, characteristics related to surface water and groundwater, and the proposed water supply to the plant, (2) hydrological causal mechanisms that may require special plant design bases or operating limitations with regard to floods and water-supply requirements, (3) current and likely future surface-water and groundwater uses by the plant and water users in the vicinity of the site that may affect the safety of the plant, (4) available spatial and temporal data relevant for the site review, (5) alternate conceptual models of the hydrology of the site that reasonably bound hydrological conditions at the site, (6) potential effects of seismic and non-seismic data on the postulated design bases and how they relate to the hydrology in the vicinity of the site and the site region, and (7) any additional information requirements prescribed within the "Contents of Application" sections of the applicable Subparts of 10 CFR Part 52. These areas are reviewed in Sections 2.4.2 through 2.4.13.

2.4.1.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR Section 2.4.1 describes the site and elevations for safety related structures, systems and components from the standpoint of hydrologic considerations and provides a topographic map showing any proposed changes to natural drainage features. The applicant addressed these issues as follows:

AP1000 COL Information Item

- PTN COL 2.4-1 Hydrological Description

The applicant has referenced the AP1000 DCD in its application to comply with the requirements of Appendix D to 10 CFR Part 52. DCD Section 2.4.1.1 requires that COL applicants describe major hydrologic features on or in the vicinity of the site. It also requires the COL applicants to provide a specific description of the site, including critical elevations of the nuclear island and safety-related facilities.

2.4.1.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for the site and all safety-related elevations, structures, and systems from the standpoint of hydrologic considerations, and the associated acceptance criteria are described in Section 2.4.1 of NUREG-0800.

The applicable regulatory requirements for identifying site location and description of the site hydrosphere are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 52.79(a)(1)(iii), as it relates to the hydrologic characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The related acceptance criteria are as follows:

- Regulatory Guide 1.29, "Seismic Design Classification," as it relates to those SSCs intended to protect against the effects of flooding';
- Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants," as supplemented by best current practices; and
- RG 1.102, "Flood Protection for Nuclear Power Plants," as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.1.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.1 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic. The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to major hydrological features and descriptions of the site and safety-related elevations, structures, exterior accesses, equipment, and systems. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Items

- PTN COL 2.4-1

The staff reviewed PTN COL 2.4-1 related to the description of major hydrologic features included in Turkey Point Units 6 and 7 COL FSAR Section 2.4.1. The COL Information Item in Section 2.4.1.1 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will describe major hydrologic features on or in the vicinity of the site including critical elevations of the nuclear island and access routes to the plant.

Evaluation of the information provided in PTN COL 2.4-1 related to the description of major hydrologic features at the Turkey Point Units 6 and 7 site is discussed below.

2.4.1.4.1 Site and Facilities

This section describes the location of the proposed site and the major facilities of the proposed plant as relevant to hydrologic considerations.

Information Submitted by Applicant

The applicant stated that the Florida Power and Light Company (FPL) is proposing to build two new AP1000 reactors, designated Turkey Point Units 6 and 7, within its existing Turkey Point plant property boundaries, approximately 25 mi south of Miami, FL, in unincorporated southeast Miami-Dade County, FL. According to the applicant, the Turkey Point plant property consists of approximately 11,000 acres (45 square km) and is east of Florida City and the City of Homestead, bordered by Biscayne Bay to the east. The Turkey Point plant property includes five operating electric generating units: two gas/oil-fired steam electric generating units (Units 1 and 2), one natural gas combined cycle plant (Unit 5), and two nuclear powered steam electric generating units (Units 3 and 4). The site for Units 6 and 7 is immediately south of Units 3 and 4 on a tract of approximately 218 acres (0.9 square km). Most Units 6 and 7 plant features are located on an area bounded on all four sides by a network of industrial wastewater facility/cooling canals that serve as part of the closed-loop cooling water supply for Units 1 through 4 and receive blowdown discharged from Unit 5.

The plant area for the Turkey Point Units 6 and 7 site would be raised above surrounding grade to grade elevations varying from 19 ft (5.8 m) to 25.5 ft (7.8 m) in North American Vertical Datum of 1988 (NAVD 88) with safety-related facilities at an elevation of 26 ft (7.9 m) NAVD 88. The area would be surrounded by a retaining wall structure with the top of wall elevation varying from 20 ft (6 m) to 21.5 ft (6.6 m) NAVD 88.

The NAVD 88 is the plant reference elevation datum for Turkey Point Units 6 and 7. The applicant notes that some reference documents and data sources for the area provide elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29). In the site area, the applicant has determined that NGVD 29 is 1.6 ft (0.5 m) below NAVD 88, meaning that elevations referenced to NGVD 29 are decreased by 1.6 ft (0.5 m) to convert them to the NAVD 88 datum.

The FPL proposes to use the Westinghouse AP1000 certified plant design for Turkey Point Units 6 and 7. The design plant grade for all safety-related facilities is at El. 26.0 ft (7.9 m) NAVD 88, which is equivalent to the design plant grade elevation of 100 ft (30 m) in the DCD reference datum. The safety-related structures for the AP1000 design include the containment/shield building and the auxiliary building. Finished grade elevations at the plant area are shown in Figure 2.4.1-1. Before construction, the area where the plant is located was

occupied by sparsely vegetated, low-lying mudflats and was isolated by the surrounding cooling canals. The preconstruction elevations ranged from approximately El. -2.4 ft (-0.7 m) to 0.8 ft (0.2 m) NAVD 88.



Figure 2.4.12.4.1-1 Turkey Point Units 6 and 7 power block layout and grading plan.
(Source: COL FSAR Figure 2.4.2-202)

As described by the applicant, the AP1000 reactor design employs a safety-related passive containment cooling system that serves as the ultimate heat sink for design-basis accident events. This system does not require offsite water sources to perform its safety functions. Turkey Point Units 6 and 7 would use mechanical draft cooling towers for non-safety related circulating water system and service water system cooling, with makeup water from two independent water sources, each capable of supplying all of the makeup water demand for the circulating water system. The two independent sources of makeup water for the plant's non-safety related circulating water system are reclaimed water and saltwater. The reclaimed water would be supplied from Miami-Dade Water and Sewer Department wastewater treatment facilities via a pipeline system to the FPL reclaimed water treatment facility. Treated reclaimed water would be stored in a concrete makeup water reservoir to be located in the cooling tower area south of the power block (Figure 2.4.1-1). The top of the makeup reservoir wall is at El. 24.0 ft NAVD 88. The saltwater would be supplied to the cooling tower basins from radial collector wells; it would be used to supplement reclaimed water as needed to meet the makeup water demand. The applicant stated that the maximum makeup water requirement for the two units when the circulating water system is operating with reclaimed water is approximately 38,400 gallons per minute. When the circulating water system is operating with saltwater the applicant stated that the maximum makeup water requirement for the two units is approximately 86,400 gallons per minute. According to the applicant, the circulating water system is capable of operating on any combination of the two types of makeup water.

The applicant stated that none of the surrounding surface water bodies would be used as a water supply source, waste effluent discharge point, or heat sink for Turkey Point Units 6 and 7. Cooling tower blowdown and other plant wastewater streams are collected in a common collection sump for injection into a deep injection well.

In accordance with the requirements in Appendix A to 10 CFR Part 52, the applicant compared Turkey Point Units 6 and 7 hydrologic site characteristics with the respective envelopes of the AP1000 standard plant site design parameters specified in Section 2.4 of the reference AP1000 DCD.

Staff's Technical Evaluation

The staff conducted a hydrology site audit March 22–24, 2010. The site audit included visits to the site of Units 6 and 7 and to the Turkey Point cooling canals. The staff also observed Biscayne Bay and the general topographic and hydrologic setting of the area.

The staff compared the information presented by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.4.1 with publicly available maps and data regarding the Turkey Point Units 6 and 7 site and its surrounding region. The staff finds the applicant's information on the site and facilities to be consistent with other sources and sufficient for the staff's review.

2.4.1.4.2 Hydrosphere

Information Submitted by Applicant

The Turkey Point Units 6 and 7 site is adjacent to the western edge of Biscayne Bay and is surrounded by the low-lying areas in the Everglades drainage basin. There are no major rivers, lakes, or dams located nearby, but the applicant stated that a network of drainage canals provides freshwater supply to the Everglades and controlled drainage from southeast Florida to Biscayne Bay. The site's hydrology is primarily controlled by Biscayne Bay.

Biscayne Bay

As described by the applicant, Biscayne Bay is a shallow coastal lagoon underlain by limestone, approximately 38 mi (61 km) long and 11.2 mi (18 km) wide, with an area of approximately 428 square mi (1,109 square mi). According to the applicant, the Turkey Point Units 6 and 7 site is adjacent to a portion of Biscayne Bay known as South Bay or Lower Biscayne Bay. South Bay is bounded on the east and separated from the Atlantic Ocean by islands, including Elliott Key, which formed in the Pleistocene as coral reefs and are considered a part of the Florida Keys, making up the northern extent of the Florida reef tract (Swarzenski et al., 2004; Klein, 1970). As described by the applicant, Biscayne Bay is connected to the Atlantic Ocean by a wide and shallow opening of coral shoal near the middle of the bay that is known as the Safety Valve, and by several channels and cuts.

There is little sediment inflow to the bay from rivers and canals. Part of Biscayne Bay near the plant property is within the designated boundaries of Biscayne National Park, which contains a narrow fringe of mangrove forest along the mainland. Similar mangrove zones are present on islands of the Florida Keys including Elliott Key east of the Turkey Point site (U.S. National Park Service 2011—Reference 216—<http://www.nps.gov/bisc/naturescience/keys.htm>).

The applicant referenced Caccia and Boyer (2005) as reporting that Biscayne Bay has an average depth of approximately 6 ft (1.8 m) and a maximum depth of approximately 13 ft (4 m). According to the applicant, the volume at mean low water is approximately 1.5×10^{10} cubic ft (344,000 ac ft). NOAA maintains tidal stations in Biscayne Bay and surrounding areas (2008b). The applicant identified the following stations as currently operating and having more than 10 years of record: Virginia Key, FL (NOAA station 8723214; approximately 25 mi (40 km) north-northwest of Units 6 and 7); Vaca Key, FL (8723970; approximately 70 mi (113 km) southwest); and Key West, FL (8724580; approximately 110 mi (177 km) southwest). The applicant found that other stations have only short periods of tidal data or are no longer active. The locations of the tidal stations are shown on Figure 2.4.1-2. The mean low water datum at NOAA Virginia Key, FL, station is located at -1.9 ft (-0.6 m) NAVD 88 (NOAA, 2008a).

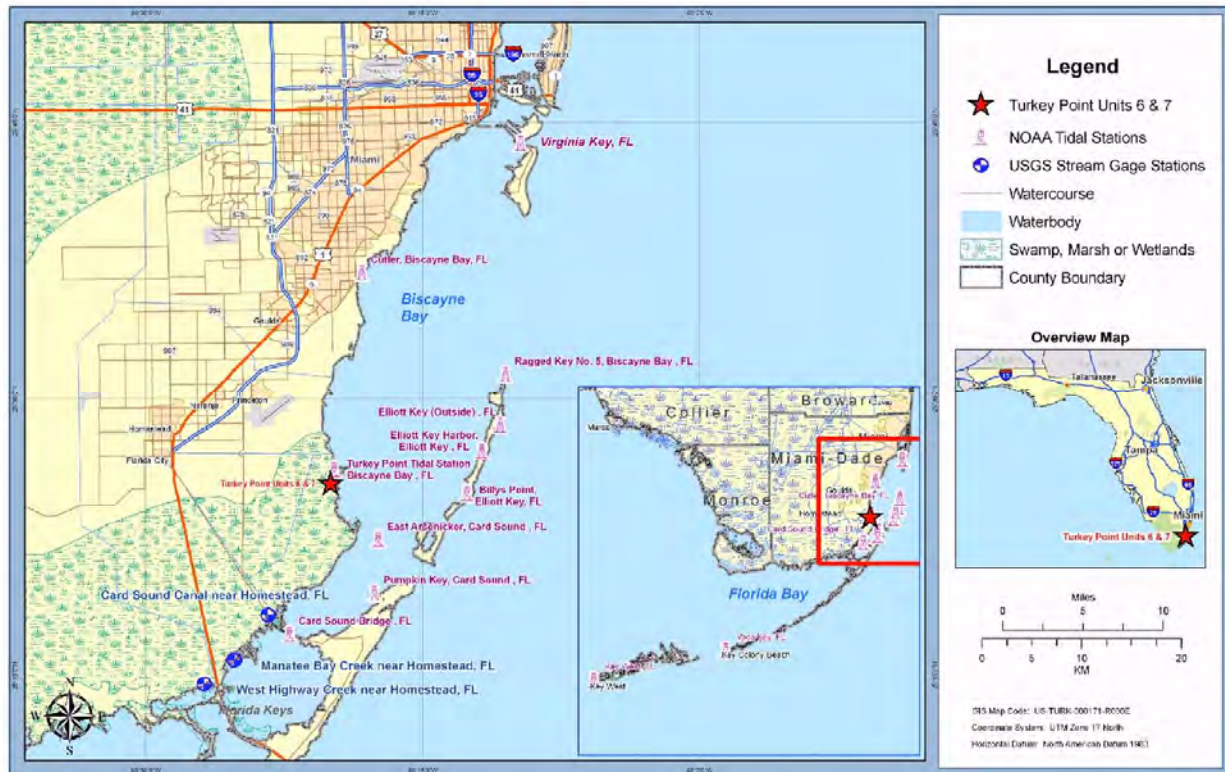


Figure -2.4.1-2 NOAA Tidal Stations and USGS Stream Gauges in the vicinity of Biscayne Bay (source: Turkey Point Units 6 and 7 COL FSAR Figure 2.4.1-212)

According to the applicant, the great diurnal tidal range, defined as the difference between the mean higher high and mean lower low tide levels, in Biscayne Bay is higher near the northern entrance of the bay. At Cutler station in Biscayne Bay, the great diurnal range is 2.13 ft (0.6 m); near the Turkey Point Units 6 and 7 site, the range is 1.78 ft (0.5 m); and at the Card Sound Bridge station to the south, the range is reduced to 0.63 ft (0.19 m).

The applicant stated that the principal circulation forces in Biscayne Bay are tidal, although winds that persist for longer than a complete tidal cycle (12 to 13 hours) cause relatively large water movements. The applicant stated that measurements of tidal flow past discrete points such as Cutter Bank (east of the cooling canals) average approximately 50,000 ac ft ($61,674,092 \text{ m}^3$) per day, or a continuous flow of 60,000 ac ft ($74,008,910 \text{ m}^3$) per half of a tidal

cycle. The applicant stated that tidal exchange between Biscayne Bay and the ocean is estimated to be less than 10,000 ac ft (12,334,818 m³) per day.

The Everglades

The Everglades is the largest wetland in the continental United States. It was part of the larger, natural Kissimmee-Okeechobee-Everglades watershed that once extended south from Lake Okeechobee to the southernmost extremity of peninsular Florida. The Everglades were formed on limestone bedrock and have lower elevations than the Flatwoods and Atlantic Coastal Ridge physiographic provinces. The Everglades slope toward the south with an average gradient less than 2 in per mile (3 cm per km). The freshwater flow from Lake Okeechobee and the flat terrain of the basin supported the accumulation of layers of peat and mud that formed the historical Everglades wetlands over an area of approximately 4,500 mi² (11,655 km²) (McPherson and Halley, 1997).

Before the beginning of drainage development in the late 1800s, overflows from Lake Okeechobee moved slowly through the Everglades as sheet flows. These flows provided the freshwater supply that sustained the ecosystem functions within the wetlands, which were dominated by sawgrass and tree islands. From the Everglades, water drained south to the Gulf of Mexico through a series of open-water sloughs.

The applicant stated that the Atlantic Coastal ridge that separates the Everglades from the Atlantic coastline has a maximum elevation of approximately 20 ft (6 m) above MSL (equivalent to NGVD 29), or approximately 18.4 ft (5.6 m) NAVD 88. Historically, nearly all of southeast Florida, except for the Atlantic Coastal ridge, was flooded annually, with the floodwater discharging to Biscayne Bay through the Miami, New, and Hillsborough rivers and other sloughs that formed transverse glades in the Atlantic Coastal ridge.

Beginning in the late 19th century, south Florida underwent substantial anthropogenic alterations that irreversibly changed its hydrology (McPherson and Halley, 1997). Causes included land reclamation for agriculture, construction of flood control levees and drainage canals, and urbanization. In the late 19th and early 20th centuries, canals were dug through the Everglades to drain water from the area south of Lake Okeechobee to enable agricultural development (McPherson and Halley, 1997). By the late 1920s, major canals were constructed and rivers in the transverse glades were modified to connect Lake Okeechobee with the Gulf of Mexico and Atlantic Ocean. In southeastern Florida, the West Palm Beach, Hillsborough, North New River, South New River, and Miami (River) Canals connected Lake Okeechobee with Biscayne Bay and the Atlantic Ocean (McPherson and Halley, 1997).

The Central and Southern Florida Flood Control Project (C&SF project) was authorized in 1948 with a mandate to provide flood protection, water supply, prevention of saltwater intrusion, and protection of fish and wildlife resources (McPherson and Halley, 1997). The State of Florida formed the Central and Southern Florida Flood Control District, which later became the South Florida Water Management District (SFWMD), to work with the C&SF project. The C&SF project adopted a water management plan for Lake Okeechobee and three water conservation areas (WCAs) to provide flood protection and water supply. As part of the water management plan, the Everglades Agricultural Area (EAA) was drained for agricultural development.

The construction of these flood control canals, levees, and structures by the C&SF project caused much of the runoff that once flowed to the Everglades from the Kissimmee River and Lake Okeechobee to be diverted directly to the Gulf of Mexico (via the Caloosahatchee Canal)

and the Atlantic Ocean (via the St. Lucie Canal). Under natural conditions, Lake Okeechobee overflowed its southern bank at El. 20 ft (6.1 m) to 21 ft (6.4 m) NGVD 29 (18.4 ft (5.6 m) to 19.4 ft (5.9 m) NAVD 88), but now the lake water level is maintained at approximately 13 ft (4 m) to 16 ft (4.9 m) NGVD 29 (11.4 ft (4.3 m) to 14.4 ft (4.4 m) NAVD 88) (U.S. Army Corps of Engineers 2007 page A-10). Surface water flows from the EAA into the WCAs are maintained by pumping. Water levels in the Everglades generally are shallower and have shorter hydroperiods than they had before development (McPherson and Halley, 1997).

Most of the undeveloped portions of the Everglades (about 50 percent of the original area) are now protected in public parks and other State lands (McPherson and Halley, 1997). The Everglades National Park, established in 1947, includes approximately 1.4 million acres (5666 km²) (McPherson and Halley, 1997). The park is approximately 15 mi (24 km) west of the plant property and is adjacent to the southeast Florida drainage canal system.

The applicant described the Comprehensive Everglades Restoration Plan (CERP), which was authorized by Congress in 2000 to provide a framework and guide the restoration, protection, and preservation of the water resources of central and southern Florida, including the Everglades. CERP projects aim to capture some water that currently flows to the Atlantic Ocean and Gulf of Mexico, hold it in surface and subsurface reservoirs, and redirect it to the wetlands, lakes, rivers, and estuaries of southern Florida. The surface and subsurface reservoirs would mainly be located within the low-lying areas of the EAA and WCAs, whereas the proposed plant facilities will be located at an elevation of 26 ft (7.9 m) NAVD 88. The applicant stated that, due to elevation differences, failure of these reservoirs would not adversely affect the functioning of the Turkey Point Units 6 and 7 safety-related structures.

Everglades National Park-South Dade Conveyance System

The applicant described the systems of canals in the site area. According to the applicant, systematic construction of drainage canals in southern Miami-Dade County was initiated in the 1960s. The Federal Flood Control Act of 1962 authorized the C&SF project for southern Miami-Dade County. The C&SF project implemented a system of canals and structures to provide drainage for urban development, prevent over-drainage of agricultural lands, and prevent contamination of groundwater by saltwater intrusion. The conveyance system relies on gravity drainage through a primary network of 12 canals with outlets to serve a system of secondary canals.

The canal system was modified in the 1970s to meet the hydrologic needs of the Everglades National Park by implementing the Everglades National Park-South Dade Conveyance System (ENP-SDCS), which interconnected several drainage basins of the C&SF drainage project. Gated control structures were installed at the eastern (coastal) end of the primary canals to release excess storm water runoff to the coastal water bodies during wet seasons and to manage saltwater intrusion during dry seasons. Secondary controls were installed on the inland reaches of the canals to regulate flow eastward, control inland and agricultural flooding, and maintain higher water levels in the surficial aquifer system. The ENP-SDCS surface water canal system was fully developed in the 1980s. The existing north-south, borrow canals L-30 and L-31N/L-31W were enlarged to convey water from the Miami Canal (C-6) to the Everglades. The west-east running canals provide drainage from the southern Dade development corridor to Biscayne Bay by control structures at the mouth of the canals. The L-31 Canal, the western borrow canal of the L-31E Levee, runs parallel to the coastline of Biscayne Bay in southern Miami-Dade County, separating the coastal wetlands along the bay from the mainland. The

L-31E Levee, with a crest elevation of approximately 7 ft (2.1 m) NAVD 88, and L-31 Canal are located immediately west of the Turkey Point cooling canals.

The applicant stated that the United States Army Corps of Engineers (USACE) has delineated water management subbasins in southern Miami-Dade County. There are 17 subbasins that contribute flow to Biscayne Bay and Everglades. Surface water flows between the subbasin areas and from the drainage subbasins to Biscayne Bay or the Everglades are controlled by numerous flow control structures. Detailed flow and water level monitoring and measurements are performed by various agencies, including United States Geological Survey (USGS), SFWMD, and the Everglades National Park, as part of the operation of the structures in the ENP-SDCS. The applicant reports that a search of the SFWMD DBHYDRO database for flow and water level monitoring data returned approximately 700 records.

Units 6 and 7 Plant Area

As described by the applicant, the Turkey Point plant area is bounded by Biscayne Bay to the east, the Florida City Canal to the north, L-31E Canal to the west, and Card Sound Road and Card Sound to the south. Two flow control structures, S-20 and S-20F, control outflow from the canals north and west of Turkey Point Units 6 and 7. The applicant stated that remnants of east-west drainage ditches and shallow north-south “mosquito ditches” constructed in the early 1900s for mosquito control are present in the area. The SFWMD has undertaken the Biscayne Bay Coastal Wetlands Project to restore the Biscayne Bay ecosystem in the areas surrounding the Turkey Point plant property. The applicant stated that FPL maintains a wetland area in the northern area of the Turkey Point plant property and is implementing a wetland mitigation project (the Everglades Mitigation Bank) southwest of Turkey Point Units 6 and 7. According to the applicant, future hydrologic changes in the Biscayne Bay Coastal Wetlands project are not expected to have adverse flooding and water use impact on the safety-related functions of Turkey Point Units 6 and 7.

The Federal Emergency Management Agency (FEMA) flood insurance study for Miami-Dade County indicates that the most severe flooding in the county would result from hurricane storm surges (FEMA, 1994). FEMA estimated surge elevations (still water level) at transect locations along the shoreline of Biscayne Bay for different return periods. Turkey Point Units 6 and 7 lie between Transect 30 in the north to Transect 31 in the south. The maximum still water levels in these transects range from elevation 8.5 ft (2.6 m) NGVD 29 (6.9 ft (2.1 m) NAVD 88) for a 10-year return period to 12.4 ft (3.8 m) NGVD 29 (10.8 ft (3.3 m) NAVD 88) for a 500-year return period (FEMA, 1994).

Dams and Reservoirs

The applicant stated that there are no dams or reservoirs near Units 6 and 7. According to the applicant, the only flow regulation and control near Units 6 and 7 is for the ENP-SDCS, which regulates drainage from the Everglades and saltwater intrusion from Biscayne Bay. The applicant’s assessment of dam failure potential is provided in Turkey Point Units 6 and 7 COL FSAR Subsection 2.4.4.

Surface Water Users

The applicant stated that SFWMD, which administers water use permits for the south Florida region, reports that approximately 90 percent of all consumptive water use in southern Florida comes from groundwater sources, with just 10 percent supplied from surface water sources.

The applicant stated that SFWMD reports that there were 139 water-use permits in use within Miami-Dade County as of October 13, 2008. There are no surface water withdrawals permitted for potable water supply. Approximately 83 percent of the permitted surface water use is for landscape irrigation. The remaining use is for irrigation of golf courses, agriculture, aquaculture, nursery irrigation, industrial uses, and dewatering. The nearest surface water user to Turkey Point Units 6 and 7 is located approximately 6 mi to the west-northwest.

The applicant stated that the major non-consumptive surface water uses near Turkey Point Units 6 and 7 are recreation, fishing, and navigation, with nearly all of this use occurring in Biscayne National Park and Homestead Bayfront Park.

Groundwater

Turkey Point Units 6 and 7 COL FSAR Section 2.4.12 describes local and regional groundwater characteristics, groundwater users, groundwater well locations, and withdrawal rates. These are discussed further in SER Section 2.4.12.

Staff's Technical Evaluation

The staff reviewed the information provided by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.4.1. The staff conducted a hydrology site audit on March 22–24, 2010. The site audit included visits to the site of Units 6 and 7 and to the Turkey Point cooling canals. The staff also observed Biscayne Bay and the general topographic and hydrologic setting of the area.

The staff compared the information presented by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.4.1 with publicly available maps and data regarding the Turkey Point site and its surrounding region. The staff's review confirmed that the information contained in the application and incorporated by reference addresses the relevant information related to site hydrologic description that the staff needs in order to perform safety assessment of the plant SSC and to consider the effects of any accidental release of radioactive effluent on public health and safety.

2.4.1.5 Post Combined License Activities

There are no post COL activities related to this section.

2.4.1.6 Conclusion

The staff reviewed the application and confirmed that the applicant provided sufficient information on the description of major hydrologic characteristics in the vicinity of the site and site regions as specified in the AP1000 Design Certification. The applicant has presented and substantiated information to establish the site description. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description to allow the staff to evaluate, as documented in SER Section 2.4.1, whether the applicant has met the relevant requirements of 10 CFR 52.79(a)(1) and 10 CFR Part 100 with respect to determining the site safety. This addresses PTN COL 2.4-1. In conclusion, the applicant has provided sufficient information for the staff to determine whether it has met the applicable requirements of 10 CFR Part 52 and 10 CFR Part 100 pertaining to hydrologic engineering.

2.4.2 Floods

2.4.2.1 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.4.2 discusses historical flooding at the proposed site and in the region of the site. The information summarizes and identifies the individual types of flood-producing phenomena, and combinations of flood-producing phenomena, considered in establishing the flood design bases for safety-related plant features. The discussion also covers the potential effects of local intense precipitation.

Primary emphases of Section 2.4.2 are (1) flood history, (2) flood design considerations, and (3) effects of local intense precipitation.

2.4.2.2 Summary of Application

The staff reviewed Section 2.4.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic. The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the site-specific flooding description. The results of the staff's evaluation of the information incorporated by reference in the VCSNS COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.4-2 Floods

The applicant provided additional information in PTN 2.4-2 to resolve COL Information Item 2.4-1 (COL Action Item 2.4.1-2), which addresses the provision for site-specific information related to historical flooding and the potential for flooding at the plant site, including flood history, flood design considerations, and the effects of local intense precipitation.

The COL Information Item 2.4-2 also requires the COL applicant to provide sufficient information to verify that hydrologic-related events will not affect the safety basis for the AP1000. AP1000 DCD Tier 1 Table 5.0-1 site parameters related to hydrology are:

- maximum flood level less than plant elevation 100 ft, which is equal to the design grade elevation,
- 1 hr 1 mi² probable maximum precipitation (PMP) of 20.7 in/hr or less, and
- maximum groundwater level less than plant elevation 98 ft.

For Turkey Point Units 6 and 7, plant elevation 100 ft is equal to 26 ft NAVD 88. This SER section addresses the estimation of the first two hydrologic site parameters, while the SER Section 2.4.12 discusses the issue related to the maximum groundwater level.

2.4.2.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for the identification of floods and flood design considerations, and the associated acceptance criteria, are described in Section 2.4.2 of NUREG-0800.

The applicable regulatory requirements for identifying floods are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 52.79(a)(1)(iii), as it relates to the hydrologic characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The related acceptance criteria are as follows:

- Regulatory Guide 1.29 as it relates to those SSCs intended to protect against the effects of flooding”;
- Regulatory Guide 1.59 as supplemented by best current practices; and,
- RG 1.102 as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.2.2 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.2 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff’s review confirmed that the information in the application and incorporated by reference addresses the required information relating to the site-specific flooding description. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.4-2

The staff reviewed PTN COL 2.4-2 related to the related to historical flooding and the potential for flooding at the plant site, including flood history, flood design considerations, and the effects

of local intense precipitation included in Turkey Point Units 6 and 7 COL FSAR Section 2.4.2. COL Information Item in Section 2.4.1.2 of the AP1000 DCD states:

Combined License applicants referencing the AP1000 certified design will address the following site-specific information on historical flooding and potential flooding factors, including the effects of local intense precipitation.

- Probable Maximum Flood on Stream and Rivers – Site-specific information that will be used to determine the design basis flooding at the site. This information will include the probable maximum flood on streams and rivers.
- Dam Failures – Site-specific information on potential dam failures.
- Probable Maximum Surge and Seiche Flooding – Site-specific information on probable maximum surge and seiche flooding.
- Probable Maximum Tsunami Loading – Site-specific information on probable maximum tsunami loading.
- Flood Protection Requirements – Site-specific information on flood protection requirements or verification that flood protection is not required to meet the site parameter for flood level.
- No further action is required for sites within the bounds of the site parameter for flood level.

Evaluation of the information provided in PTN COL 2.4-2 related to historical flooding and the potential for flooding at the Turkey Point Units 6 and 7 site, including flood history, flood design considerations, and the effects of local intense precipitation is discussed below.

2.4.2.4.1 *Flood History*

This subsection describes the historical floods at and in the vicinity of the proposed site.

Information Submitted by Applicant

Due to its location alongside the Atlantic Ocean, Florida Bay, and Biscayne Bay, the applicant stated that the area surrounding the Turkey Point Units 6 and 7 site is exposed to flooding from tsunami and from storm surge associated with tropical storms and hurricanes. In addition, ponding can occur in the very flat, poorly drained areas and drainage canals that characterize the area (FEMA 1994; Federal Emergency Management Agency, *Flood Insurance Study, Dade County, Florida and Incorporated Areas*, Revised March, 1994). The applicant summarized the most severe flooding events (up to 1992) in Miami-Dade County, as reported by the Federal Emergency Management Agency (FEMA) in the 1994 flood insurance study for Miami-Dade County, FL, and incorporated areas (FEMA, 1994). The applicant also provided information on potential for local flooding in streams and canals and for flooding due to dam or levee breaches and, supplemented this information with more recent data as described below.

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.5, the applicant discusses major historical hurricanes near the Turkey Point Units 6 and 7 site. The maximum storm tide level in Biscayne

Bay reported by FEMA (1994) was 11.7 ft (3.6 m) NAVD 88, occurring at Coconut Grove between September 6 and 22, 1926. Hurricane Andrew caused the worst flooding on record for the area near Units 6 and 7. The FEMA flood insurance study (1994) did not report quantitative flood levels from Hurricane Andrew. During Hurricane Andrew, rainfall totals of more than seven in were recorded in southeastern Florida (Lovelace, 1996) and the peak storm surge on the southeast Florida coast occurred near the time of high astronomical tide. The height of the storm tide ranged from 4 to 6 ft (2.1 to 1.8 m) in northern Biscayne Bay and increased to a maximum value of 16.9 ft (5.2 m) NGVD 29 (15.37 ft (4.68 m) NAVD 88) at a location in Biscayne Bay approximately 13 mi north of Turkey Point Units 6 and 7. However, the height of the storm tide was 4 to 5 ft (1.2 to 1.5 m) in southern Biscayne Bay.

The applicant examined three USGS stream gages in the site vicinity for high water levels that occurred in years more recent than the FEMA flood insurance study. These gages are Card Sound Canal (USGS Gage 251816080232200), Manatee Bay Creek (USGS Gage 251549080251200), and West Highway Creek (USGS Gage 251433080265000), all located along the southeastern Florida shoreline south of the Turkey Point Units 6 and 7 site (Figure 2.4.1-2). The maximum gage water levels that the applicant identified in the records are 1.11 ft (0.34 m) NAVD 88 on November 12, 2003, at the Card Sound Canal gage; 2.27 ft (0.69 m) NAVD 88 on September 20, 2005, at the Manatee Bay Creek gage; and 2.59 ft (0.79 m) NAVD 88 on October 24, 2005 (during Hurricane Wilma), at the West Highway Creek gage.

The applicant also examined tide level measurements at two tide gage stations: the Virginia Key tide gage (Station ID: 8723214) 25 mi (40 km) north of the Turkey Point Units 6 and 7 site, and the Vaca Key tide gage (Station ID: 8723970) 70 mi south of Turkey Point Units 6 and 7 (Figure 2.4.1-2). According to the applicant, all peak tide levels at these stations are associated with tropical storm or hurricane events, and the maximum gage heights at both stations occurred on October 24, 2005, during Hurricane Wilma: 2.79 ft (0.85 m) NAVD 88 at the Virginia Key tide gage and 5.43 ft (1.7 m) NAVD 88 at the Vaca Key gage.

The applicant stated that the design grade elevation at 26 ft (8 m) NAVD 88 for all safety-related buildings of Units 6 and 7 is above the maximum recorded storm tide level of 11.7 ft NAVD 88, as reported in the 1994 FEMA flood insurance study for Miami-Dade County, FL.

Staff's Technical Evaluation

An accurate description of the history of flooding in the site area and adjacent regions is required for the staff to perform its safety assessment. The staff reviewed the site-specific information related to historical flooding and the potential flooding at the plant site provided by the applicant, as well as references cited.

Based on the review of the information provided or cited by the applicant, the staff concludes that the applicant has provided a sufficient history of flooding in the site area, and that the historical flood levels, including the level cited in the applicant's comparison (11.7 ft (3.6 m) NAVD 88) and the highest storm tide level in Biscayne Bay (15.37 ft (4.7 m) NAVD 88), are well below the proposed plant grade (26.0 ft (7.9 m) NAVD 88) for safety-related facilities.

2.4.2.4.2 Flood Design Considerations

This section describes the scenarios used to determine the design basis flood at the Turkey Point Units 6 and 7 site.

Information Submitted by Applicant

The applicant stated that it considered and investigated the following potential flooding scenarios for Units 6 and 7: probable maximum flood (PMF) on streams and rivers, potential dam failures, probable maximum surge and seiche flooding, probable maximum tsunami, flooding due to ice effects, and potential flooding caused by channel diversions. The applicant stated that these flooding scenarios were investigated in conjunction with other flooding and meteorological events, such as wind generated waves and tidal levels, as recommended in ANSI/ANS-2.8-1992 (ANS, 1992).

The applicant stated that flooding from Biscayne Bay during severe storms, such as the PMP event, would be the most severe and controlling event among all scenarios because Turkey Point Units 6 and 7 are located on the Biscayne Bay shoreline and there are no major streams or rivers nearby. Therefore, the applicant did not perform detailed modeling analysis to determine the flood levels from PMF on streams and rivers.

The applicant stated that the maximum water level in the power block area due to a local PMP storm event is estimated to be at 24.5 ft (7.5 m) NAVD 88, which is lower than the design grade of 26.0 ft (7.9 m) NAVD 88 of the safety-related facilities by 1.5 ft (0.5 m). Thus, the applicant concludes that no safety-related facilities are affected due to flooding as a result of the local PMP.

The applicant estimated that the maximum flood water surface elevation at the Turkey Point Units 6 and 7 site would result from storm surge and wave run-up associated with a probable maximum hurricane storm. The applicant estimates this elevation to be 24.8 ft (7.6 m) NAVD 88, which the applicant determined to be the design basis flood elevation at the site. The applicant notes that the design basis flood elevation of 24.8 ft (7.6 m) NAVD 88 is lower by 1.2 ft (0.4 m) than the design grade of 26.0 ft (7.9 m) NAVD 88 of the safety-related facilities, including the elevation of floor entrances and openings of all safety-related facilities. Thus, the applicant concludes that no safety-related facilities are affected due to flooding as a result of the design basis flood.

Staff's Technical Evaluation

The staff reviewed the description of flooding mechanisms provided by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.4.2. The staff determines that the applicant has considered all plausible flooding mechanisms at the Turkey Point 6 and 7 site. The staff's technical review of these individual flooding mechanisms and their flooding potential is described in appropriate sections of the SER.

2.4.2.4.3 Effects of Local Intense Precipitation

This section describes the estimation of local intense precipitation and its effects on the safety-related SSCs of Turkey Point Units 6 and 7.

Information Submitted by Applicant

Probable Maximum Precipitation Depths

The design basis for local intense precipitation is the all-season, 1 mi² (2.6 km²) PMP, which the applicant obtained from NWS Hydrometeorological Reports (HMR) No. 51 and 52 (Schreiner et

al., 1982). The values of the PMP depths obtained by the applicant are reproduced in Table 2.4.2-1.

The applicant noted that the 1-hour local PMP depth of 19.4 in (49.3 cm) is 1.3 in (3.3 cm) less than the corresponding AP1000 DCD value of 20.7 in (52.6 cm).

Table 2.4.2-1. Local Intense Precipitation at the Turkey Point Site (Adapted from FSAR Table 2.4S.2-207).

PMP DURATION AND AREA	1-HR, POINT RATIO	SOURCE	PMP DEPTH (IN)
6 hr, 10 mi ²	–	HMR 51 - Fig. 18	32.0
1 hr, point	–	HMR 52 - Fig. 24	19.4
30 min, point	0.73	HMR 52 - Fig. 38	14.2
15 min, point	0.50	HMR 52 - Fig. 37	9.7
5 min, point	0.32	HMR 52 - Fig. 36	6.2

Local Drainage Components and Subbasins

As addressed in Turkey Point Units 6 and 7 COL FSAR Section 2.4.1, the plant area for Units 6 and 7 will be built up from the existing ground with backfill and surrounded by a retaining wall structure. The design grade for all safety-related facilities, which consist of the containment/shields building and auxiliary building, is at 26 ft (7.9 m) NAVD 88. The grade elevation adjacent to the retaining wall is 19 ft (5.8 m) NAVD 88. The top of the retaining wall is at 21.5 ft (6.6 m) NAVD 88 along the eastern perimeter and the western perimeter and 20 ft (6.1 m) NAVD 88 along the northern perimeter. The southern portion of the plant area is occupied by the makeup water reservoir with the top of the reservoir wall at 24 ft (7.3 m) NAVD 88. The safety-related facilities are located in the center portion of the power block and the finish grade slopes away from the safety-related facilities at a minimum slope of 0.5 percent toward the retaining wall in the east and west and to the swales to the north and south of the power block.

The swales south of the power block collect overflow from the makeup water reservoir during extreme rainfall events, and the swales to the north of the power block collect storm water runoff from the switchyard (Clear Sky substation) and parking lot areas. The applicant determined water levels in the swales during the local PMP along their flow paths using the step-backwater methodology in the computer program HEC-RAS (USACE, 2009). For typical design storm events, runoff from the power block area is conveyed via catch basins and storm drains to a system of piping and swales that release to the industrial wastewater facility/cooling canal system (cooling canals). For the local PMP flooding analysis, the applicant assumed conservatively all storm drains, culverts, and catch basins are to be clogged and not functioning. All flow during PMP condition is assumed to be either overland or directed through the swales.

In the PMP flood analysis, the swales south of the power block are referred to as flow paths Cooling Tower East (CT-E) and West (CT-W). The swales north of the power block are referred to as flow paths Parking Lot East (PL-E) and Switchyard West (SY-W). The flow path SY-W consists of two parallel swales located in the switchyard and access road area north of the power block. These two parallel swales are modeled as one channel because during a PMP

event, the road is postulated to be overtopped. As shown in Figure 2.4.2-1, the plant area has been delineated into 22 drainage subbasins, with 19 subbasins for the power block area and 3 subbasins for the makeup water reservoir. The overflow from the makeup water reservoir during the PMP contributes to the flood flow discharges along flow paths CT-E and CT-W.

The northern half of the switchyard and the parking lot is graded down from the high-point elevations of 21.0 ft (6.4 m) and 23.0 ft (7 m) NAVD 88, respectively, toward the retaining wall along the northern perimeter of the plant site where grade elevation is at 19.0 ft (5.8 m) NAVD 88. Runoff from these areas would generally behave as sheet flows during the PMP condition. The runoff would flow along and over the swales on the northern perimeters of the plant area into the industrial wastewater facility. Therefore, the runoff from these areas does not contribute flood flow to the major flow paths defined in the PMP analysis.

Peak Discharges

The applicant used the Rational Method to determine PMP peak discharges at the outlet of each of the 22 subbasins. The whole site drainage area was conservatively assumed to be impervious at the start of and during the local PMP event, resulting in increasing the calculated peak discharges. The times of concentration for the subbasins were estimated using the U.S. Natural Resources Conservation Service (NRCS) methods (NRCS, 1986). In order to account for nonlinear effects during extreme floods, the estimated times of concentration were reduced by 25 percent, as recommended by the USACE Engineering Manual EM-1110-2-1417 (USACE, 1994).

The overflow PMP peak discharge on all sides of the makeup water reservoir is also calculated using the Rational Method. It is conservatively assumed that the reservoir, whose top of wall is at 24 ft (7 m) NAVD 88, is full at the beginning of the PMP event. The PMP peak runoff is computed based on the area of the reservoir, a runoff coefficient of 1.0, and the 5-minute PMP intensity of 74.5 in per hour for the 5-minute storm duration. The depth of the contributing overflow discharges from the makeup water reservoir to flow paths CT-E and CT-W is determined using the broad-crested weir equation and the length of reservoir wall.

The applicant calculated PMP peak discharges for all subbasin outlets, including overflow contributions from the makeup water reservoir. The calculated values are presented in Table 2.4.2-2.

Hydraulic Model Setup

The applicant used the USACE HEC-RAS model (USACE, 2005) to estimate the maximum water surface elevation during the local site flooding under a local PMP event. The HEC-RAS model simulated transient, subcritical flow conditions in the site drainage area with a critical flow depth boundary condition for each swale. This downstream boundary condition assumes a free overfall discharge at the downstream wall.

Inflow discharges in the HEC-RAS model were input based on estimates from the Rational Method. Peak discharge for each subbasin was distributed to the corresponding channel reach by drainage area proration.

Road crossings and retaining walls are modeled as inline structures with broad crested weirs with a discharge coefficient of 2.6 (USACE, 2005). Using this fairly low weir coefficient produces higher and, therefore, more conservative water levels over the structures.

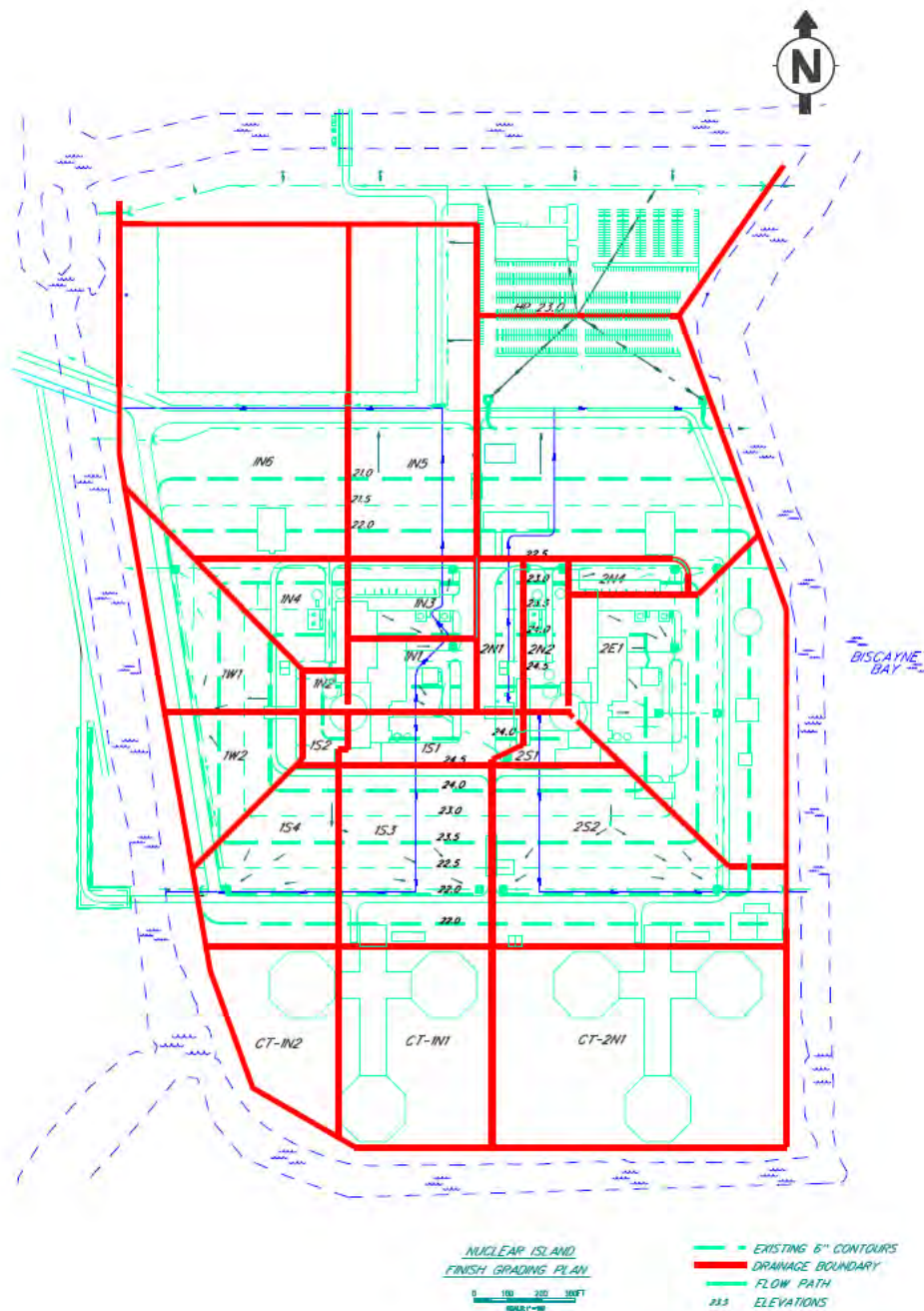


Figure 2.4.2-1. Units 6 and 7 Local PMP Analysis Subbasin Drainage Areas (Adapted from FSAR Figure 2.4.2-203)

Table 2.4.2-2. Units 6 and 7 Subbasin Local PMP Peak Discharges (Adapted from FSAR Table 2.4.2-211).

Basin #	Drainage Area (acres)	Composite Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (in/hr)	without MWR Overflow (cfs)	MW Overflow (cfs)
1	2.98	1	5.0	74.5	222.3	—
3	12.83	1	8.1	63.0	808.1	275.
4	20.45	1	10.0	56.0	1145.0	235.
1	1.39	1	5.0	74.5	103.7	—
2	15.40	1	10.3	56.0	862.3	534.
1	3.44	1	5.0	74.5	256.5	—
3	6.89	1	5.5	73.0	502.8	—
5	20.03	1	13.0	47.0	941.5	—
6	48.02	1	19.9	36.0	1728.6	—
1	2.36	1	5.2	74.0	174.7	—
3	26.56	1	13.6	45.0	1195.1	—
1	6.55	1	5.0	74.5	487.7	—

The Manning's roughness coefficients (n values) for the channel and over bank areas are assigned based on guidance provided by Chow (Chow, 1959). A Manning's n of 0.033, the maximum value for dredged straight channel with short grass and few weeds, is used for the swales. The power block area is primarily paved with impervious surface. The area between the power block and the makeup water reservoir and the area between the power block and the parking lot/switchyard consist of grassy surfaces. These areas are represented by a Manning's n of 0.05, which is the maximum value for over bank areas with high grass.

All storm water inlets were assumed to be completely blocked during the local PMP event.

Flood Elevations

Based on this analysis, the applicant determined the maximum water surface elevation in the power block area to be 24.5 ft (7.5 m) NAVD 88. This elevation is approximately 1.5 ft (0.5 m) below the design grade of 26 ft (8 m) NAVD 88 for safety-related structures.

The applicant used the Rational Method to estimate peak discharges from the roofs of the safety-related structures. The flow depth was estimated using Manning's Equation by postulating that the runoff will flow over the sides of the safety-related buildings and then sheet flow away from the buildings. The applicant used a conservatively high Manning's n value of 0.05 to represent a rough surface and to account for an increased roughness influence on shallow flows over the surface. The applicant estimated a sheet flow depth near the safety-related facilities during a PMP to be in the range of 1.4 to 3.8 in (3.6 to 9.7 cm). The

highest finish grade elevation in the power block is at 25.5 ft (7.8 m) NAVD 88, which is 6 in below the design grade of 26 ft (7.9 m) NAVD 88 for safety-related facilities. Therefore the applicant concluded that safety-related facilities are not affected by PMP flooding.

Staff's Technical Evaluation

Probable Maximum Precipitation Depths

The staff reviewed the description of the local PMP analysis performed by the applicant. The staff finds that the applicant had made appropriate use of the guidance in HMR 51 and HMR 52. The staff noted that these reports are based on data collected in the 1970s and earlier, and questioned whether newer data could change conclusions regarding the applicability of these methods. Accordingly, in RAI 4806 Question 02.04.02-1, the staff asked the applicant to document how additional rainfall data compiled at locations throughout Florida in the years since the publication of HMR 51 and HMR 52 influences conclusions about the applicability of these methods. The applicant stated that in response to this RAI dated on September 1, 2010 (ADAMS Accession No. ML102450485), the applicant had examined data from 10 rainfall stations in southern Florida. Based on its review, the applicant reported that the records did not reflect significant rainfall events that would possibly influence the information presented in HMR 51 and HMR 52. The staff accepts this response as reasonable. Additionally, the staff observes that the applicant's PMP point estimates (Table 2.4.2-1) are higher than both the world record precipitation values for the relevant time periods (for example, the one-hour world record is 401 mm or 15.8 in) and the values predicted by analysis of the apparent scaling relationship between peak precipitation records and durations (NWS, 2009; Galmarini et al., 2004); this increases confidence in the conservatism of the estimates.

Local Drainage Components and Subbasins

The staff reviewed the description of site drainage components and subbasins provided by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.4.2. The staff determined that this description matches staff's interpretation of the site grading plan depicted in Figure 2.4.2-1. The staff agrees, therefore, with the description of local drainage components and subbasins.

Peak Discharges

The applicant selected the Rational Method to estimate peak discharges in the site drainage area under a local PMP event. The staff determined that the Rational Method is an appropriate model to apply for the determination of peak discharge from local site drainages. The Rational Method is a conservative approach that is likely to overestimate peak discharges. The staff also determined the Rational Method was applied properly with conservative assumptions.

Hydraulic Model Setup

The applicant used USACE HEC-RAS model to estimate flood elevations at the site during the local PMP event. This model is one of the recommended models in the SRP. The staff determined that HEC-RAS is an appropriate model for this purpose.

The staff reviewed the details of the applicant's HEC-RAS analysis and found that the applicant did not demonstrate that its HEC-RAS analysis had bounded the flood elevations during the local PMP event. Accordingly, the staff issued RAI 4806 Question 02.04.02-2, requesting that the applicant explain whether a sensitivity analysis with HEC-RAS would verify the assumption

that additional interpolated cross-sections are not necessary. In particular, the applicant was asked to explain whether there would be any change in water surface elevations after adding interpolated cross-sections, confirm whether adding interpolated sections would establish a grid independent solution, and report on any changes to water surface profiles resulting from interpolated cross-sections. The applicant replied on September 17, 2010 (ADAMS Accession No. ML102640041), reporting that it had conducted a sensitivity analysis of the HEC-RAS model in which additional interpolated cross sections were added in such a way that the spacing between the cross sections was halved (i.e., the grid resolution is refined by a factor of two). The applicant stated that the analysis showed that adding interpolated cross sections did not change the elevation of the maximum water level.

Additionally, the applicant stated that these results were expected because there are no abrupt changes in the channel cross sections in the HEC-RAS model flow paths near the safety-related facilities, and the simulated water surface profile has a mild slope. Therefore, the applicant concluded that the HEC-RAS model used to obtain the maximum water level at the safety-related facilities due to local PMP is grid independent. The staff reviewed the applicant's modeling results and found that some of the added cross-sections resulted in water surface profiles that had elevations 0.1 to 0.3 ft (0.03 to 0.09 m) higher than in the original analysis. The staff interprets this result to mean that the HEC-RAS simulation is grid dependent, so the applicant has not demonstrated that its analysis bounds maximum water elevation from the local PMP. However, because the largest increment found in the sensitivity analysis (0.3 ft (0.09 m)) was well below the 1.5 ft (0.5 m) elevation margin indicated by the applicant's original analysis, the staff concludes that the applicant has satisfactorily demonstrated that flood elevations at the site due to local PMP would remain below the design grade for safety-related facilities.

2.4.2.4.4 Combined Flooding Events

Information Submitted by Applicant

The applicant did not provide an explicit discussion of combined flooding events in the initial version of Turkey Point Units 6 and 7 COL FSAR Section 2.4.2.

Staff's Technical Evaluation

The staff's review resulted in questions about whether combined flooding events related to hurricanes were sufficiently considered. Accordingly, the staff requested in RAI 4806, Question 02.04.02-2 that the applicant describe the reasons for selecting a particular combination of events that does not include a hurricane event. The section "Combined Events Criteria" in SRP Section 2.4.2 states: "The staff reviews the worst flooding at a site that may result from a reasonable combination of individual flooding mechanisms. Some or all of these individual mechanisms could be less severe than their worst-case occurrence but the combination may exceed the most severe flooding effects from the worst-case occurrence of any single mechanism." Consistent with that guidance, in RAI 4806, Question 02.04.02-2 asked the applicant to describe why the combination of events considered represents a conservative assessment that bounds the range of credible combinations of flooding events for Turkey Point Units 6 and 7.

In FPL Letter to NRC L-2010-087 Attachment 10, dated April 30, 2010 (ADAMS Accession No. ML102450485), associated with Hydrology Information Need HA-16, the applicant indicated that its local PMP flood analysis considers a coincident occurrence of a 500-year flood level in

Biscayne Bay. Because the 500-year flood in Biscayne Bay would be the result of a hurricane event, the applicant stated that hurricane events have been considered for combined flooding events. On September 1, 2010 (ADAMS Accession No. ML102450485), the applicant explained that it did not consider probable maximum storm surge (PMSS) flooding coincident with the peak discharge and flood level from the local PMP because it estimates the probability of such a combination to be near zero. The applicant estimated the probability of a PMSS (including 10 percent exceedance high tides) at a particular site to be on the order of 2.4×10^{-12} and estimated the probability of a PMP on a specific watershed to be on the order of 1.0×10^{-5} . Accordingly the applicant estimated the combined probability of a coincident event as 2.4×10^{-17} , which the applicant deems to be “not credible for design purposes.” Additionally, the applicant stated that if the calculated PMSS water level of 21.2 ft (6.5 m) NAVD 88 (not including wave run-up) were to occur simultaneously with peak discharges from the local PMP, because the PMSS would not overtop the retaining wall (at elevation 21.5 ft (6.6 m) NAVD 88) on the east and west sides of the plant, it would not affect the discharge of local runoff flows over the wall. Thus, the applicant concluded that this unlikely combination of flooding events would not increase PMP-related flood levels in the power block area. The applicant revised the Turkey Point Units 6 and 7 COL FSAR to include a discussion of combined events. The staff accepts the applicant’s reasoning as appropriately addressing the topic of combined flooding events.

The staff reviewed Section 2.4.2 of the Turkey Point Units 6 and 7 COL FSAR. The staff’s review confirmed that the information contained in the application and incorporated by reference addresses the relevant information related to individual types of flood-producing phenomena, and combinations of flood-producing phenomena, considered in establishing the flood design bases for safety-related plant features. The information also covered the potential effects of local intense precipitation. The staff’s technical review of this application includes an independent review of the applicant’s information in the FSAR and in the responses to the RAIs. The staff supplemented this information with other publicly available sources of information.

2.4.2.5 Post Combined License Activities

There are no post-COL activities related to this subsection.

2.4.2.6 Conclusion

The staff reviewed the application and confirmed that the applicant has addressed the information related to individual types of flood-producing phenomena, and combinations of flood-producing phenomena, considered in establishing the flood design bases for safety-related plant features. The information also covered the potential effects of local intense precipitation. The staff also confirmed that there is no outstanding information required to be addressed in the COL FSAR related to this section.

As set forth above, the applicant has presented and substantiated information to establish the site description. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description for the staff to determine, as documented in Section 2.4.2 of this SER, that the applicant has met the relevant requirements of 10 CFR 52.79(a)(1)(iii) and 10 CFR Part 100 with respect to determining the acceptability of the site. This addresses COL Information Item 2.4-2.

2.4.3 Probable Maximum Flood On Streams and Rivers

2.4.3.1 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.4.3 describes the hydrological site characteristics affecting any potential hazard to the plant's safety-related facilities as a result of the effect of the PMF on streams and rivers.

SER Section 2.4.3 provides a review of the following specific areas: (1) regional probable maximum precipitations and their losses, (2) runoff and stream course models, (3) PMF, (4) consideration of other site-related evaluation criteria, and (5) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts of 10 CFR Part 52.

2.4.3.2 Summary of Application

This section of the Turkey Point Units 6 and 7 COL FSAR addresses the information about site-specific PMFs on streams and rivers. In this section, the applicant provides site-specific supplemental information to address the COL specific information identified in DCD Tier 2 Revision 12, Section 2.4.1.2.

AP1000 COL Information Item

- PTN COL 2.4-2 Floods

COL License Information Item 2.4-2 requires COL applicants to provide site-specific information that will be used to determine the design basis flooding at the site. This information will include the PMF on streams and rivers.

2.4.3.3 Regulatory Basis

The relevant requirements of the NRC regulations for the identification of floods and flood design considerations, and the associated acceptance criteria, are described in Section 2.4.3 of NUREG-0800.

The applicable regulatory requirements for identifying probable maximum flooding on streams and rivers are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirements to consider physical site characteristics in site evaluations are specified in 10 CFR 100.20(c).

- 10 CFR 100.23(d) sets forth the criteria to determine the siting factors for plant design bases with respect to seismically induced floods and water waves at the site.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The related acceptance criteria are as follows:

- Regulatory Guide 1.29 as it relates to those SSCs intended to protect against the effects of flooding”;
- Regulatory Guide 1.59 as supplemented by best current practices; and,
- Regulatory Guide 1.102 as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.3.4 *Technical Evaluation*

The staff reviewed Section 2.4.3 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff’s review confirmed that the information in the application and incorporated by reference addresses the required information relating to the site-specific PMF on streams and rivers. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.4-2 Floods

The staff reviewed PTN COL 2.4-2 related to the site-specific information on PMF on streams and rivers included in Turkey Point Units 6 and 7 COL FSAR Section 2.4.3.

Evaluation of the information provided in PTN COL 2.4-2 related to PMF on streams and rivers is discussed below.

Information Submitted by the Applicant

The applicant notes that the site for Turkey Point Units 6 and 7 is adjacent to the Biscayne Bay shoreline, and there are no major natural streams or rivers nearby. There are several man-made canals located west of Units 6 and 7 extending from Florida City and Homestead to Biscayne Bay, as described in Subsection 2.4.1. The applicant notes that the topography of the area is extremely flat with natural elevations ranging from 2 to 5 ft (0.6 to 1.5 m) NAVD 88.

The applicant stated that during a storm event with the magnitude of the PMP, the floodwater level in the nearby canals would be controlled by the seawater level in Biscayne Bay. The applicant reasons that this extreme precipitation event would likely be associated with a tropical storm event and would be accompanied by a strong low-pressure system and a storm surge in Biscayne Bay.

The applicant reviewed the flood history of these canals, as reported by the FEMA Flood Insurance Study, Dade County, Florida, and Incorporated Areas (FEMA, 1994). That report provides still water elevations in Biscayne Bay at the Turkey Point plants and near the mouths for these canals for return period frequencies ranging from 10 years to 500 years. The highest still water elevation given in the FEMA study is 12.4 ft (3.8 m) NGVD 29 (10.8 ft (3.3 m) NAVD 88), for the 500-year return period, at the location identified as Transect 30 (FEMA, 1994, Table 2). The applicant notes that this is substantially below the flood elevation determined in the applicant's analysis of the probable maximum hurricane, presented in Turkey Point Units 6 and 7 COL FSAR Section 2.4.5 as a still water elevation of 20.3 ft (6.2 m) NAVD 88 with a wave run-up water level at elevation 24.8 ft (7.6 m).

The applicant notes that all flood elevations given in the FEMA report are higher than the ground elevations surrounding both the canals and Turkey Point Units 6 and 7. Floodwater levels from Biscayne Bay would extend landward a significant distance even during a 10-year flooding event on the bay. Additionally, the applicant stated that the flat topography that extends for many miles in all directions provides a large storage volume for canal flooding, with very little increase in water level.

Based on this large storage volume and the expectation that water levels in Biscayne Bay will control the water levels in the canals, the applicant stated that PMF water levels in canals most likely will not reach levels that would impact the site or that would be above the estimated probable maximum hurricane flood level resulting from PMSS, as presented in Turkey Point Units 6 and 7 COL FSAR Subsection 2.4.5. The applicant also stated that American National Standards/American Nuclear Society 2.8-1992 (USACE, 2005) indicates that flooding as a result of the PMP on adjacent streams or rivers need not be considered for nuclear power reactor sites located on shorelines because coastal water levels along a shoreline will control maximum water levels.

Based on this reasoning, the applicant did not perform a PMP runoff analysis on streams and rivers.

Staff's Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.3 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to probable maximum flooding. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff conducted a hydrology site audit on March 22 – 24, 2010. The site audit included a visit to the Turkey Point Units 6 and 7 site, and observations of the topography and hydrology of the surrounding area. The staff reviewed the applicant's information in Turkey Point Units 6 and

7 COL FSAR Section 2.4.3, and safety conclusions regarding potential hazards from PMF on streams and rivers.

Based on its initial review, the staff finds that the applicant had provided a strong qualitative justification for its conclusion that the large storage volume on the surrounding land would prevent canal flooding from influencing the flood levels above the estimated probable maximum hurricane level that it has identified as the design basis flood, but the applicant had not provided quantitative reasoning to support this conclusion.

Accordingly, in RAI 4808, Question 02.04.03-1, the staff requested additional information concerning the analysis of probable maximum flooding on streams and canals. The RAI requested quantitative reasoning for the conclusion that canal flooding would not influence the flood levels above the estimated probable maximum hurricane level.

The applicant responded on September 2, 2010. In its response, the applicant calculated the storage in the Florida City Canal floodplain, based on the assumptions that the floodplain is more than 45,000 ft wide and land surface elevations range from 2 to 5 ft NAVD 88. Using this information, the applicant calculated that every 1,000 ft (305 m) reach of the Florida City Canal floodplain contains approximately 1,030 ac ft (1,270,484 m³) of storage for every foot of vertical rise above elevation 5 ft (1.5 m) NAVD 88. In Turkey Point Units 6 and 7 COL FSAR Subsection 2.4.2, the applicant stated that this storage, combined with the flat topography of the region, would prevent the flood discharge from a 6 hour, 10 square mi (25.9 square km) probable maximum precipitation (PMP) depth of 32.0 in (81.2 cm) from reaching elevations approaching those produced by flooding events in the Atlantic Ocean and Biscayne Bay (referring to storm surge and tsunami flooding) or the Turkey Point Units 6 and 7 safety-related buildings design grade elevation of 26.0 ft (7.9 m) NAVD 88. The staff has confirmed the reasonableness of this conclusion by calculating that a 17 ft rise in water level on a 1,000 ft (304.8 m) reach of the canal floodplain would accommodate the runoff from a 32 in. rainfall over a 10 mi² (26 km²) area.

The staff reviewed the applicant's quantitative reasoning and accepts the applicant's analysis of probable maximum flooding on streams and rivers, including canals.

2.4.3.5 Post Combined License Activities

There are no post-COL activities related to this subsection.

2.4.3.6 Conclusions

The staff reviewed the application and confirmed that the applicant has addressed the information relevant to probable maximum flood (PMF) on streams and rivers, and that there is no outstanding information required to be addressed in the COL FSAR related to this section.

As set forth above, the applicant has presented and substantiated information to establish the site description. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description to allow the staff to evaluate, as documented in SER Section 2.4.3. This addresses COL information item 2.4-2. In conclusion, the staff determines that the identified site characteristics meet the relevant requirements of 10 CFR Part 52.79(a)(1) and 10 CFR Part 100 with respect to determining the acceptability of the site.

2.4.4 Potential Dam Failures

2.4.4.1 Introduction

Section 2.4.4 of the Turkey Point Units 6 and 7 COL FSAR addresses potential dam failures to ensure that any potential hazard to safety-related structures due to failure of onsite, upstream, and downstream water-control structures is considered in the plant design.

This section of the SER presents the staff's review of the analysis of potential dam failures.

2.4.4.2 Summary of Application

This section of the Turkey Point Units 6 and 7 COL FSAR addresses the site-specific information about potential dam failures. In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.4.4, the applicant provides site-specific supplemental information to address COL License Information Items 2.4-2:

AP1000 COL Information Item

- PTN COL 2.4-2 Floods

COL License Information Item 2.4-2 requires COL applicants to provide site-specific information related to potential dam failures that will be used to determine the design basis flooding at the site.

2.4.4.3 Regulatory Basis

The relevant requirements of the NRC regulations for the identification of floods, flood design considerations and potential dam failures, and the associated acceptance criteria, are described in Section 2.4.4 of NUREG-0800.

The applicable regulatory requirements for identifying the effects of dam failures are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 100.23(d) sets forth the criteria to determine the siting factors for plant design bases with respect to seismically induced floods and water waves at the site.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

Appropriate sections of the following Regulatory Guides are used by the staff for the identified acceptance criteria:

- RG 1.29 as it relates to those SSCs intended to protect against the effects of flooding”;
- RG 1.59 as supplemented by best current practices; and,
- RG 1.102 as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.4.2 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.4 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff’s review confirmed that the information in the application and incorporated by reference addresses the required information relating to potential dam failures. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.4-2 Floods

The staff reviewed PTN COL 2.4-2 related to potential dam failures that will be used to determine the design basis flooding at the site included in Turkey Point Units 6 and 7 COL FSAR Section 2.4.4.

Failures of dams and impoundments are a concern for safety because they can result in downstream flooding or loss of access to water supplies. Evaluation of the information provided in PTN COL 2.4-2 related to potential dam failures is discussed below.

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.4, the applicant stated that there are no dams located either upstream or downstream of the site. The nearest embankment dam to the site is the Herbert Hoover Dike that surrounds Lake Okeechobee. The dike and lake are more than 90 mi (145 km) northwest of the Turkey Point Units 6 and 7 site, and there is no direct channel or stream path from Lake Okeechobee to the site. The applicant stated that any breach of the Herbert Hoover Dike would result in floodwaters from the breach quickly spreading out laterally from the breaching location, as the topography between the lake and Units 6 and 7 is relatively flat. Herbert Hoover Dike Breach Inundation Area maps published in the Unified Mitigation Strategy for Palm Beach County, FL, and produced by USACE (Palm Beach County 2009) indicate that flooding as a result of a Herbert Hoover Dike breach would not extend beyond the drainage canals along the Palm Beach-Broward County line between Lake Okeechobee and the site. Based on this information, the applicant concluded that flood water from a Herbert Hoover Dike breach would have no impact on the Units 6 and 7 site.

The applicant also reviewed the potential impact of the failures of dams or dikes controlling onsite reservoirs. The Turkey Point Units 6 and 7 concrete water storage reservoir, referred to

as the makeup water reservoir, would be located in the cooling tower area south of the power block. The top of the reservoir wall is at elevation 24.0 ft (7.3 m) NAVD 88, which is 2 ft (0.6 m) below the design grade elevation of the safety-related structures. The existing cooling water return canals for Units 1, 2, 3 and 4 surround the reservoir walls on the east, south, and west sides. The applicant stated that any breach along these three sides of the reservoir would result in water flowing away from the power block and into the canals, to Biscayne Bay, or to the low-lying natural topography south and west of Units 6 and 7. Therefore, the applicant concluded that breaches along these three sides would pose no flooding risk to the safety-related facilities.

A breach in the makeup water reservoir's northern wall could, however, result in water flowing toward the power block area. The applicant notes that the design grade elevation adjacent to the north wall of the makeup water reservoir is approximately elevation 22.0 ft (6.7 m) NAVD 88, meaning that the north reservoir wall extends only 2 ft (0.6 m) above grade. The maximum operating water level in the reservoir is approximately elevation 22.5 ft (6.9 m) NAVD 88, 1.5 ft (0.5 m) below the top of the reservoir. The applicant cites the combined events criteria in American National Standards/American Nuclear Society 2.8-1992 (NOAA, 2006) as indicating that a one-half PMF should be considered coincident with a breach of a reservoir wall. Given that the full PMP event maximum discharge over the reservoir walls is estimated to be 2,696 cfs, the applicant reasoned that a one-half PMP storm event would produce a peak discharge over the reservoir wall of 1,348 cfs (38 cm). Using the broad crest weir equation with a total wall length of 5,717 ft (1,743 m) around the four sides of the reservoir and a weir coefficient of 2.6, the applicant calculated the maximum water level to be 2.4 in (6 cm) above the top of the reservoir wall at elevation 24.0 ft (7.3 m) NAVD 88. Thus, the applicant determined the maximum one-half PMP water level in the reservoir to be approximately elevation 24.2 ft (7.4 m) NAVD 88. The applicant compared this value to the safety-related design grade elevation for Turkey Point Units 6 and 7, at 26.0 ft (7.9 m) NAVD 88. The applicant stated that because the flood wave from a breach in the north wall of the reservoir would be 1.8 ft (0.5 m) below the elevation of the safety-related facilities, it does not pose a flooding risk to the safety-related facilities. Additionally, the applicant points out that the 700 ft (213 m) distance between the makeup water reservoir wall and the nearest safety-related building (i.e., the auxiliary building for either Unit 6 or 7) would further reduce any potential for inundation of safety-related facilities.

In summary, the applicant found that there are no upstream or downstream dams that would pose a flooding potential to Turkey Point Units 6 and 7. Based on the result of a simple bounding analysis, the applicant concluded that the flood elevation during a breach of the makeup water reservoir would be lower than the design grade elevation of the safety-related facilities.

Staff's Technical Evaluation

The staff reviewed the applicant's information in Turkey Point Units 6 and 7 COL FSAR Section 2.4.4 and found the methods and tools used in conjunction with or developed using this information to be reasonable.

The staff reviewed publicly available maps and reports and found that they confirm the applicant's information about dam and dike locations and the impacts of a failure of the Herbert Hoover Dike. The staff also reviewed the applicant's analysis of the potential breach of the makeup water reservoir, performed some confirmatory calculations for that analysis, and determined that the applicant's reasoning and supporting analysis are appropriate.

The staff finds that the applicant has considered the appropriate site phenomena for establishing the design bases for SSCs important to safety. The staff accepted the methodologies used to determine the potential for inundation due to dam breaks in the vicinity of the site. Accordingly, the staff also concludes that the use of these methodologies provides acceptable results. The staff concludes that the identified site characteristics meet the requirements of 10 CFR 52.79 and 10 CFR Part 100.20(c), with respect to establishing the design basis for SSCs important to safety.

2.4.4.5 *Post Combined License Activities*

There are no post-COL activities related to this subsection.

2.4.4.6 *Conclusion*

As set forth above, the applicant presents and substantiates information relative to the potential for site inundation due to dam failure. The staff reviewed the available information and concluded, for the reasons given above, that the identification and consideration of the potential dam failure in the vicinity of the site and site regions are acceptable and meet the requirements of 10 CFR 52.79 and 10 CFR Part 100.20(c), with respect to determining the acceptability of the site.

The staff reviewed the application and confirmed that the applicant has addressed the information relevant to potential dam failures, and that there is no outstanding information required to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section.

As set forth above, the applicant has presented and substantiated information to establish the site description. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description to allow the staff to evaluate, as documented in SER Section 2.4.4, whether the applicant has met the relevant requirements of 10 CFR Part 52.79(a)(1) and 10 CFR Part 100 with respect to determining the acceptability of the site. This addresses COL information item 2.14.

2.4.5 **Probable Maximum Surge and Seiche Flooding**

2.4.5.1 *Introduction*

Turkey Point Units 6 and 7 COL FSAR Section 2.4.5 addresses the probable maximum surge and seiche flooding to ensure that any potential hazard to the SSCs at the proposed site has been considered in compliance with the Commission's regulations.

Section 2.4.5 of this SER presents evaluation of the following topics based on data provided by the applicant in the Turkey Point Units 6 and 7 COL FSAR and information obtained from site audits, RAI responses, and publicly available sources: (1) probable maximum hurricane (PMH) that causes the probable maximum surge as it approaches the site along a critical path at an optimum rate of movement, (2) probable maximum wind storm (PMWS) from a hypothetical extratropical cyclone or a moving squall line that approaches the site along a critical path at an optimum rate of movement, (3) a seiche near the site, and the potential for seiche wave oscillations at the natural periodicity of a water body that may affect flood water surface elevations near the site or cause a low water surface elevation affecting safety-related water

supplies, (4) wind-induced wave run-up under PMH or PMWS winds, (5) effects of sediment erosion and deposition during a storm surge and seiche-induced waves that may result in blockage or loss of function of SSCs important to safety, (6) the potential effects of seismic and nonseismic information on the postulated design bases and how they relate to a surge and seiche in the vicinity of the site and the site region, and (7) any additional information requirements prescribed in the “Contents of Application” sections of the applicable subparts to 10 CFR Part 52.

2.4.5.2 *Summary of Application*

This section of the Turkey Point Units 6 and 7 COL FSAR addresses the information related to probable maximum surge and seiche flooding in terms of impacts on structures and water supply. The applicant addressed these issues as follows:

AP1000 COL Information Item

- PTN COL 2.4-2 Floods

COL License Information Item 2.4-2 requires COL applicants to provide site-specific information related to probable maximum surge and seiche flooding that will be used to determine the design basis flooding at the site.

2.4.5.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for consideration of the effects of probable maximum surge and seiche, and the associated acceptance criteria, are described in Section 2.4.6 of NUREG-0800.

The applicable regulatory requirements for identifying surge and seiche hazards are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 100.23(d)(3) sets forth the criteria to determine the siting factors for plant design bases with respect to water levels at the site.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

In addition, the staff used the regulatory positions of the following regulatory guides for the identified acceptance criteria:

- Regulatory Guide 1.29 as it relates to those structures, systems, and components (SSCs) intended to protect against the effects of flooding”;

- Regulatory Guide 1.59 as supplemented by best current practices; and,
- Regulatory Guide 1.102 as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.5.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.3.5 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic. The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to PMSS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.4-2

The staff reviewed PTN COL 2.4-2 related to probable maximum surge and seiche flooding included in Turkey Point Units 6 and 7 COL FSAR Section 2.4.5.

Because of the location of Turkey Point Units 6 and 7 on Florida's east coast, the site would be exposed to hurricane storm surge from hurricanes affecting that coast. Determination of the PMSS is, therefore, an important element of the safety evaluation for the site. Evaluation of the information provided in PTN COL 2.4-2 related to probable maximum surge and seiche flooding is discussed below.

2.4.5.4.1 *Probable Maximum Winds and Associated Meteorological Parameters*

An estimate of the probable maximum wind field for the site is necessary to perform the safety assessment because the potential for storm surge is related to the wind field of the PMH or PMWS. Subsection 2.4.5 of NUREG-0800 defines the PMSS as the surge that results from a combination of meteorological parameters of a PMH, a PMWS, or a moving squall line. NUREG-0800 indicates that the PMH, as defined by NOAA Technical Report NWS 23 (NOAA, 1979), should be estimated for coastal locations that may be exposed to hurricanes. The PMH is a hypothetical steady-state hurricane with a combination of meteorological parameters that will give the highest sustained wind speed that can probably occur at a specified coastal location. Meteorological parameters that define the PMH wind field include the hurricane peripheral pressure (p_n), central pressure (p_o), radius of maximum winds (R), forward speed (T), track direction (θ), and inflow angles of the hurricane winds (ϕ).

Information Submitted by Applicant

The applicant used guidance in NOAA NWS Report 23 (NOAA, 1979) as its basis for defining the combination of parameters of the wind field for the PMH at the location of Turkey Point Units 6 and 7. The PMH parameter values provided by NWS 23 are based on data from historical

hurricanes from 1851 to 1977. Table 2.4.5.4-1 summarizes the PMH characteristics determined by the applicant.

Table 2.4.5.4-1 Assumed PMH Characteristics for Turkey Point Units 6 and 7

Hurricane Parameter	Magnitude or range
Peripheral Pressure (p_n)	30.12 in. mercury (1020 millibar [mb])
Central Pressure (p_o)	26.12 in. mercury (884.5 millibar [mb])
Radius of Maximum Winds (R)	4 to 20 nautical miles (4.6 to 23.0 miles)
Forward Speed (T)	6 to 20 knots [kts] (6.9 to 23.0 mph)
Track Direction (θ)	72 to 185 ° clockwise from north
Inflow angle (ϕ)	2 to 9 ° (at a distance R from the hurricane center)

According to NWS 23, the pressure difference between the hurricane peripheral and central pressures, Δp , is the most important meteorological parameter in defining the hurricane wind field. The applicant notes that the Δp value in its analysis is 4 in. of mercury (135.5 millibar).

The applicant reviewed published information on historical trends in hurricane intensities and research on the effect of climate variability on hurricane intensity (NOAA, 2006, Blake et al., 2007). The applicant's review found that research on the effects of El Niño/Southern Oscillation on hurricane formation indicates that El Niño conditions tend to suppress hurricane formation in the Atlantic basin and La Niña conditions tend to favor hurricane development (NOAA, 2006). Additionally, hurricane activity increases during warm phases of the Atlantic Multi-decadal Oscillation, which is the variation of long-duration sea surface temperature in the northern Atlantic Ocean with cool and warm phases that may last for 20 to 40 years (NOAA, 2006). Historical hurricane data indicate that Atlantic hurricane seasons have been significantly more active since 1995 than they were in preceding decades, but earlier periods, such as from 1945 to 1970, were apparently as active the recent period (NOAA, 2006; Blake et al., 2007). Analysis by Blake et al. (2007) of historical trends from 1851 to 2006 found that the United States is affected by a Category 4 or stronger hurricane (based on the Saffir-Simpson scale, in which Category 4 corresponds to wind speeds over 130 mph (113 kts) and central pressure below 945 mb) approximately once every 7 years on average. The applicant stated that this suggests that the frequency of exceptionally strong hurricane landfalls during the last 35 years of the study period (from 1971 to 2006, when there were three storms of Category 4 or stronger at landfall) was less than average.

Based on this information, the applicant concluded that because NOAA Technical Report NWS 23 is based on historical data from 1851 to 1977 and includes the most recent active hurricane

period from 1945 to 1970, it is reasonable to assume that the PMH parameters derived from it are sufficiently conservative even in the consideration of future climate variability.

Staff's Technical Evaluation

The staff reviewed the basis for the applicant's conclusion that NOAA Technical Report NWS 23 is sufficiently conservative to bound the magnitude of the PMH, and found it to be reasonable. Although theoretical analyses (such as Bender et al., 2010) have projected an increase in the frequency of intense hurricanes due to global warming, they do not appear to project an increase in the intensity of the most severe individual storms.

The staff reviewed the applicant's application of NOAA Technical Report NWS 23 and concluded that it is acceptable.

The staff observed that the central pressure at landfall of the recommended PMH is lower than that for any storm included in the U.S. historical record documented by Blake et al. (2007), and the wind speed is higher than for any storm in the record. These observations are consistent with a finding that the PMH parameters are conservative.

2.4.5.4.2 Historical Hurricane Events and Storm Surges

The record of historical hurricane events and storm surges affecting the site, which is adjacent to the Biscayne Bay shoreline and approximately 8 mi west of the Elliott Key Barrier Island, helps to inform the analysis of PMSS.

Information Submitted by Applicant

The applicant reviewed the historical record of hurricanes that caused sustained wind damage to the Florida coast (including hurricanes that did not make landfall) between 1851 and 2006. The Labor Day hurricane of August/September 1935 (Category 5 on the Saffir-Simpson scale) was the most intense hurricane to affect the Florida coast during the period of record. With a central pressure of 892 mb (26.35 in.), this storm had the lowest central pressure at landfall for any hurricane to strike the U.S. coast during the period of record. It made landfall on the islands of Islamorada in the upper Florida Keys (roughly 40 mi south of the Turkey Point Units 6 and 7 site).

The most severe recent hurricane to make landfall near Units 6 and 7 was Hurricane Andrew in August 1992. Hurricane Andrew made landfall as a Category 5 hurricane (NOAA, 1993 and 2005) approximately 8 mi north of the plant area, at Fender Point, FL. At landfall, the hurricane had a central pressure of 922 mb (27.23 in.) and a maximum sustained wind speed (1-minute average, 33-ft-high) of 145 kts (167 mph). The applicant stated that, based on its central pressure, it is the fourth most intense hurricane to make landfall in the United States in the period of the historical record.

Observed high water elevations in Biscayne Bay associated with Hurricane Andrew storm surge are mapped in Figure 2.4.5-1 (NOAA, 1993 and 2005). The highest observed water level resulting from the combined effects of Hurricane Andrew storm surge and astronomical tide was 16.9 ft NGVD 29 (15.3 ft NAVD 88), on the western shoreline near the center of Biscayne Bay. In northern Biscayne Bay, high water levels were 4 to 6 ft NGVD 29, which is approximately

2.4 to 4.4 ft NAVD 88. In southern Biscayne Bay, the surge elevation ranged from 4 to 5 ft NGVD 29 (2.4 to 3.4 ft NAVD 88).

Staff's Technical Evaluation

The staff reviewed the applicant's information on the historical hurricane record and compared it with published sources cited by the applicant. The staff accepted this information as valid and appropriate for consideration in evaluating PMSS at the Turkey Point Units 6 and 7 sites.

2.4.5.4.3 Methodology for Storm Surge Analysis

Information Submitted by Applicant

The applicant selected the NOAA computer model "Sea, Lake, and Overland Surges from Hurricanes" (SLOSH) for simulation of the PMSS elevation from the PMH at Units 6 and 7 (Jelesnianski et al., 1992). SLOSH was developed by the NWS to forecast real-time hurricane storm surge levels, including inland routing of water levels. SLOSH is a depth-averaged two-dimensional finite difference model on curvilinear polar, elliptical, or hyperbolic grid schemes. Modification of storm surges due to the overtopping of barriers (including levees, dunes, and spoil banks), the flow through channels and floodplains, and barrier cuts/breaches are included in the model. The effects of local bathymetry and hydrography are also included in the SLOSH simulation (Jelesnianski et al., 1992). The developer of the SLOSH model conducted verification and validation testing of the SLOSH computer code.

The applicant used the PMH parameters (\bar{p} , radius of maximum wind, forward speed, track direction) listed in Table 02.04.05.2-1 to define the physical attributes of the PMH in the model. The applicant ran model simulations with various combinations of the input PMH parameters to obtain the maximum storm surge elevation.

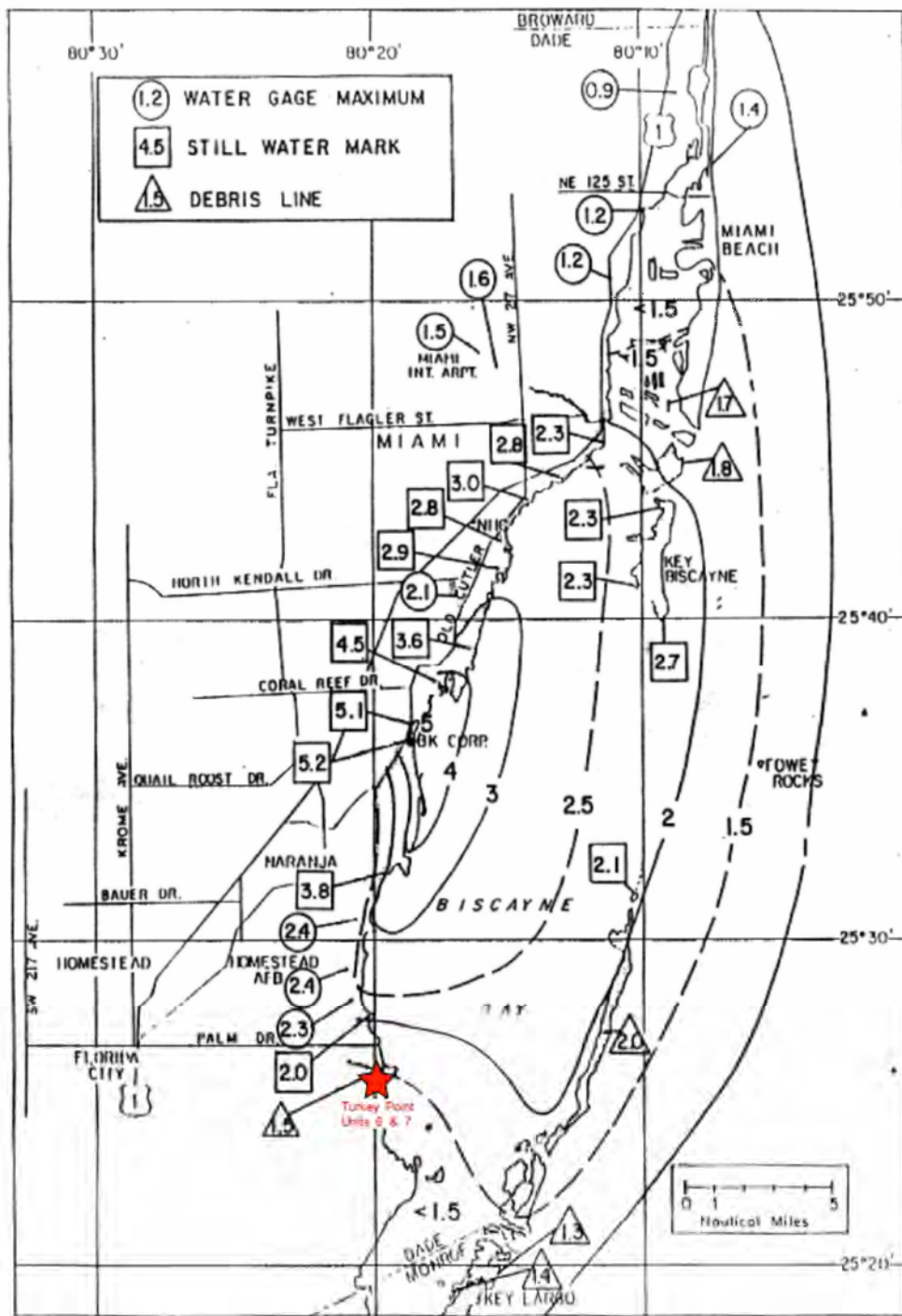


Figure 2.4.5-1 Observed high water elevations around Biscayne Bay during Hurricane Andrew

(Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.4.5-203, based on NOAA, 1993 and 2005 <http://www.nhc.noaa.gov/prelims/1992andfig7.gif>). Labeled in meters above 1929 mean sea level (1 m = 3.28 ft).

In applying SLOSH, the applicant separately estimated the antecedent water level, as discussed below in Subsection 02.04.05.4.4, and used that estimated water level as the initial water level condition in the SLOSH model simulation.

Staff's Technical Evaluation

In evaluating the sufficiency of the methodology for analysis of storm surge, the staff reviewed the model documentation for the SLOSH model, the Section 02.04.05 of the Turkey Point Units 6 and 7 COL FSAR, the responses to relevant RAIs and published studies of modeling of hurricane storm surge.

Advances in computing technology since the development of SLOSH have led to development of more sophisticated modeling techniques for storm surge prediction. Among the capabilities provided by newer modeling tools are three-dimensional simulation, larger domain sizes, and finer discretization (Massey et al., 2007). Researchers who have compared different modeling approaches identify several advantages from the use of more sophisticated codes. For example, Blain et al. (1994) found that domain size influenced hurricane storm surge modeling results for the Gulf of Mexico. They modeled one actual storm at three scales, and found that modeling of a domain size similar to the domain sizes used in implementing SLOSH resulted in lower and less accurate estimates of peak storm surge than modeling at the scale of the entire Gulf of Mexico or the entire east coast of North America. They attributed the difference in results to the smaller-scale domain's inability to represent oscillatory behavior due to resonance within the semi-enclosed Gulf of Mexico basin, the boundaries of which lay outside the model domain. Weisberg and Zheng (2008) used two- and three-dimensional models to simulate the potential impact on the Tampa Bay, FL, area if Hurricane Ivan (September 2004) had made landfall there. They found that the 2-D model produced lower estimates than the 3-D model for the height of the storm surge as it moved up an inlet. They concluded that the 2-D model underestimated storm surge due to its inability to account accurately for bottom stresses.

Some studies of the accuracy of SLOSH predictions, including the applicant's validation run for Hurricane Carla, have found relatively large errors in predicting surge for storms striking various parts of the U.S. Gulf Coast, leading in some instances (e.g., Federal Emergency Management Agency, USACE and NOAA, 2005) to a recommendation that finer modeling grids are needed, together with updated bathymetric and topographic data.

The staff's review considered these findings, but did not identify any reason to reject SLOSH as an appropriately conservative tool for use in predicting PMSS at the Turkey Point Units 6 and 7 site on the shore of Biscayne Bay. The site does not have the characteristics that these studies identified as sources of error in SLOSH and similar models. The influence of domain size on modeling results that has been identified in the Gulf of Mexico and attributed to boundary-condition constraints is not a reason to reject the model for use at the Turkey Point Units 6 and 7 site because the site location faces the Atlantic Ocean, where it is not subject to the types of boundary-condition constraints that make larger-scale modeling desirable for Gulf Coast locations. Additionally, the model applications where researchers have identified a need for three-dimensional models, or for finer grid resolutions than are available in SLOSH are locations, where complex coastal geometry and topography are identified as important determinants of surge behavior. The coastal geometry of Biscayne Bay and the Florida coast near the Turkey Point Units 6 and 7 site is simple by comparison, and is further simplified in the case of an exceptionally large storm event (such as the PMH) that would overtop Elliott Key. Additionally, the staff noted that good agreement has been achieved in using the SLOSH

Biscayne Bay Model to simulate the storm surge from Hurricane Andrew. This increases confidence in the SLOSH implementation for Biscayne Bay.

Furthermore, the staff noted that the applicant accounted for the uncertainty of the SLOSH model simulations in determining the maximum storm surge level. That is, the estimated maximum surge level was adjusted conservatively by adding about 20 percent of the estimated surge level for the uncertainty of its SLOSH simulations as described in SER Subsection 2.4.5.4.5. The staff determined that this adjustment is sufficient to compensate for any effects of small SLOSH model domain, 3-D wave propagation, and the resonance of wind and wave.

Based on this review, the staff determined that the applicant's choice of methodology is appropriate for the analysis of PMSS at the Turkey Point Units 6 and 7 site.

2.4.5.4.4 Antecedent Water Level

To help ensure that modeling of PMSS does not underestimate storm surge elevation, it is necessary to consider the potential effects of tides, sea-level anomalies, and future sea-level changes on storm surge. These factors are combined in defining the antecedent water level. The extreme level of conservatism used in the analyses is included in the following discussion.

Information Submitted by Applicant

The applicant used guidance in RG 1.59 to determine the PMSS antecedent water level, following two different approaches described in the guidance.

The applicant notes that RG 1.59 states that the 10 percent exceedance high spring tide including initial rise should be used to represent the PMSS antecedent water level. The 10 percent exceedance high spring tide is the high tide level that is equaled or exceeded by 10 percent of the maximum monthly tides over a continuous 21-year period. For locations where the 10-percent exceedance high spring tide can be estimated from 21 years or more of observed tide data, RG 1.59 indicates this value can be used for antecedent water level without incorporating a separate estimate for initial rise (or sea-level anomaly).

The applicant identified three NOAA tide gauging stations in the area that have long-term tide-measurement records: Virginia Key (station number 8723214), Vaca Key (8723970), and Key West (8724580). The applicant reports that only the station at Key West has data records longer than a 21-year period that can be used to estimate the 10-percent exceedance high spring tide, consistent with the definition in RG 1.59. The estimated 10-percent exceedance high spring tide at Key West is 0.97 ft NAVD 88, based on 38 years of record. Closer to the Turkey Point Units 6 and 7 site, at the Virginia Key station (located north-northeast of the site), the corresponding value is 1.43 ft NAVD 88, based on 15 years of record.

The RG 1.59 also provides estimates of 10-percent exceedance high spring tide and initial rise (or sea-level anomaly) at the Miami Harbor Entrance on the Atlantic Ocean, which is located close to the NOAA tide gage station at Virginia Key. The 10 percent exceedance high spring tide and the initial rise at the Miami Harbor Entrance are given as 3.6 ft above mean low water and 0.9 ft, respectively. Using these values, the applicant determined that the combined height of the 10 percent exceedance high spring tide and initial rise is $3.6 \text{ ft} + 0.9 \text{ ft} = 4.5 \text{ ft}$ above mean low water. The applicant stated that mean low water at Virginia Key is at -1.9 ft NAVD 88, so the antecedent water level at the Miami Harbor Entrance based on this approach is approximately 2.6 ft NAVD 88. The applicant used this value in its PMSS determinations. The

applicant stated that this is the highest, and thus most conservative, of the values determined by the alternative approaches described in RG 1.59.

In addition to the 10 percent exceedance high spring tide and initial rise, the applicant used the long-term trend in tide gage measurements to estimate the expected sea-level rise over the design life of the plant. The applicant identified the Miami Beach, FL, (8723170) station as the NOAA station nearest to Units 6 and 7 where long-term trend in sea-level rise is available. This station, which is located close to the Virginia Key station, is no longer active. The applicant cites a NOAA analysis of data from 1931 to 1981 that indicates that the long-term rate of sea-level rise at Miami Beach is 0.78 ft per century (NOAA, *Sea Levels Online*). To account for sea-level rise over the life of the plant, the applicant added a nominal long-term sea-level adjustment of 1 ft to the estimate of 10-percent high tide level and initial rise to arrive at an antecedent water level of 3.6 ft NAVD 88 (2.6 ft NAVD 88 + 1 ft).

Staff's Technical Evaluation

The staff reviewed the applicant's basis for determining the antecedent water level, and accepted the use of RG 1.59 values for 10 percent exceedance high tide and initial rise. The staff notes that the combined value of 4.5 ft above mean low water (2.6 ft NAVD 88) is higher than the highest value (1.43 ft NAVD 88) derived from available records, supporting the view that it is appropriately conservative.

The staff had questions about the applicant's analysis of long-term sea-level rise, which is based on a linear extrapolation of historical sea-level changes measured at Miami Beach, FL. Walton (2007) analyzed historical sea-level records for the State of Florida and found that a nonlinear model provided a better fit for the data, including some acceleration in sea-level rise. Using a second-order trend analysis and treating 2006 as the base year, Walton forecast sea-level rise through 2080 for five Florida coastal sites where long-term historical water level records exist. Predicted increases range from 0.82 ft (0.25 m) at Fernandina (in the northeastern corner of the State) to 1.15 ft (0.35 m) at St. Petersburg on the Gulf Coast. At Cedar Key, the location nearest to the Turkey Point Units 6 and 7 site, the forecast sea-level rise was 0.89 ft (0.27 m). All of these forecast values exceed the applicant's estimate of a sea-level rise of 0.78 ft in a century. Walton's predictions are generally consistent with average global sea-level increases of 0.6 to 1.9 ft (0.18 to 0.49 m) by 2100 that were projected by working group I of the Intergovernmental Panel on Climate Change in its 2007 report on the physical science basis (National Park Service, 2009), but some more recent studies suggest that these values may underestimate sea-level rise resulting from climate change (National Park Service, 2009). For example, the National Park Service (2009) cites a study that projected a global sea-level rise of 1.6 to 4.6 ft (0.5 to 1.4 m) between 1990 and 2100.

With this background, staff issued RAI 02.04.05-3 asking the applicant to provide analysis of the effect of a nonlinear model of the future rate of sea-level rise on PMF water levels at Units 6 and 7 resulting from PMH-related storm surge. In a March 22, 2011, response to RAI 02.04.05-3 (ADAMS Accession No. ML110840025), the applicant provided additional analysis of historical sea-level changes at Miami Beach, FL, including nonlinear modeling approaches, and provided analysis of the effect of a nonlinear model of the future rate of sea-level rise on PMF water levels at the Turkey Point Units 6 and 7 resulting from PMH-related storm surge. The applicant's analysis showed that a nonlinear analysis of Miami Beach water levels does not change the conclusion that the results of the linear approach are conservative. However, in reviewing the analysis, the staff found indications of shortcomings in the Miami Beach data set. The most recent measurements at Miami Beach were 30 years old (from 1981), so the data set

may not represent recent trends, and there are gaps in the record from earlier years. A data set exists for Key West, FL, that covers a longer period, continuing to the present time, and does not have gaps. In the applicant's analyses of the two data sets, R-squared values for both linear and nonlinear trend analyses of the Miami Beach data were much lower than those for trend analyses for Key West data (values of 0.32 to 0.35 for Miami Beach data (versus values of 0.45 and 0.46 for Key West data), which indicated a better fit for the Key West data. Also, the applicant's attempt to fit a second-order trend to the Miami Beach data counterintuitively predicts a large drop in sea level, suggesting problems with the data set. The applicant's linear regression analysis of the Miami Beach and Key West data sets did, however, find a close correlation between sea-level measurements at the two locations (R-squared of 0.85). To provide assurance that there is a technically valid basis for analysis of future sea-level rise, the staff issued RAI 5860, Question 02.04.05-05:

Provide sufficient reasoning and analysis to demonstrate that reliance on the Miami Beach sea-level data is a valid and sufficient basis for predicting potential future sea-level rise, when a longer and more recent data set for the region is available from Key West.

In a November 4, 2011, response to RAI 5860, Question 02.04.05-5 (ADAMS Accession No. ML11312A049), the applicant provided comparisons of several linear and non-linear trend analyses of sea-level data for both Miami Beach and Key West. The applicant's analyses show that no alternative analytical approach provides a result that is more conservative than the sea-level rise of 1.0 ft that the licensee assumed based on the determination from linear trend analysis of the Miami Beach data. Staff noted that the applicant's analytical approach is consistent with the recommendations of NUREG/CR-7046 (NRC 2011), which states that long-term sea-level rise for the expected life of the nuclear power plant should be derived from the trend in site or regional tide gage station data. Thus, the staff considers RAI 02.04.05-3 and RAI 02.04.05-5 resolved.

2.4.5.4.5 Analysis of Probable Maximum Storm Surge

Information Submitted by Applicant

The applicant used the NOAA SLOSH model to simulate PMSS. The model package used was the version obtained from NWS as of November 30, 2006. The applicant determined that the site of Turkey Points Units 6 and 7 is within the region of the SLOSH Biscayne Bay basin domain, which is simulated in SLOSH with a two-dimensional curvilinear hyperbolic grid, as illustrated in Figure 02.04.05-2. The applicant stated that the center of Units 6 and 7 (25.425 ° N, 80.333 ° W) is located in the SLOSH model grid cell (63, 40). Basin bathymetry data are included in the model and are referenced to NGVD 29. Modeling results were processed using Version 1.40 of the NOAA SLOSH Display Program (SLOSH, 2006). Output referenced to NGVD 29 was converted to a NAVD 88 basis using the -1.6 ft conversion determined for Virginia Key.

The applicant performed model simulations for different combinations of the PMH parameters given in Table 02.04.05.2-1 to obtain the maximum surge water level at Units 6 and 7. A total of 53 SLOSH model runs were performed to investigate the effects on the storm surge elevation using different combinations of PMH forward speed, size, direction, and track distance from Units 6 and 7. The applicant modeled two steady-state PMH forward speeds (the lower and upper bounds), three PMH radiuses of maximum wind (the mean, the lower bound, and upper bound), five PMH directions, and seven track distances. The five hurricane directions modeled

were 225, 247.5, 258.75, 270, and 315°, measured in a clockwise direction from the north. Storm tracks were modeled at distances of 0, 5.75, 11.5, 17.25, 23, 34.5, and 46 mi in a southerly direction from Turkey Point Units 6 and 7. All simulations were based on the PMH pressure differential (Δp) of 4.0 in of mercury (135.5 mb) given in Table 02.04.05.2-1 and used an antecedent water level of 4.2 ft NGVD 29 (this value includes the 10 percent exceedance high spring tide and initial rise, but not long-term sea-level rise) as an initial condition.

Figure 02.04.05-3 shows storm surge elevations at the Turkey Point Units 6 and 7 site that the applicant determined for different combinations of PMH forward speed and radius of maximum wind at three hurricane directions, 225, 270, and 315 ° from the north. From these simulation results, the applicant observed that:

- Higher PMH forward speed results in higher surge elevations.
- At the upper bound PMH forward speed, surge elevation increases with increasing storm radius.
- At the lower bound forward speed, the largest (upper bound) hurricane radius does not produce the highest surge elevation.
- Storm direction results in the largest differences in surge elevation at the upper bound PMH radius.

Figure 02.04.05-4 shows the results of the applicant's SLOSH analysis of the effect on surge elevation of different PMH directions and track distances for a storm with a RMW of 20 nautical mi. From this analysis, the applicant determined that the highest surge elevation occurs when the PMH direction is 258.75 ° from the north and the PMH track is at a distance approximately 0.75 times the PMH radius of maximum wind (i.e., 15 nautical mi) south from Turkey Point Units 6 and 7. Based on the results of the SLOSH model sensitivity runs, the applicant concluded that the PMSS would be generated by a PMH with the upper bound forward speed (20 kts or 23 mph) and size (radius of maximum wind of 20 nautical mi or 23 mi), a track direction of 258.75 ° from the north, and a track distance of approximately 15 nautical mi (17.25 mi) south of Units 6 and 7.

The applicant also investigated the effect of increasing the PMH size (radius of maximum wind) above the upper bound specified in NWS 23 for a PMH approaching at a direction of 270 ° from the north. In this analysis, the hurricane track was assumed to be located at a distance from Turkey Point Units 6 and 7 equal to the PMH radius of maximum wind. The analysis for the effect of radius of maximum winds considered values of 4 (the lower end of the range indicated in NWS 23), 12, 20 (the upper end of the range in NWS 23), 25, 30, 40, and 100 nautical mi. Radius of maximum wind values of 25, 30, and 40 nautical mi all resulted in storm surge elevations higher than were determined for a radius of 20 nautical mi. The highest storm surge elevation found by the analysis resulted from a radius of 30 nautical mi (34.5 mi), at which value the predicted surge elevation at Turkey Point Units 6 and 7 was 19.4 ft (NAVD 29), approximately 2.6 percent (3.5 percent, as a percentage of the surge height) higher than the 18.9 ft surge predicted for the same conditions but with a radius of maximum wind of 20 nautical mi. The applicant did not determine whether other values between 25 and 35 nautical mi could result in a higher estimated storm surge elevation than that calculated for a value of 30 nautical mi.

The applicant used SLOSH to simulate storm surge for four combinations of PMH characteristics using the full estimate of antecedent water level, 5.2 ft NAVD 29. With an antecedent water level of 5.2 ft NAVD 29, three of the four modeled combinations (storm directions of 247.5, 258.75, and 270 ° from north, all with RMW of 20 nautical mi, track distance of 15 nautical mi, and PMH forward speed of 20 knots) resulted in a storm surge of 19.8 ft NAVD 29.

Based on this analysis, the applicant concluded that the highest surge elevation at Turkey Point Units 6 and 7 is 19.8 ft NGVD 29 (18.2 ft NAVD 88) and is obtained from the SLOSH model simulation using PMH parameters of Δp of 4 in mercury, forward speed of 20 knots, radius of maximum wind of 20 nautical mi, direction of 258.75 ° from the north, and track distance approximately 15 nautical mi south of Turkey Point Units 6 and 7, with antecedent water level of 5.2 ft NGVD 29 (3.6 ft NAVD 88). Figure 02.04.05-5 is a map display of SLOSH output for this set of conditions, including the storm track and maximum surge elevations over the model domain. The highest surge elevation predicted in this simulation occurs at a location northwest of the Turkey Point Units 6 and 7 site.

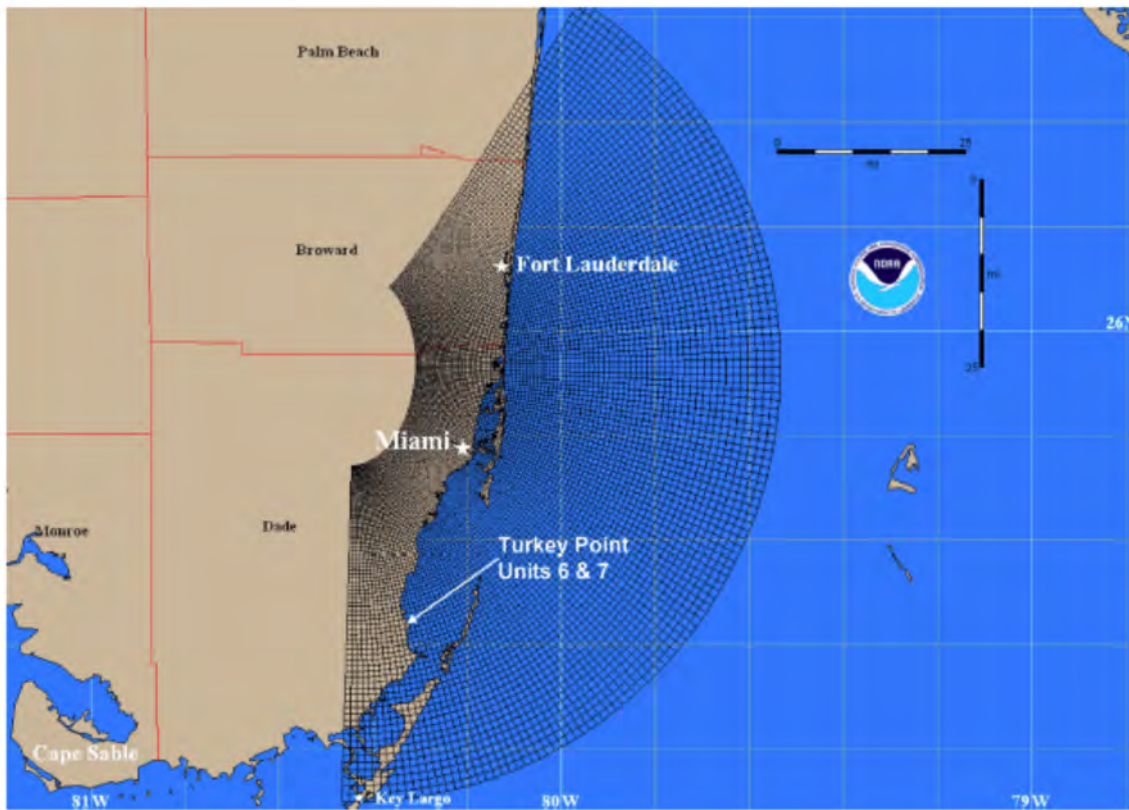


Figure 02.04.05-2 Biscayne Bay model grid used in applicant's implementation of SLOSH

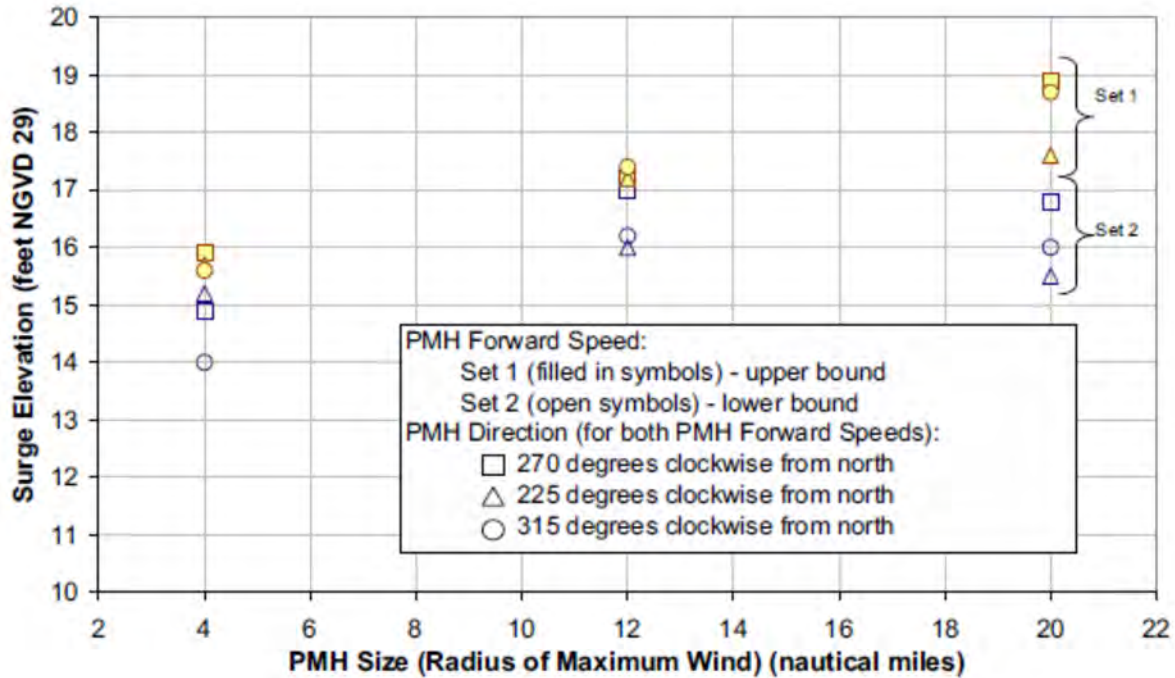
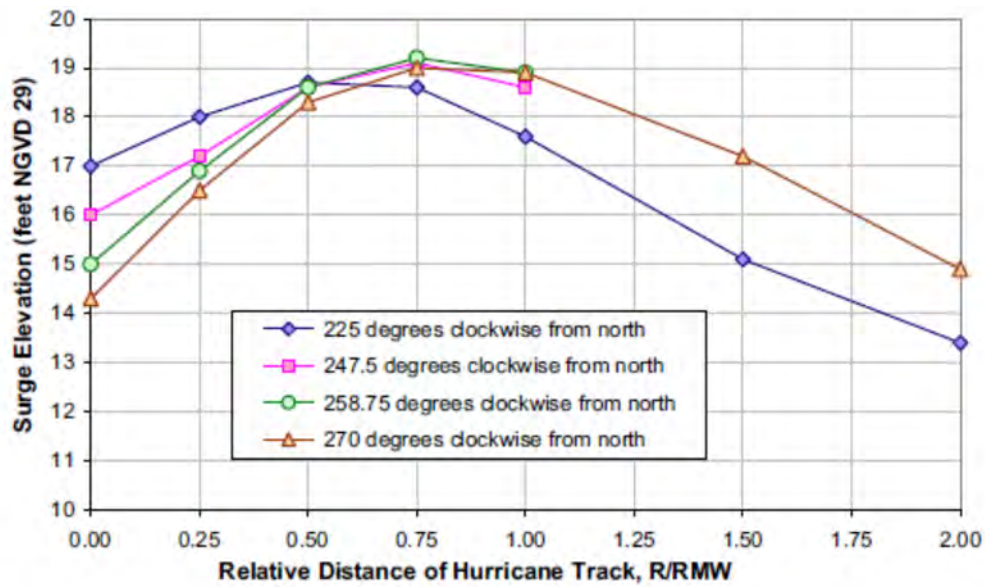
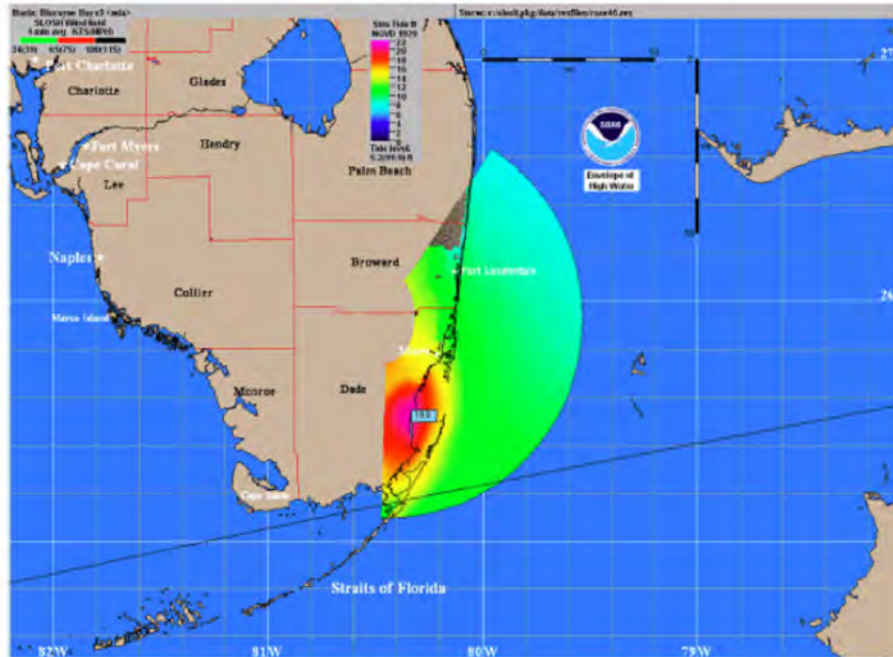


Figure 02.04.05-3 Surge elevations simulated for different combinations of PMH parameters (Source: Turkey Point Units 6 and 7 COL FSAR Figure 02.04.05-205)



Note: R is the distance of the PMH track from Units 6 & 7.
 RMW is the radius of maximum wind, which is 20 nautical miles or 23 miles.

Figure 02.04.05-4 Applicant's analysis of surge elevation sensitivity to PMH direction and track distance. (Source: Turkey Point Units 6 and 7 COL FSAR Figure 02.04.05-206)



Note: Number in the flag indicates the maximum surge elevation (in NGVD 29) at Units 6 & 7.

Figure 02.04.05-5 Applicant's SLOSH output for the parameter combination producing the PMSS at Units 6 and 7. The black line is the storm track at 258.75 ° from north. (Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.4.5-209)

To evaluate the uncertainty in SLOSH model predictions, the applicant reviewed published studies in which SLOSH was used to model actual storms and model predictions were compared with observed hurricane surge levels. Jarvinen and Lawrence (1985; NOAA, 1982) evaluated the error in SLOSH predictions for ten storms in eight SLOSH model basins. Based on a comparison of the SLOSH simulated surge heights against 523 observations, 90 percent of which were in the Gulf of Mexico, they reported a mean error of -0.09 m (-0.3 ft) and a range of errors from -2.16 m (-7.1 ft) to 2.68 m (8.8 ft) with a standard deviation of 0.61 m (2 ft). In that study, negative values for the error mean that SLOSH underpredicted the surge height. NOAA Technical Report NWS 48 (Jelesnianski et al., 1992) compared SLOSH model results with 570 observations for well-documented hurricanes in nine SLOSH basins. The applicant cited the report's finding that model results were "generally" within ± 20 percent for "significant surge heights." To illustrate that result, the applicant modified a graph from the report by adding a line to indicate a +20 percent margin above the "perfect forecast" line (Figure 02.04.05-6).

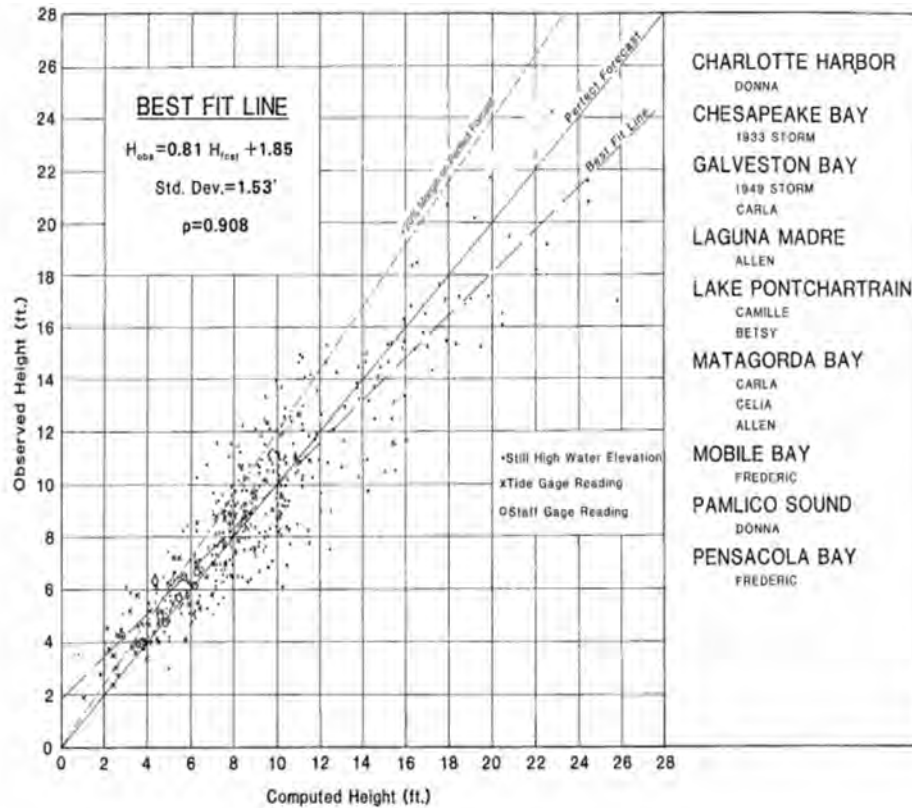


Figure 02.04.05-6 Comparison of SLOSH predictions with observed storm surge elevations (Source: Turkey Point Units 6 and 7 COL FSAR Figure 02.04.05-211, modified from Jelesnianski et. al, 1992)

The evaluation in NWS 48 (Jelesnianski et. al, 1992) considered only the storm surge height component of SLOSH predictions, not including contributions from antecedent water level. To apply the 20 percent model uncertainty indicated by NOAA NWS 48 to the modeling results for Turkey Point Units 6 and 7, the applicant determined the storm surge height component of the modeling results by subtracting the antecedent water level of 5.2 ft NGVD 29 (3.6 ft NAVD 88) from the model-simulated maximum surge level of 19.8 ft NGVD 29 (18.2 ft D 88), arriving at a modeled surge height of 14.6 ft. To account for model uncertainties, the applicant increased this value by 20 percent to arrive at an adjusted surge height of 17.5 feet. By adding the antecedent water level (5.2 ft NGVD 29 or 3.6 ft NAVD 88) to this adjusted maximum surge height, the applicant determined the PMSS elevation at Turkey Point Units 6 and 7 to be approximately 22.7 ft NGVD 29 or 21.1 ft NAVD 88.

The applicant concluded that no additional adjustment was needed to account for the greater surge elevation predicted by SLOSH when the radius of maximum wind was increased from 20 to 30 nautical mi. The applicant reasoned that the 20 percent adjustment to surge height to account for model uncertainties is much greater than the increase in surge elevation (approximately 2.6 percent of total surge elevation and 3.5 percent of the surge height component) calculated for the larger radius of maximum wind, so no additional adjustment in surge height is necessary to account for the potential effect of a larger radius (i.e., the 20 percent adjustment is sufficient to account for all sources of uncertainty).

The applicant compared its SLOSH model results with estimates of PMSS elevation provided in RG 1.59, which provides estimates of the PMSS elevation along the U.S. Gulf and Atlantic Coasts. The applicant stated that, from RG 1.59, the only location close to Units 6 and 7 where PMSS water level is available is Miami, FL, (25.787 ° N, 80.13 ° W). For this location RG 1.59 lists a wind set-up of 2.51 ft, a pressure set-up of 3.9 ft, an initial rise of 0.9 ft, and a 10 percent exceedance high spring tide of 3.6 ft above mean low water. These four components combine to give a total storm surge elevation of 10.91 ft above mean low water, which the applicant equates to approximately 9 feet NAVD 88 or 10.6 ft NGVD 29. The applicant stated that its implementation of the SLOSH Biscayne Bay basin model predicts a higher surge elevation of 11.2 ft NGVD 29, for Miami (represented in the model by grid cell [40, 88]), without accounting for long-term sea-level rise or adjusting for uncertainty in SLOSH predictions. Based on this comparison, the applicant concluded that the PMSS elevation obtained from the SLOSH model is more conservative than that presented in RG 1.59.

Staff's Technical Evaluation

Applicant SLOSH Simulations

In evaluating the applicant's analysis of PMSS, the staff reviewed the applicant's report of its application of the SLOSH model to predict storm surge from the PMH, the model documentation for the SLOSH model, the applicant's report of the verification and validation of the SLOSH model, and published studies of modeling of hurricane storm surge. The staff also performed limited confirmatory analysis using SLOSH.

The staff accepts the applicant's analysis as an appropriate implementation of the model. Additionally, the staff accepts the analysis as having adequately explored the sensitivity of model predictions to most of the factors potentially affecting storm surge elevation. The staff notes, however, that the applicant's analysis of the effect of PMH forward speed on storm surge considered only two values for PMH forward speed, 6 knots and 20 kts, the upper and lower end of the range specified in NWS 23. The analysis found that the higher value resulted in higher storm surge elevations. Research has shown, however, that storm surge height is not always correlated with storm forward speed; somewhat slower storms sometimes can result in higher surge elevations (Peng et al., 2004). The applicant's analysis does not demonstrate that a 20-kt forward speed is bounding for PMH storm surge at the Turkey Point Units 6 and 7 site, that is, that other values of forward speed between 6 kts and 20 kts would not result in higher storm surge at the Turkey Point Units 6 and 7 site. To resolve this omission, the staff issued RAI 5860, Question 02.04.05-4, which asked the applicant to provide sufficient reasoning and analysis to demonstrate that the effect of forward speed on storm surge elevation is bounded at Turkey Point Units 6 and 7 site.

In a November 16, 2011, response to RAI 5860, Question 02.04.05-4 (ADAMS Accession No. ML11321A3317), the applicant performed additional simulations with forward speeds of 6 knots, 13 knots, 16.5 knots, and 18.25 knots. The results show that the surge elevation at the site increases with increasing forward speed within the range specified in NWS 23 and is bounded by the forward speed of 20 knots. Thus, the staff considers RAI 02.04.05-4 resolved.

In its evaluation of the applicant's analysis of uncertainty and the sufficiency of the 20 percent increase in surge height that the applicant used to account for model uncertainty, the staff reviewed the applicant's SLOSH validation studies, the published information cited by the applicant, and evaluations by FEMA, USACE, and NOAA (2005) of the SLOSH model's accuracy in simulating surge levels for four hurricanes that occurred in 2004 (these are more

recent than the data set included in NWS 48). The staff observed that, for SLOSH estimates of storm surge less than about 14 ft NGVD 29, a significant number of observed surge levels exceed the SLOSH estimate by more than 20 percent, but for larger predicted surge elevations, no surge observations exceed the prediction by more than 20 percent. The staff accepts the applicant's determination that a 20 percent factor is sufficient to account for empirically determined uncertainty in SLOSH output.

The staff notes that the applicant had not provided clear technical justification, however, for the conclusion that the adjustment to storm surge height made to account for empirical uncertainty is sufficient to account for all uncertainty in PMH parameters. Of specific concern is the deterministically estimated effect on storm surge of a radius of maximum wind larger than 20 nautical mi. Although NWS 23 identified 20 nautical mi as the upper bound value of radius of maximum winds for a PMH, several major hurricanes striking the continental United States or the Caribbean in recent years had maximum winds at larger radial distances than 20 nautical mi. As summarized by Masters (undated), Hurricane Katrina in 2005 had a radius of maximum winds of about 30 mi (about 26 nautical mi) and Hurricane Ike of 2008 had a radius of 40 to 50 mi (about 35 to 43 nautical mi) one day before it made landfall. In 1995, Hurricane Luis in the Caribbean in 1995 had an eyewall radius of 60 km (32 nautical mi) and Hurricane Opal had an asymmetrical wind field as it approached its U.S. landfall, with maximum winds at 20 km (11 nautical mi) and a secondary maximum at a 60 km (32 nautical mi) radial distance (Powell and Houston, 1998). As discussed above, the highest storm surge elevation that the applicant found in its sensitivity analysis for the Turkey Point Units 6 and 7 site resulted from a radius of 30 nautical mi, at which value the predicted surge elevation at Units 6 and 7 was approximately 2.6 percent (3.5 percent, as a percentage of the surge height) higher than predicted when the radius of maximum wind was specified as 20 nautical mi. To address this issue, the staff issued RAI 02.04.05-6:

Provide technical justification for the conclusion that the adjustment to storm surge height made to account for uncertainty in storm surge estimation is sufficient to account for the deterministically estimated effect on storm surge of a radius of maximum wind larger than 20 nautical mi.

In an October 21, 2011, response to RAI 02.04.05-6 (ADAMS Accession No. ML11298A089), the applicant described surge simulations using radius of maximum wind values of 25, 30, 40 and 100 nautical mi. The applicant stated that the highest storm surge elevation found by the analysis resulted from a radius of maximum winds of 30 nautical mi (3.5 percent of the surge height at a radius of maximum winds of 20 nautical mi). Furthermore, the applicant noted that the analysis arbitrarily assumed a constant value of Δp , but stated that when considering a larger radius of maximum wind, Δp should not be held constant (that is, a larger-radius hurricane would be associated with a lower pressure differential). In addition, the staff noted that the applicant's PMSS of 24.8 ft (using the 20 nautical mile radius of maximum winds) is within 0.1 ft of comparable USACE ADCIRC storms using a 30 nautical mile radius of maximum winds (exceedance probability 10^{-7}) (details provided below). Thus, the staff considers RAI 02.04.05-6 resolved.

NRC and Army Corps of Engineers ADCIRC Simulations

In 2009, in order to specify acceptable methods for estimating design-basis floods that reflect changes in the state of the art flood estimation since 1977, especially for regions susceptible to

severe storm events, the NRC and USACE conducted a project to provide a technical basis for estimating probable maximum floods due to the storm surge from extreme storm events along the southern coast of the United States for consideration in evaluating flood protection for nuclear power plants.

As a result of the damage caused by the 2005 hurricane season (e.g., Hurricane Katrina), USACE created the Interagency Performance Evaluation Task Force (IPET), a distinguished group of government, academic, and private sector scientists and engineers. IPET applied some of the most sophisticated capabilities available in civil engineering to understand what happened during Katrina and why. The IPET purpose was not just to acquire new knowledge, but also to improve engineering practice and policies. In addition, the Congress of the United States authorized the USACE to initiate two important and comprehensive planning efforts to address the impacts caused by the 2005 storms and to plan actions that would make the region more resilient and less susceptible to future risk from such disasters. One of the plans of actions was the Mississippi Coastal Improvements Program (MsCIP), which applied and further developed the technical approach and tools for estimating storm surge flood levels and waves established under IPET. The USACE studies, tools, and approach have all been extensively reviewed. Peer reviews have been conducted by distinguished External Review Panel (ERP) of the American Society of Civil Engineers, and the National Academy of Sciences. In the NRC/USACE project, these tools and approaches were applied to the South Texas Project, Levy County, and Turkey Point new reactor applications for the Estimation of Very-Low Probability Hurricane Storm Surges for Design and Licensing of Nuclear Power Plants in Coastal Areas (NUREG/CR-7134).

The USACE hurricane modeling system used for the Turkey Point storm surge analysis combines various wind models, the WAM offshore and STWAVE nearshore wave models, and the ADCIRC basin- to channel-scale unstructured grid circulation model. The modeling system is well validated and, in addition to being applied for Corps projects, has also been adopted by several FEMA regional offices for flood mapping.

Hurricane storm parameters (synthetic storms) are derived using the Joint Probability Method (JPM), which is extensively used by USACE and other agencies conducting storm hazard analyses (Resio and Irish, 2008; NUREG/CR-7134). For synthetic storms, the TC96 Planetary Boundary Layer (PBL) model (Thompson and Cardone, 1996) is applied to construct snapshots of wind and atmospheric pressure fields every 15 minutes for driving the surge and wave models. Storms are defined by a track and time-varying wind field parameters. For each storm, a unique set of input conditions is defined. The data file includes the track position in space and time, the forward speed and direction, central pressure, pressure scale radius (which is related to the radius to maximum winds), a rotation angle, and a pressure profile peakedness parameter termed the Holland B factor (Holland, 1980). The wind and pressure field is generated and positioned on a fixed longitude/latitude grid system covering the Gulf of Mexico. Based on the location of the storm center, these snapshots describe the temporal and spatial evolution of a hurricane. The final wind and pressure fields resulting from TC96 are targeted on a grid domain. The temporal variation in these fields is typically set to 1800 s (30 min) average wind. All wind-fields are marine-exposure (no effective roughness variations for land/sea changes), and generated at a 10 m elevation. The effect of ground cover on winds as the hurricane makes landfall is accounted for within the ADCIRC storm surge model.

The depth-integrated circulation model ADCIRC (Luettich et al., 1992; Westerink et al., 1994; Luettich and Westerink, 2004) was then run to compute the pressure- and wind-driven surge component. Imposing the wind and atmospheric pressure fields, the ADCIRC model could

replicate tide induced and storm-surge water levels and currents. In parallel with the initial ADCIRC runs, the large-domain, discrete, time-dependent spectral wave model WAM (Komen et al., 1994) was run to calculate directional wave spectra that serve as boundary conditions for the local-domain, near-coast wave model STWAVE (Smith et al., 2001; Smith, 2007). WAM generates the offshore wave field and directional wave spectra. The model solved the action balance equation for the spatial and temporal variation of wave action in frequency and direction over a fixed longitude-latitude geospatial grid. The numerical model STWAVE simulated nearshore wave transformation and generation. Using initial water levels from ADCIRC, winds that included the effects of sheltering due to land boundaries and reduction due to land roughness, and spectral boundary conditions from the large-domain wave model, STWAVE was run to produce wave fields and estimated radiation stress fields. The radiation stress fields were added to the estimated wind stresses, and applied as forcing in the ADCIRC model. ADCIRC estimates the water level across the entire grid at each time step.

Many coastal landscapes are characterized by complex bathymetry and topography. Natural features such as barrier islands, bays, inlets, marshes, lakes and rivers as well as man-made features such as levees, roadways, railways, navigation channels, gates, and seawalls all could influence surge and wave propagation. The surge and waves were not only influenced by the elevation of the landscape features, but also by the land cover, such as vegetation or buildings. The ADCIRC, TC96 PBL, and WAM model domains accurately capture basin-to-basin and shelf-to-basin physics, which is important in estimating high water levels that often occur well in advance of a hurricane's landfall.

The ADCIRC mesh contains over 2.3 million nodes with nodal spacing reaching as low as approximately 40 m in the most highly refined areas. Increased resolution across the coastal floodplain allows features such as inlets, rivers, navigation channels, levee systems and local topography/ bathymetry to be properly represented (Westerink et al., 1994). Levees and roadways are barriers to flood propagation that are generally below the defined grid scale. ADCIRC defines these structures as sub-grid scale parameterized weirs with a specified height (Westerink et al., 2001) within the domain. In addition, wave breaking zones are resolved to ensure that the grid scales of the surge and nearshore wave models are consistent. The nearshore wave forcing function is properly incorporated by adding resolution where significant gradients in the wave radiation stresses exist (IPET 2007; Bunya et al., 2009).

For a detailed, site-specific storm surge analysis, very extreme event storms are used that cover the range well beyond the annual exceedance probability of 10^{-6} (10^{-7} to 10^{-12}) (NRC, 1986). In the staff analysis, the period of record is chosen to be 1940–2009 (70 year) and considered east-to-west moving storms within a latitude-longitude box with boundaries at 77.4° W and 80.4° W longitude and 23.5° N and 27.5° N latitude. The staff analysis further limited the storms to those with central pressures, which are less than 990 mb in this box.

The Maximum Possible Intensity of a hurricane has been postulated as an upper limit for extreme tropical cyclone intensities at least since the late 1970's) (see for example: World Meteorological Organization, 1976 and Mooley, 1980). More recently, Emanuel (1986, 1991) and Holland (1997) formulated theoretical models for estimating maximum tropical cyclone intensity. The central pressures used in the analysis are 880 mb (lowest for the Atlantic) and 870 mb (lowest ever recorded worldwide) with radius of maximum winds 30 to 45 nautical mi. Note that by restricting the storm tracks to the paths shown in Figure 02.04.05-6, the exceedance probabilities could actually be lowered one order of magnitude (e.g., range 10^{-8} to 10^{-13}).

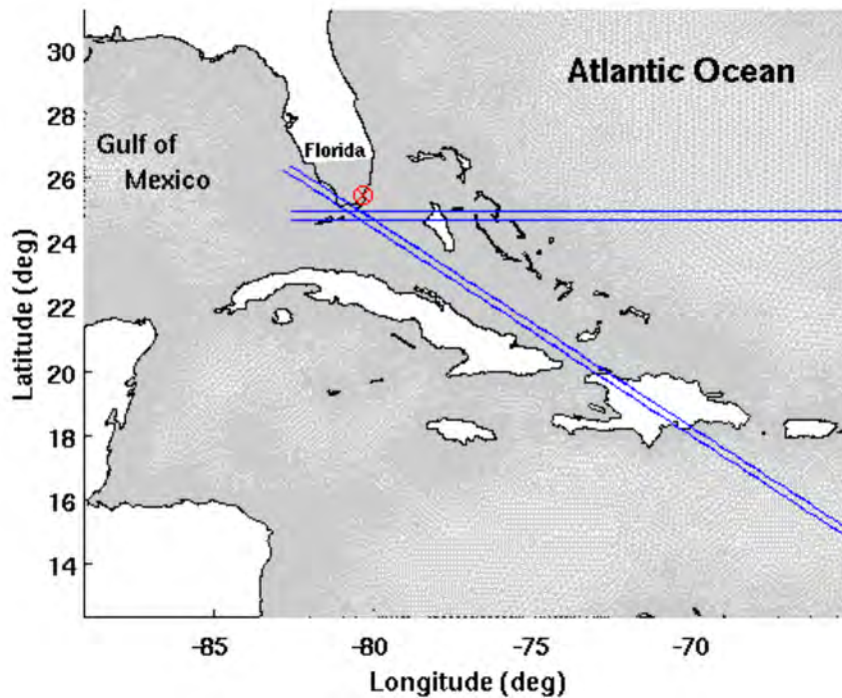


Figure 02.04.05-6 Storm tracks (blue lines) modeled in ADCIRC analysis for the Turkey Point site (shown with a red circle and x) in Florida.

Sea-level rise (1 ft NAVD88), initial rise (0.9 ft Mean Low Water) and the 10 percent exceedance high tide (3.6 ft Mean Low Water) were added to the ADCIRC still water level calculations, which included wind wave and wave setup (STWAVE/WAM). All Mean Low Water (MLW) heights were converted to NAVD88 (MLW = -1.9 ft NAVD88) and simulations were run at mean tide level. No adjustment was made equal to the difference between the 10 percent exceedance high tide and mean tide level, thus adding additional conservatism/margin.

Table 2.4.5.4-2 contains the USACE ADCIRC simulations adjusted for Turkey Point site-specific storm surge characteristics. The site characteristics were calculated in accordance with NRC guidance (RG 1.59 and NUREG-0800). In addition, the ADCIRC results were verified (December 2011 and January 2012) by the U.S. Army Engineer Research and Development Center's (ERDC) Coastal & Hydraulics Laboratory (CHL), which performed the original screening simulations. The PMSS for all 10^{-7} exceedance probability storms are 24.7 ft and below (site grade is 26 ft). Table 02.04.05.4-3 shows FPL SLOSH and comparable USACE ADCIRC simulations for storms having similar meteorological parameters. In summary, there was only a 0.1 ft difference (24.8 ft vs 24.7 ft), between the FPL SLOSH PMSS and the highest USACE ADCIRC PMSS for storms, respectively with a central pressure of 880 mb and probability of recurrence of 10^{-7} . This shows the very conservative nature of the applicant's storm surge analyses.

Table 02.04.05.4-2 USACE Turkey Point ADCIRC PMSS

PMSS (ft)	Surge (ft)	Wind (mph)	P (mb)	Rp (nm)	Vf (mph)	DeltaP (mb)	Exceedance Probability
27.0	20.4	138	870	30	6	141	10 ⁻⁸
26.3	19.7	135	880	45	6	131	10 ⁻¹¹
26.1	19.5	134	870	45	6	141	10 ⁻¹²
25.5	18.9	131	880	45	6	141	10 ⁻¹²
25.5	18.9	138	870	45	13	141	10 ⁻¹²
25.4	18.8	143	870	30	13	131	10 ⁻⁷
24.9	18.3	135	880	45	13	141	10 ⁻¹²
24.9	18.3	127	900	30	6	131	10 ⁻⁷
24.7	18.1	140	880	30	13	131	10 ⁻⁷
23.5	16.9	142	870	45	25	141	10 ⁻¹²
23.2	16.6	137	870	30	6	131	10 ⁻⁷
22.9	16.3	139	880	45	25	141	10 ⁻¹²
22.7	16.1	133	880	30	6	131	10 ⁻⁷
22.7	16.1	148	870	30	25	141	10 ⁻⁸
22.2	15.6	145	880	30	25	131	10 ⁻⁷
22.2	15.6	113	930	30	6	81	N/A
22.2	15.6	140	870	30	13	141	10 ⁻⁸
22.1	15.5	132	870	45	6	141	10 ⁻¹²
21.8	15.2	135	870	45	13	141	10 ⁻¹²
21.7	15.1	129	880	30	6	131	10 ⁻⁷
21.3	14.7	132	880	45	13	131	10 ⁻¹¹
21.3	14.7	137	880	30	13	131	10 ⁻⁷
20.3	13.7	140	870	45	25	141	10 ⁻¹²
20.0	13.4	146	870	30	25	141	10 ⁻⁸
19.5	12.9	137	880	45	25	131	10 ⁻¹¹
19.5	12.9	143	880	30	25	131	10 ⁻⁷
18.6	12.0	93	960	30	6	51	N/A

**Table 02.04.05.3- FPL SLOSH vs USACE Turkey Point ADCIRC PMSS
(880 mb, $R_p=30$ nm, 10^{-7} Exceedance Probability)**

PMSS (ft)	Surge (ft)	Wind (mph)	P (mb)	R_p (nm)	Vf (mph)	DeltaP (mb)	Probability of Recurrence
FPL SLOSH							
24.8	17.5	159	880	30	23	135.5	N/A
USACE ADCIRC							
24.7	18.1	140	880	30	13	131	10^{-7}
22.7	16.1	133	880	30	6	131	10^{-7}
22.2	15.6	145	880	30	25	131	10^{-7}
21.7	15.1	129	880	30	6	131	10^{-7}
21.3	14.7	137	880	30	13	131	10^{-7}
19.5	12.9	143	880	30	25	131	10^{-7}

2.4.5.4.6 Wave Actions

Waves generated by hurricane winds increase water levels above the still-water levels resulting from storm surge, so the effect of wind-driven waves must be considered in determining the PMF elevation resulting from the PMSS.

Information Submitted by Applicant

The applicant investigated the effect of PMH wind field on the PMSS still-water level near Units 6 and 7 in order to estimate the PMH-induced waves, set-up, and run-up.

Hurricane Maximum Wind Speed

SLOSH model results were used to estimate the 1-minute average, 33 ft high wind speed at Units 6 and 7 during the PMH. The maximum wind speed corresponding to the PMH conditions that provide the maximum surge elevation is estimated to be 188.3 mph.

From SLOSH model results, the applicant estimated the maximum 1-minute average, 33-ft high wind speed at Units 6 and 7 as 188.3 mph. Following a procedure given in the Coastal Engineering Manual of USACE (USACE, 2005), the applicant converted this to the sustained 10-minute average, 33-ft-high wind speed. The converted 10-minute average wind speed is approximately 159 mph, which value the applicant used to calculate wind wave activities.

Wave Height, Period, and Run-up

The applicant notes that SLOSH model results indicate that a PMH surge elevation inundates the Elliott Key Barrier Island east of Biscayne Bay. Because the PMH maximum wind approaches from the Atlantic Ocean, the fetch length to produce wind waves during a PMH is very large. The applicant stated that wave heights at the retaining wall surrounding Units 6 and 7 would likely be limited by the shallow water depth, with the breaking wave height representing the limiting wave condition beyond which waveforms cannot sustain. Because the breaking wave

condition would bound the maximum wave height, the applicant did not separately calculate the significant and 1 percent wave heights. Following procedures given in the Coastal Engineering Manual (USACE, 2005), the applicant calculated the breaking wave height and corresponding wave period in front of the retaining wall as approximately 15.4 ft and 5.1 seconds, respectively. To calculate wave run-up above the retaining wall (which would have a top of wall elevation of 21.5 ft NAVD 88 on the eastern side, and therefore could be overtopped by wind waves during a PMH), the applicant treated the ground above the wall as a berm with an equivalent slope based on the grade elevations between the retaining wall to the safety-related facilities. The surf similarity parameter, which defines wave breaking and run-up and depends on approach bottom slope and wave steepness, was calculated using equivalent deep-water wave parameters corresponding to the breaking waves at the retaining wall and the equivalent slope including the berm. By this approach, the applicant estimated the maximum wave run-up at the Turkey Point Units 6 and 7 sites as 3.7 ft.

Maximum Water Surface Elevation due to the PMH

Adding the wave run-up of 3.7 ft to the PMSS still water level of 21.1 ft NAVD 88, the applicant estimated the maximum water level due to a PMH at Units 6 and 7 as 24.8 ft NAVD 88.

Staff's Technical Evaluation

The staff reviewed the applicant's analysis of wind conditions, formation of wind waves, and wave run-up during the PMH event, and accepts the analysis as sufficient to define the maximum wave height during this event.

2.4.5.4.7 Resonance

Information Submitted by Applicant

Turkey Point Units 6 and 7 are adjacent to the west shore of Biscayne Bay approximately 8 mi (13 km) west of the Elliott Key barrier island. The applicant reports that there are no records of seismic seiches within the bay. However, because the bay is a semi-enclosed body of water, seiche oscillation may occur due to atmospheric forcing. The applicant stated that it is likely that such oscillations would occur along the principal axis of the bay in the north-south direction. Assuming that the bay is approximately 25 mi (40 km) long, the natural period of oscillation for the bay is estimated to be approximately 36.8 minutes.

The applicant stated that because storm surges during a PMH event would overtop Elliott Key and other barrier islands, seiche oscillations within the bay would not be expected to coincide with large storm surge events like the PMSS.

In addition, the applicant noted that the natural period of oscillation is much greater than the period of wind-waves and shorter than the period of storm surge waves. Therefore, the applicant concluded that natural oscillations within the bay do not result in a resonance, and flooding of the plant area due to a seiche event in Biscayne Bay is precluded.

Staff's Technical Evaluation

The staff reviewed the applicant's reasoning regarding resonance in Biscayne Bay.

With an elevation of about 3 ft (0.8 m) above sea-level, the Elliott Key barrier island would be overtopped by the model-predicted storm surge from a PMH (Turkey Point Units 6 and 7 COL FSAR Figure 2.4.5-209 indicated a storm surge elevation at Elliott Key of about 15 ft (4.6 m) NGVD 29 in association the PMSS at Turkey Point Units 6 and 7) and inundated beneath more than 10 ft (3 m) of water (similar to the average depth of Biscayne Bay under normal conditions). Under those conditions, the staff finds that the barrier island would no longer function as a physical boundary that could contribute to a within-bay seiche, making it unlikely that such a seiche could add to the elevation of the PMSS from the PMH.

The staff reviewed the applicant's reasoning regarding the potential for natural oscillations within the Biscayne Bay to produce a resonance. The staff finds that the application discusses seismic forcing and acknowledges the possibility of atmospheric forcing as a contributor to seiche oscillation, but it does not discuss the possible role of ocean currents (such as the Florida Current) in contributing to oscillations (see Soloviev et al., 2003, and Davis et al., 2008).

Accordingly, the staff issued RAI 02.04.05-1 asking the applicant to provide sufficient reasoning and analysis to demonstrate that natural oscillations in the Biscayne Bay would not coincide with other phenomena to produce flooding that could adversely affect the safety-related facilities of Turkey Point Units 6 and 7. The RAI asked the applicant to demonstrate that all potential natural causes of oscillation are accounted for, and provide details for any quantitative analyses, calculations, and comparisons. The applicant responded on March 22, 2011, to RAI 02.04.05-1 (ADAMS Accession No. ML110840025).

In the response, the applicant described additional assessments that were conducted to examine other natural phenomena that might generate oscillations with periods close to the natural oscillation periods of the Biscayne Bay. The applicant stated that, in addition to seismic forcing and seiche oscillation induced by a PMSS, Florida Current and sea breeze forcing are the only phenomena identified to be capable of generating high frequency oscillations. The applicant's evaluations concluded that the Florida Current and sea breeze will not produce resonance responses in the Biscayne Bay and will have no safety-related flooding impact on the Turkey Point Units 6 and 7 site. The applicant noted that Florida Current is a major influence on the coastal circulation and current dynamics in the southeast Florida shelf, generating internal wave field and coastal ocean current oscillations with a dominant periodicity of about 10 hours (Refs. 1, 2, and 3). The applicant stated that Soloviev et al. (2003) illustrates that the presence of the Florida Current has no apparent effect on the sea-level and its oscillations near the shore, which still follows the tidal constituents with dominant periods near 12 and 24 hours. Therefore, the applicant concluded that there is no evidence to support a hypothesis that the Florida Current has any impact on the sea-level oscillations near the Turkey Point Units 6 and 7 site, despite its influence on the velocity and density fields. The staff accepts the applicant's assessments and considers RAI 02.04.05-1 resolved.

The applicant estimated the natural period of Biscayne Bay using methodology from Section 11-5-6 of the USACE Coastal Engineering Manual for open and closed basins. The analysis assumed that Biscayne Bay has an average depth of approximately 6 ft (1.8 m) (Caccia and Boyer; 2005) and is approximately 25 mi (40 km) long from north to south and 8 mi wide from east to west. In the north-south direction, the bay was postulated to be a closed basin, and an open basin in the east-west direction. The applicant estimated the natural oscillation periods of

Biscayne Bay during a normal sea condition as approximately 3.4 to 5.3 hours, which are much smaller than the observed oscillation period of 10 hours in the current and density fields. Therefore, the applicant determined that the potential for resonance in Biscayne Bay as affected by the Florida Current can further be precluded.

The applicant also evaluated the potential of resonance within Biscayne Bay from the forcing from sea breeze, which is caused by the diurnal (24-hour period) heating and cooling of the land and sea. The applicant noted that this 24-hour period is much greater than the natural oscillation periods of the Biscayne Bay, which are estimated to be approximately 3.4 to 5.3 hours. Militello and Kraus, 2001 observed that sea breeze can introduce diurnal oscillations and generate higher harmonic motions into water bodies. Their study, using an analytical solution and numerical modeling developed for a simplified one-dimensional idealized basin, illustrates that (1) the amplitudes of wind-forced motions at the higher harmonics are orders of magnitude smaller than that at the fundamental period, and (2) the wind-forced motions near the resonant modes can be almost completely damped by relatively small bottom friction in the water body. Consequently, the applicant concluded that flooding from resonance within the Biscayne Bay due to sea breeze is not expected.

The staff determined that the Turkey Point Units 6 and 7 COL FSAR did not include an evaluation of the potential for resonance within the makeup water reservoir (MWR) resulting from the interaction of natural oscillations with storm-driven wind waves. Accordingly, the staff issued RAI 02.04.05-2 asking the applicant to provide this evaluation. The applicant responded to RAI 02.04.05-2 on February 28, 2011 (ADAMS Accession No. ML110610686). The applicant stated that resonance is not expected because the natural periods of the MWR are much longer than the wave periods generated from storms such as the probable maximum hurricane. To determine the natural wave periods of the MWR, the applicant approximated it as a rectangular basin and applied Equation 11-5-26 of the USACE Coastal Engineering Manual (Chapter 5) for a closed water body. The applicant stated that the dimensions along the two principal axes of the MWR are approximately 2,200 feet and 766 feet (a north side dimension of 2,260 feet is used for this evaluation). With the top of wall and bottom elevations at 24.0 ft (7.3 m) and -2.0 (0.6 m) ft NAVD 88, respectively, the applicant determined the natural periods of the MWR to be approximately 156 and 53 seconds, based on the two principal dimensions and a full reservoir with 26 ft of water to account for precipitation. The applicant stated that the corresponding wave height and wave period for the maximum PMH wind condition at the Turkey Point Units 6 and 7 site is 2.4 ft (0.7 m) (NAVD88) and 1.7 seconds, respectively, following procedures in the USACE Coastal Engineering Manual (Chapter 2). Because of the large difference in wave periods, the applicant concluded that resonance in the MWR due to storm-driven wind waves is not expected.

The staff accepts the applicant's reasoning and analysis related to resonance and considers RAI 02.04.05-2 resolved.

2.4.5.4.8 Protective Structures

Information Submitted by Applicant

The applicant noted that the estimated PMSS still-water level at Turkey Point Units 6 and 7, combined with coincidental wind-wave run-up, of approximately 24.8 ft (7.6 m) NAVD 88 is lower than the design plant grade elevation of 26 ft (7.9 m) NAVD 88 for safety-related facilities. Therefore, the applicant concluded that the postulated PMH event does not affect the safety

functions of the plant, and debris, waterborne projectiles, and sediment erosion and deposition are not of concern to the safety-related facilities.

Staff's Technical Evaluation

The staff reviewed and accepts the applicant's basis for determining that if the PMH event does not affect the safety functions of the plant, then debris, waterborne projectiles, and sediment erosion and deposition associated with that event are not of concern to the safety-related facilities.

2.4.5.5 Post Combined License Activities

There are no post-COL activities related to this subsection.

2.4.5.6 Conclusion

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.5 and PTN COL 2.4-2 and confirmed that the applicant has addressed the information relevant to probable maximum surge and seiche flooding, and that there is no outstanding information required to be addressed in the COL FSAR related to this section.

As set forth above, the applicant has presented and substantiated information to establish the site description. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description for the staff to determine, as documented in Section 2.4.5, of this SER, that the applicant has met the relevant requirements of 10 CFR 52.79(a)(1)(iii) and 10 CFR Part 100 with respect to determining the acceptability of the site. This addresses part of COL Information Item 2.4-2.

2.4.6 Probable Maximum Tsunami Hazards

2.4.6.1 Introduction

The probable maximum tsunami (PMT) hazards are addressed to ensure that any potential tsunami hazards to the SSCs important to safety are considered in plant design. The specific areas of review are as follows: (1) historical tsunami data, including paleotsunami mappings and interpretations, regional records and eyewitness reports, and more recently available tide gauge and real-time bottom pressure gauge data, (2) PMT that may pose hazards to the site, (3) tsunami wave propagation models and model parameters used to simulate the tsunami wave propagation from the source toward the site, (4) extent and duration of wave runup during the inundation phase of the PMT event, (5) static and dynamic force metrics, including the inundation and drawdown depths, current speed, acceleration, inertial component, and momentum flux that quantify the forces on any safety-related SSCs that may be exposed to the tsunami waves, (6) debris and water-borne projectiles that accompany tsunami currents and may impact safety-related SSCs, (7) effects of sediment erosion and deposition caused by tsunami waves that may result in blockage or loss of function of safety-related SSCs, (8) potential effects of seismic and non-seismic information on the postulated design bases and how they relate to tsunami in the vicinity of the site and the site region, and (9) any additional information requirements prescribed within the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.4.6.2 *Summary of Application*

This section of the Turkey Point Units 6 and 7 COL FSAR addresses the site-specific information about tsunami hazards. The applicant addressed the information as follows:

AP1000 COL Information Item

- PTN COL 2.4-2 Probable Maximum Tsunami

The applicant provided additional information in PTN 2.4-2 to resolve COL Information Item 2.4-1 (COL Action Item 2.4.1-2), which addresses the provision for site-specific information related to tsunami loading.

2.4.6.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for the identification of tsunami floods, tsunami flood design considerations and the associated acceptance criteria are described in Section 2.4.6 of NUREG-0800.

The applicable regulatory requirements for identifying the effects of tsunami flooding are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 100.23(d) sets forth the criteria to determine the siting factors for plant design bases with respect to seismically induced floods and water waves at the site.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

Appropriate sections of the following RGs are used by the staff for the identified acceptance criteria:

- Regulatory Guide 1.29 as it relates to those SSCs intended to protect against the effects of flooding”;
- Regulatory Guide 1.59 as supplemented by best current practices
- Regulatory Guide 1.102 as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.6.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.6 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the probable maximum tsunami hazards. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.4-2

The staff reviewed PTN COL 2.4-2 related to include tsunami loading in Turkey Point Units 6 and 7 COL FSAR Section 2.4.5.

Evaluation of the information provided in PTN COL 2.4-2 related to tsunami loading at the Turkey Point Units 6 and 7 site is discussed below.

2.4.6.4.1 *Probable Maximum Tsunami*

Information Submitted by the Applicant

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.6.1, the applicant qualitatively summarized potential tsunami sources and their effects for four submarine landslide regions and two submarine earthquakes regions. The primary reference for these source regions that the applicant cited was ten Brink et al. (2008). The landslide regions include the U.S. Atlantic margin as far south as the Blake Escarpment, the Gulf of Mexico (Mississippi Canyon and carbonate landslides off the West Florida shelf, and Campeche Escarpment), the Canary Islands (specifically, off the volcanic island of La Palma), and the North Atlantic Ocean (the Storegga landslide offshore Norway and the Grand Banks landslide offshore Canada). Earthquake source regions for PMT determination include the Azores-Gibraltar plate boundary between the African and Eurasian tectonic plates and the northern Caribbean subduction zones.

In terms of other sources, intraplate earthquakes are not considered by the applicant in terms of defining the PMT. The applicant also did not provide any information regarding seismically induced seiches in Biscayne Bay. Finally, the applicant indicated that the flat topography near the Turkey Point Units 6 and 7 site prevents the occurrence of subaerial slope failures that may generate tsunami-like waves. The applicant indicated that the most likely source for the PMT is an earthquake in the Azores-Gibraltar region and that the associated maximum tsunami runup will not exceed the proposed plant-grade elevation.

Staff's Technical Evaluation

The staff conducted independent confirmatory analyses to determine the PMT at the Turkey Point Units 6 and 7 site. The detail is described in the sections that follow. A general conclusion found from the modeling was that while the Bahamas do not necessary shield the

Turkey Point Units 6 and 7 site from large incident tsunami waves, the very shallow and irregular nature of the Biscayne Bay makes penetration of tsunami wave energy through the Bay to the shoreline difficult. The Puerto Rico Trench landslide source proved to have the largest impact at the Turkey Point Units 6 and 7 site, with maximum water surface elevations due to the tsunami of 10.5 ft (3.2 m). The Florida Straits and Mid-Atlantic landslide sources have the potential to produce multi-meter wave heights, but produce smaller waves than the Puerto Rico landslide source. The Florida Straits source produced, by far, the largest wave height just offshore of the Bay in a water depth of 250 m (820.2 ft), but due to the relatively short period of these waves they were rapidly damped and scattered within the Bay. The Canary Islands source, despite generating sea surface elevation of 1 km at the source, led to a tsunami crest elevation less than 1.6 ft (0.5 m) offshore of the Turkey Point Units 6 and 7 site. The earthquake source has the smallest effect on the site, with maximum water surface elevations less than 0.5 ft (0.15 m). Thus the Puerto Rico Trench landslide source is the PMT, however the effects of the PMT are below that of the PMSS.

2.4.6.4.2 *Historical Tsunami Record*

Information Submitted by the Applicant

The applicant identified 11 historical tsunamis along the U.S. and Canadian Atlantic Coast and divides the historical tsunami record into four regions: (1) the Nova Scotia margin offshore Newfoundland, (2) the Caribbean region, (3) the mid- to North U.S. Atlantic margin, and (4) far-field sources. The primary source that the applicant uses is the National Geophysical Data Center (NGDC) tsunami database (<http://www.ngdc.noaa.gov/hazard/tsu.shtml>), which is a compilation of original tsunami catalogs and sources. A secondary source of information is the catalog by Lockridge et al., (2002) for the Delaware-New York coast.

In terms of historical tsunami observations near the site, for the first region related to the 1929 Grand Banks earthquake and landslide the applicant indicated a reading of 12 cm near Charleston, SC.

For the second region related to Caribbean tsunami sources, that applicant indicated that observations along the Florida Atlantic coast from these sources are absent. A 6 cm wave-amplitude observation was reported near Atlantic City, New Jersey, from the 1918 Mona Passage earthquake and landslide.

For the third region, tsunami waves from the 1886 Charleston earthquake were reported in Jacksonville and Mayport, Florida. No amplitude measurements were recorded. No waves were reported along the Florida Atlantic coast from the New Jersey and New York events listed in the tsunami database.

For far-field events, the applicant reports a 23 ft (7 m) reading in the Lesser Antilles Islands from the 1755 Lisbon earthquake. In addition, a 0.56 ft (17 cm) reading at Trident Pier in Port Canaveral, FL, was reported from the 2004 Sumatra-Andaman earthquake.

For paleotsunami events, the applicant indicates that an extensive literature search and review of borehole logs from the site revealed no evidence for paleotsunami deposits (cf. RAI 02.04.06-3).

The staff issued RAI 4809, Question 02.04.06-3 to obtain detailed information regarding (1) evidence of tsunami deposits at the site, distinguishing characteristics of tsunami versus

storm deposits, and interpretation of the boring logs, (2) updated information on submarine landslides offshore of Puerto Rico and indicate how these sources are included in PMT determination, (3) clarification that seafloor offset from earthquake sources is not necessary to generate significant tsunamis, with regard to mid-plate earthquakes, and (4) correction regarding the phrase “wide continental shelf” offshore of the site in relation to the attenuating effect of tsunami waves. The applicant responded to the staff’s RAI 4809, Question 02.04.06-3 in a letter dated September 2, 2010 (ADAMS Accession No. ML102500207). In its response to RAI 4809, Question 02.04.06-3 (ADAMS Accession No. ML102500207), the applicant cross-referenced a Subsection 2.5.1.1.5 that doesn’t exist in the Turkey Point Units 6 and 7 COL FSAR. No reference to tsunami deposit can be found in Section 2.5.1.

In RAI 4089, Question 02.04.06-2 (ADAMS Accession No. ML102150446), the staff requested that the applicant provide a complete description of the numerical modeling methodology used for the revised tsunami analysis and supply water level results specific to the site. The staff also asked the applicant to take into account the regional and local (site-specific) bathymetry/topography. The staff noted that the applicant’s assertion that the site is sheltered by the Bahamas Islands from landslide-generated tsunamis north of the Puerto Rico depended on the results from RAI 4809, Question 02.04.06-2.

In response to RAI 4809 Question 02.04.06-2 (ADAMS Accession No. ML102670160), the applicant did not specifically model tsunamis from landslides north of Puerto Rico. Further evidence is needed to verify this assertion. Third, the assertion that the impact of a submarine landslide to the north (offshore of the Carolinas) would be considerably reduced depends on the results from RAI 4809, Question 02.04.06-2. In response to RAI 4809, Question 02.04.06-2, the applicant did not specifically model tsunamis from landslides offshore of the Carolinas. Further evidence was needed to verify this assertion. Finally, the applicant did adequately address the issued that seafloor offset from earthquake sources is not necessary to generate significant tsunamis, with regard to mid-plate earth. The staff issued RAI 4809, Question 02.04.06-06 to request the applicant to provide the following:

- Provide the correct COL FSAR cross-reference for paleotsunami deposits.
- Justify the assertion that the Bahamas Islands shelter the site from landslide-generated tsunamis north of the Puerto Rico.
- Justify the assertion that tsunami water levels from submarine landslides to the north (offshore of the Carolinas) would be negligible at the site.

The applicant responded to the staff’s RAI 4809, Question 02.04.06-6 in a letter dated October 10, 2010 (ADAMS Accession No. ML11286A088). In its response, the applicant resolved Part (1) (Subsection 2.4.1.1.5 exists in Revision 2 of the Turkey Point Units 6 and 7 COL FSAR). For Parts (2) and (3) of this RAI, the applicant provides justification for its assertions described in the original COL FSAR. For Part (2), the applicant referred to coarse-grid modeling described in ten Brink et al. (2008). Finer grid modeling and modeling of shorter wavelengths associated with landslide tsunamis may affect the numerical results, but a physical basis for the assertion is now provided in the COL FSAR revision (resolved). For Part (3), the applicant referred to modeling described in Hornbach et al. (2007) to justify its assertion. However, the Hornbach et al. (2007) study did not use conservative estimates of the landslide source parameters for tsunami generation. Hornbach et al. (2007) only investigated the upper part of the Cape Fear slide, relying on very limited bathymetry coverage to determine the size of the evacuated mass (they only looked at the scars around the diapir, and did not include the larger scar further

downslope). In the Hornbach et al. (2007) paper (Section 4.3.3), the authors made special mention to note that they have very limited constraints on slide volume, timing (they separate the scars into multiple “failures”), and triggering. There are likely limited constraints on mobilization parameters as well. The 2007/2008 USGS reports contain information on the Cape Fear slide clearly different from that in the Hornbach et al. (2007) paper, yet the applicant appeared to not explain its rationale for choosing the Hornbach et al. vs. USGS source information.

Because the applicant’s offshore tsunami amplitude estimate from the Cape Fear landslide is close to its PMT offshore tsunami amplitude (1.5 m (4.9 ft) vs. 2 m (6.6 ft), respectively) and because the Hornbach et al. (2007) study did not use the most conservative parameters for landslide tsunami generation, further justification was needed for the applicant’s assertion that landslides to the north would be negligible at the site (Part 3). The staff issued RAI 6225, Question 02.04.06-08 requesting the applicant to provide justification that source parameters for the Cape Fear landslide from Hornbach et al. (2007) are conservative, with regard to not only the upper part of the landslide, but also the downslope region of failure. If the source parameters for this potential PMT source are revised, the applicant was requested to discuss how the revised source affects PMT water levels at the site. In a January 20, 2012, response to RAI 6225, Question 02.04.06-8 (ADAMS Accession No. ML12025A2491), the applicant provided the requested information.

In response to RAI 6225, Question 02.04.06-8, the COL applicant provided a new COL FSAR Subsection 2.4.6.4.2 that evaluates the impact at the Turkey Point Units 6 and 7 site from a tsunami generated as a result of a hypothetical submarine landslide event at a site identified as the Cape Fear Slide. It concluded, based on COL applicant modeling results and assessments inferred from recent published literature on the subject, that the flood risk at the Units 6 and 7 site from the Cape Fear Slide will be bounded by the postulated PMT, i.e., the 1755 Lisbon Earthquake tsunami, as described in Subsection 2.4.6.4.1. An additional discussion on the source characteristics of the Cape Fear Slide including the downslope region of the failure was provided. Furthermore, the COL applicant provided a quantitative assessment of the tsunami generation at the Cape Fear Slide using a set of conservative source parameters, and its propagation toward the Turkey Point Units 6 and 7 site using the numerical models, NHWAVE (Version 1.1) and FUNWAVE (Version 1.1), developed and maintained by the University of Delaware, is described. Specifically, the COL applicant’s response explained how the postulated Cape Fear Slide was represented in the model and describes the estimation of the wave shape and size generated by this slide. The COL applicant’s numerical simulations of the tsunami wave propagation and coastal inundation at the Turkey Point Units 6 and 7 site based on two alternative assumptions for the initial wave, corresponding to a dynamic source and a static source generated by the Cape Fear Slide, was also presented.

The staff verified that the above information is included in Turkey Point Units 6 and 7 COL FSAR Section 2.4.6 and considers RAI 4809, Question 02.04.06-3, RAI 5818, Question 02.04.06-6, and RAI 6225, Question 02.04.06-8 resolved.

Staff’s Technical Evaluation

The staff’s assessment of the historical record is consistent with that of the applicant. The applicant has summarized the essential historical record of tsunamis in the region. The complete history of tsunamis and tsunami-like waves along the Atlantic seaboard of the U.S. is given by Lockridge and others (2002).

With regard to the 1918 Puerto Rico tsunami cited by the applicant, the source is most likely a landslide triggered by an earthquake (López-Venegas et al., 2008). It is not representative of a Greater Antilles subduction zone earthquake, but rather normal faulting within the arc from oblique extension (Chaytor and ten Brink, 2010).

With regard to the 1755 Lisbon tsunami, it should be emphasized that tsunami amplitude estimates along the Florida coasts were derived from a numerical model (Mader, 2001a).

The source parameters for the earthquake that generated this tsunami are very uncertain and likely to be complex (e.g., possibly compound earthquake rupture). Barkan and others (2009) indicated that tsunami amplitudes from this earthquake are likely to be less than 1 m (39.4 ft) and demonstrated the effect that source parameter uncertainty had on computed tsunami amplitudes at the U.S. East Coast.

The most relevant tsunami observations near the site appeared to be from the 1886 Charleston, SC, earthquake. At Jacksonville, Florida, reports were of “a tidal wave smashed along the Jacksonville beaches and thrust itself up the St. John River past Mayport...sailors dashed ashore as their vessels rocked and heaved on violent waves that whipped against the shore.” In Mayport, Florida, reports were of “a sudden wave dashed high over the beach.” In addition, the 1946 Dominican Republic seismogenic tsunami was recorded on the Daytona Beach tide gauge station although no amplitude measurements were available as indicated by the applicant in the Turkey Point Units 6 and 7 COL FSAR. Large waves up to 6 m (19.7 ft) that struck Daytona Beach and St. Augustine, FL, in 1992 were included in the NGDC tsunami database, but are likely of meteorological origin. The applicant therefore indicated the most relevant historical tsunamis in the Turkey Point Units 6 and 7 COL FSAR.

Evaluation of Turkey Point Boring Logs

An independent analysis of the geotechnical boring logs provided was conducted. The boring are focused toward a geotechnical/engineering purpose. Lastly, no definitive, widespread evidence of paleotsunami-type deposits (borings with items of note listed below) is found.

Stratigraphy (see Section 2.5.1.1.2.3 of the COL FSAR for detailed discussion of these units)

Formations present in borings include (youngest to oldest): *Muck*—mix of organic material, shell fragments, silt; high water content; often present in the upper 1 m of the borings overlying limestone/boundstone units; *Miami Formation*—poorly to well indurated, sandy, fossiliferous limestone (oolitic and bryozoans facies); *Fort Thompson Formation*—alternating beds of marine, brackish and freshwater limestones; *Tamiami Formation*—Poorly graded, silty, carbonate sand (contains shell fragments); *Hawthorn Group*—interbedded limestone, mudstone, dolomite, sandstone.

Boring of Note

Several characteristics of individual boring should be noted.

#B-620 (DH): contains 3 m (10ft) of gravel (gravel/sand) at the base of a limestone layer at a depth of 39 m (117 ft).

#B-635: ~ 1m (3ft) of fat clay at the ground surface.

#B-734: ~0.7 m (2ft) of lean clay at ground surface (above muck layer).

#B-736: ~ 0.7 m (2ft) of fat clay at ground surface (above muck layer)

#B-738: ~ 0.7 m (2ft) of fat clay at ground surface (above muck layer)

#B-802: ~ 1.3 m (4ft) of fat clay at ground surface (above muck layer)

As boring #B-620 is the only occurrence of this type section in the boring logs, it is unlikely that it is the result of paleotsunami deposition. Similarly, the presence of clay layers of varying thicknesses (i.e., #B-635, 734, 736, 738, and 802) above the muck layer is likely to be due to anthropogenic causes, or localized depositional processes. Therefore, the staff has reasonable assurance that there has been no history of paleotsunami at the site.

2.4.6.4.3 *Source Generator Characteristics*

Information Submitted by the Applicant

The applicant identified two regions that are likely to define the PMT source for the site: the Azores-Gibraltar plate-boundary zone between the African and Eurasian tectonic plates, and the northern Caribbean subduction zones. The source parameters necessary to define tsunami generation from ten Brink and others (2008), including magnitude, depth to fault plane, fault dimension, orientation, and average fault slip, are tabulated by the applicant for each of these source regions.

For the Azores-Gibraltar plate-boundary zone (Figure 2.4.6-1), the applicant considered a 200 km (124 mi) long by 80 km (50 mi) wide earthquake rupture zone with an average slip of 13.1 m (43 ft). The applicant did not indicate the earthquake magnitude for this scenario but from these rupture dimensions and slip, assuming a shear modulus of 50–70 GPA and using standard formulas for seismic moment (e.g., Lay and Wallace, 1995), the staff calculated an approximate moment magnitude of $M_w = 8.6$ to 8.7. However, for the estimated tsunami water levels, the applicant used the source specification of Mader (2001a) rather than tabulated values (See Turkey Point Units 6 and 7 COL FSAR Section 2.4.6.5).

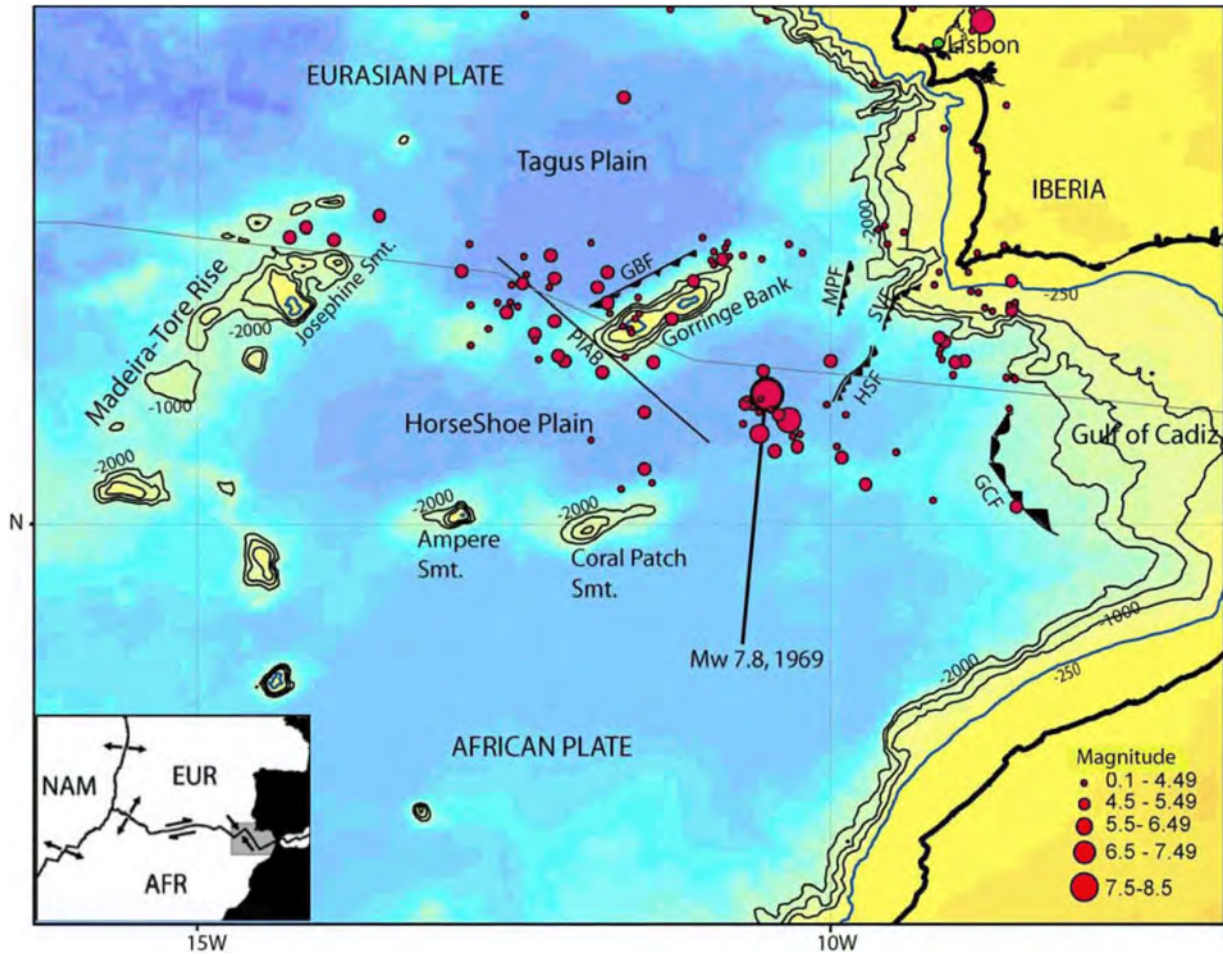


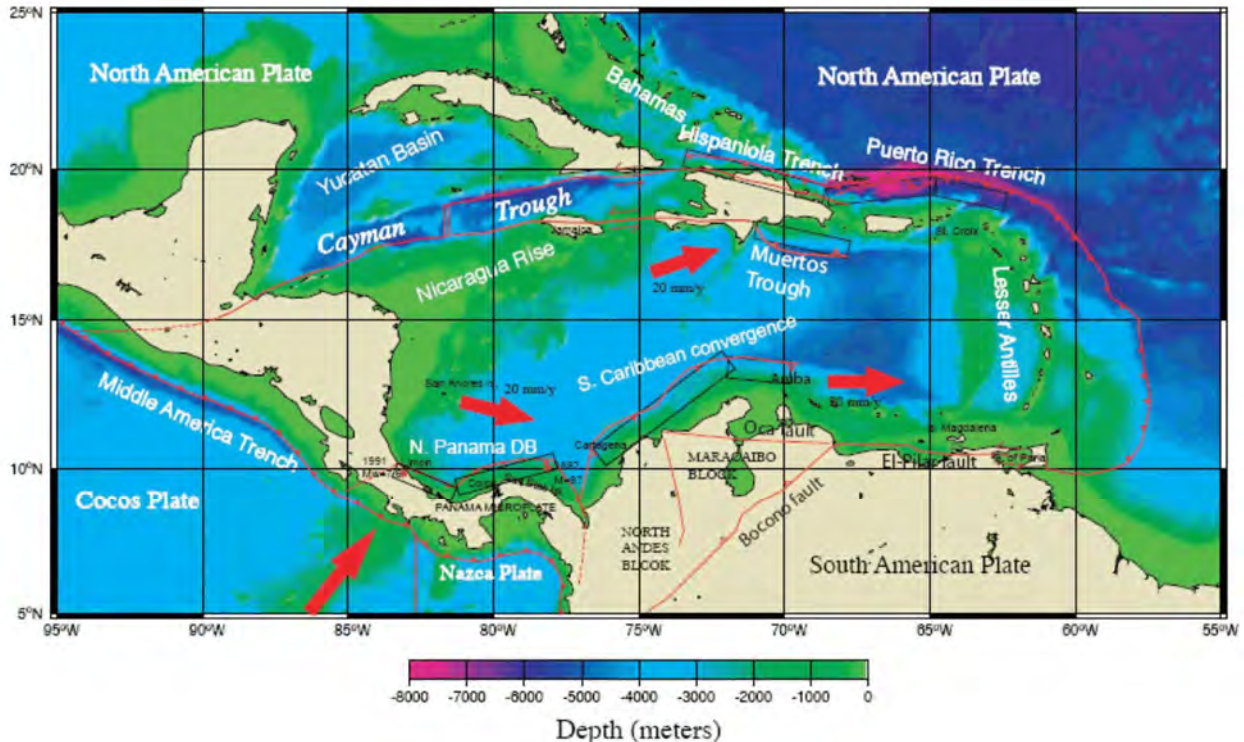
Figure 2.4.6-1: Azores-Gibraltar region showing various faults that make up the oceanic convergence zone boundary (Barkan and others, 2009).

For the northern Caribbean subduction zones (Figure 2.4.6-2), the applicant provided source parameters for both a Puerto Rico Trench and a Hispaniola trench earthquake rupture scenario. The magnitudes for each of these scenarios are $M_w = 8.85$ and $M_w = 8.81$, respectively.

However, in Turkey Point Units 6 and 7 COL FSAR Section 2.4.6.5 the applicant used the source specification by Knight (2006) for a Puerto Rico Trench earthquake only and not the tabulated values (i.e., a Hispaniola earthquake is not considered further).

Figure 2.4.6-2: The Caribbean Plate Boundary and its Tectonic Elements

To address submarine landslides in the Florida Straits/Bahamas/Cuba region as potential sources for PMT, the staff issued RAI 02.04.06-1 asking the applicant why these sources were not considered for the PMT and the justification for excluding them. The applicant responded to the staff's RAI 02.04.06-1 in a letter dated September 2, 2010 (ADAMS Accession



No. ML102500207). The applicant acknowledged evidence of Miocene debris flows in the Florida Straits region. However, it justified omission of Florida straits debris flows as potential tsunami sources for PMT determination on the basis of (1) absence of evidence for any correlated tsunami deposit along the southern Florida coast, and (2) the unlikelihood of debris flows similar to those that occurred in the Miocene under present-day sea-level-rise conditions. With regard to the first point, Miocene tsunami deposits would probably not be preserved over such a long period and in areas that are near sea-level now, given the changes in paleogeography since Miocene time. With regard to the second point, additional justification (e.g., past scientific studies) was needed to support this assertion. The staff also notes that the cross-referenced Subsection 2.5.1.1.5 did not exist in the Turkey Point Units 6 and 7 COL FSAR. The applicant might be referring in part to Subsection 2.5.1.1.1.5 with regard to Cuban geology.

The staff issued RAI 5818, Question 02.04.06-4 to request the applicant to provide justification for the assertion that debris flows in the Florida straits region, similar to those observed in the Miocene from drill-hole records, would not occur under present-day sea-level conditions, and to provide the correct cross-reference to Subsection 2.4.1.1.5, which does not exist in the Turkey Point Units 6 and 7 COL FSAR. The applicant responded to the staff's RAI 5818, Question 02.04.06-4 in a letter dated October 11, 2010 (ADAMS Accession No. ML11286A088).

The applicant evaluated the ocean circulation patterns and contourite/turbidite depositional regimes of the Florida Straits beginning in the Cretaceous, but still failed to justify ignoring the Florida Straits debris flows as a potential PMT source. Essentially, it said the sequence of events (contourite/turbidite deposition on the carbonate bank tops and falling sea level) responsible for the failure of the slope and deposition of the Miocene debris deposits observed in drill-hole records cannot occur today because of the ocean current regime and rising sea level. What was missing from its justification was a convincing explanation of the underlying cause of the slope instability; sea-level variations and the presence of an unknown thickness and composition of deposits on the bank tops did not provide a satisfactory description of the pre-conditioning/loading factors or triggers. The pre-conditioning factors and the triggering mechanism for the failure were unknown (could be any or all of the usual triggers: tectonic, sediment loading, current undercutting, underlying structure, pore pressure variations), so excluding them as possible PMT sources based on sea level and ocean currents alone was not a basis for determining if debris flows will happen again. Moreover, younger likely Pleistocene-age debris deposits occur at the western-most end of the Florida Straits near the Florida Slope/Escarpment and in a similar geologic environment (Holmes, 1985; Twichell and others, 1993), further suggesting the possibility of debris flows in the Florida Straits near the site.

As a result of insufficient justification provided by the applicant addressing why debris flows in the Florida straits region would not occur, the staff issued RAI 6225, Question 02.04.06-7. The staff requested the applicant to provide justification that triggering conditions for submarine mass failures in the Florida Straits are not currently present. If triggering and pre-conditioning factors/loading conditions such as those that caused the Miocene debris flows and likely Pleistocene-age failures at the western end of the Florida Straits (Holmes, 1985; Twichell and others, 1993) cannot be determined, the applicant requested to explain whether potential submarine mass failures can be conservatively excluded. If such failures are considered, the applicant was asked to discuss how inclusion of this source affects PMT water levels at the site.

In its January 20, 2012, response to RAI 6225, Question 02.04.06-7 (ADAMS Accession No. ML13100A104), the COL applicant elected to supplement the COL FSAR evaluation with numerical model simulations, using the NHWAVE and FUNWAVE codes developed and maintained by University of Delaware, to provide a quantitative estimate of the flood level at the site and reaffirm that the tsunami source of concern will not affect the probable maximum tsunami (PMT) flood level reported in the COL FSAR. The COL applicant's simulations of a tsunami generated by a conservatively large submarine mass failure at the Florida Escarpment suggested that the impact of such an event on water levels near Turkey Point Units 6 and 7 would be smaller than that of the postulated PMT presented in Subsection 2.4.6.4.1. The maximum predicted water level near Turkey Point Units 6 and 7 due to this tsunami event would be 1.71 m (5.6 ft) MLW or 1.14 m (3.7 ft) NAVD 88, representing a rise of only 0.02 meter (0.065 foot) above the initial sea water level. The assumed initial sea water level in the FUNWAVE model simulation includes the 10 percent exceedance high tide, an initial rise plus the long-term sea-level rise, all of which add up to 1.68 m (5.5 ft) MLW or 1.11 m (6 ft) NAVD 88. This water level was much smaller than the maximum tsunami water level of 4.5 m (14.76 ft) MSL (4.82 m (15.81 ft) MLW) reported for the PMT case in Subsection 2.4.6.5. This conclusion was also consistent with the results of the Florida Escarpment Slide evaluation described in Subsection 2.4.6.1.2.

The staff verified that the above information was included in Turkey Point Units 6 and 7 COL FSAR Section 2.4.6, and considers RAI 02.04.06-1, RAI 02.04.06-4 and RAI 02.04.06-7 resolved.

Staff's Technical Evaluation

Tsunami sources used for the independent confirmatory analysis were described in terms of their identification, characteristic, and tsunami generation parameters. Potential tsunamigenic sources are first discussed below, followed by parameters associated with the maximum credible earthquakes and submarine landslides around the Atlantic Ocean basin.

Potential Tsunamigenic Sources

Potential tsunami sources likely to determine the PMT at the Turkey Point site are as follows:

Subaerial Landslides

With regard to subaerial landslides, there are no major coastal cliffs along the Florida coast near the site that could be a location of large sub-aerial landslides. Thus, there are no areas of subaerial coastal landslides near the site that would produce tsunami-like waves exceeding the amplitude of those generated by other sources. Similarly, no major coastal cliffs exceeding 10 m (30 ft) are present along the western margins of the islands of the Bahamas.

Coastal elevations, which rarely exceeding 30 m (100 ft), are present along a segment of the north-central Cuban between Havana and Matanzas. Pliocene to Holocene age limestone formations (likely Matanzas and Jaimanitas formations; de la Torre y Callejas, 1966) crop out along the coast forming low coastal cliffs above extensive, shallowly submerged coastal platforms. Iturralde-Vinent (2009) noted the presence of boulders on coastal terraces along the north coast of Cuba, which he attributed to tsunami deposition, but, the emplacement mechanism of these boulders has not been well studied. Iturralde-Vinent (2009) described the presence of minor coastal rock falls originating from limestone cliffs along the south coast of Cuba, but did not identify any similar features along the north coast. Although coastal erosion leading to rock fall along the limestone cliffs is possible along the north coast of Cuba, the fractured nature of the limestone formations and the presence of shallow water platforms on to which they fall would likely limit any resulting water disturbance. See below for details of subaerial landslides associated with volcanogenic sources.

Volcanogenic Sources

According to the Global Volcanism Program of the Smithsonian Institution (<http://www.volcano.si.edu/>), there are three general regions of volcanic activity that have the potential to generate localized wave activity along the Florida coast and Caribbean Sea: (1) two Mexican volcanoes near the Gulf of Mexico coastline, (2) two volcanoes in the western Caribbean, and (3) volcanic activity along the Lesser Antilles island arc. Two Mexican volcanoes, (Cerro el Abra/Los Atlixos and San Martin) associated with the eastern Trans-Mexican Volcanic Belt, are near the Gulf of Mexico coastline. Basaltic flows associated with Los Atlixcos have reached as far as the coast. Capra et al. (2002) provided an inventory of major debris avalanches associated with the Trans-Mexican Volcanic Belt. In that study, there did not appear to be any major catastrophic failures that would reach the Gulf of Mexico. In the eastern Caribbean, Utila Island, located offshore Honduras, comprises primarily pyroclastic cones and rises 74 m (242.8 ft) above sea level. However, any flank failures are unlikely to generate significant wave activity in the Gulf of Mexico or Caribbean, owing to the size of the failures and obstructed propagation paths around the Yucatan Peninsula. Also in the western Caribbean, Volcán Azul on the coast of Nicaragua comprises three small cinder cones, but these were unlikely to generate significant tsunamigenic failures of sufficient size to affect the

site. There are many active volcanoes along the Lesser Antilles island arc, some of which have historically caused local tsunamis (Pelinovsky and others, 2004). However, because of their distance to the Turkey Point site and the obstructed propagation path created by the islands of the Greater Antilles, tsunami amplitudes from these volcanoes are unlikely to be significant (e.g., Smith and Shepherd, 1995).

In summary, catastrophic failures associated with volcanoes along the eastern coasts of Mexico and Central America were either too far inland or too small in size to generate significant wave activity near the Turkey Point site. Based on existing evidence, volcanoes along the Lesser Antilles or in the eastern Atlantic Ocean are too far away or unfavorably situated to generate significant wave activity along the east Florida coast near the Turkey Point site.

Canary Islands Region: The maximum credible landslide event is a catastrophic volcanic flank failure along the SW flank of La Palma Island. The maximum estimated landslide volume is 500 km³ (Ward and Day, 2001), though Masson and others (2006) note that this volume is 2–3 times bigger than a typical Canary island landslide and that such landslides often fail as separate (in terms of tsunami generation) sub-events. The geologic age of these landslides range from 13,000–17,000 years before present (ybp) for the El Golfo landslide on El Hierro Island, to over a 1 million ybp (Masson et al., 2002; Masson et al., 2006). From these studies, the age of the Cumbre Nueva landslide for which the maximum credible landslide event is based is 125,000–536,000 ybp.

The initial research on the La Palma flank failure (Ward and Day, 2001) predicts wave heights of 10–25 m (32–82 ft) on the eastern shore of North America from the 500 km³ landslide volume. The hydrodynamic model used by Ward and Day (2001), however, did not include the effects of non-linear advection or wave breaking. More recent research that incorporated these effects suggested wave heights along the eastern U.S. coast from this failure would be less than 3 m (9.8 ft) (Mader, 2001) or less than 1 m (3.3 ft) (Gisler and others, 2006).

Intra-Plate Earthquakes

Cuba: Low to moderate levels of seismicity has been recorded across most of Cuba, with an increase in intensity (occurrence and magnitude) in the vicinity of the Oriente Fault Zone along the south coast of the island. Potential tsunamigenic faults are present along the north coast of Cuba. Specifically, the offshore sections of the Nortecubana thrust fault system but the activity of these faults and their earthquake slip/tsunami generation potential are largely unconstrained. Significant amounts of slip on some of the faults of the Nortecubana system have been identified on seismic sections (Garcia and others, 2003), but Echerarvia-Rodriguez and others (1991) and Moretti and others (2003) found that the offshore sections of the faults are draped by an undisturbed Tertiary to Quaternary sedimentary section suggesting the system has been inactive for at least tens of thousands of years.

Inter-Plate Earthquakes

The Greater Antilles Subduction Zone: This fault represents the boundary between the North American and Caribbean tectonic plates (North American plate is subducted beneath the Caribbean plate). The earthquakes that are generated along subduction zones involve thrust motion with large amounts of vertical seafloor motion and are relatively efficient at generating tsunamis. In comparison, transform plate boundaries involve strike-slip motion and are much less efficient at generating tsunamis. Because the relative convergence direction between the two plates at the Greater Antilles subduction zone is highly oblique to the orientation of the fault

it is possible that there may be a mixed mode of thrust and strike-slip motion for earthquakes at this subduction zone.

The large surface area of subduction zone faults results in the occurrence of the world's largest earthquakes on these thrusts. As explained by Geist and Parsons (2009), there are several methods to determine the maximum magnitude that can occur on subduction zones. The most conservative method is a statistical fit to the frequency-magnitude distribution of earthquakes (known as the Gutenberg-Richter distribution) that occur on all of the world's subduction zones (Bird and Kagan, 2004). Because the length of the Greater Antilles subduction zone may limit the maximum earthquake magnitude possible, parametric and empirical methods are also considered.

The Azores-Gibraltar Oceanic Convergence Boundary: The offshore boundary between the African and Eurasian tectonic plates was classified as an oceanic convergence boundary (Bird, 2003). An $M=8.4-8.7$ earthquake along this plate boundary offshore of Lisbon in 1755, generated a transoceanic tsunami that was observed in the Caribbean and Canada (Barkan et al., 2009). The specific faults that make up this plate boundary in the Azores Gibraltar region are highly complex. Using the statistical analysis of Bird and Kagan (2004), the magnitude distribution of earthquakes along the world's oceanic convergence zones can be estimated. Because of a much smaller sample size in comparison to subduction zones, however, there is much greater uncertainty in the distribution curves for the earthquakes (Geist and Parsons, 2009).

Local Submarine Landslides

Currituck

The Currituck (also known as the Albemarle) landslide was approximately 60 km south of Norfolk Canyon, offshore of the Outer Banks of North Carolina.

The Currituck landslide likely occurred as two sub-events, which appear to have occurred contemporaneously (Locat et al., 2009). The total volume of the landslide was estimated to be 128 km^3 (30.7 mi^3) by Prior and others (1986) and 165 km^3 (39.6 mi^3) by Locat et al. (2009). The latter estimate was used as the maximum credible volume. In terms of the geologic setting of this landslide, Quaternary shelf edge delta deposits make up the bulk of the failed material, but some Pliocene strata may have been removed as well (Bunn and McGregor, 1980; Prior and others, 1986). There is approximately 4-9 m of sediment that has accumulated since the Currituck slope failure (Prior and others, 1986). The age of the failure is unknown, but might be approximately 25,000–50,000 ybp, based on average sedimentation rates of 5 cm/year (2 in/yr) for sediment burying the scar and deposits (Prior and others, 1986; Lee, 2009).

Cape Fear/Cape Lookout

The Cape Fear and Cape Lookout landslides are off the South Carolina and Georgia coasts, seaward of the Carolina Trough. These landslides occur in a different geologic setting to those landslides north of Cape Hatteras (such as the Currituck landslide), and therefore different processes contributed to their formation. The headwall scarps of these failures are near salt domes and the tectonic activity of the salt domes has been suggested as a triggering mechanism (Dillon et al., 1982; Popenoe et al., 1993; Cashman and Popenoe, 1985; Hornbach et al., 2007). The decomposition of gas hydrates due to changes in sea level has also been suggested to have contributed to triggering these failures (Popenoe et al., 1993; Schmuck and

Paull, 1993). The recent observation of small, shallow earthquakes along this section of the continental margin (Ekström, 2006) suggests that seismic activity may have also contributed to the formation of these landslides.

From an analysis of multi-beam bathymetry, the Cape Fear submarine landslide covers an area of 7,270 square kilometers (km^2) (1,817,500 acres) (excavation zone) and has an estimated volume of 342 km^3 (82.1 mi^3) (excavation zone). It has a stepped (potentially retrogressive) headwall, with mapped scarps at water depths of 930 m (3,051.2 ft) and 3,250 m (10,662.7 ft). The Cape Lookout submarine landslide has a more complex morphology, making calculation of its dimensions more difficult. It was estimated that the Cape Lookout landslide covers an area of approximately $3,630 \text{ km}^2$ (907,500 acres) (excavation zone) and has a volume (excavation zone) of approximately 216 km^3 (51.8 mi^3). The headwall of the Cape Lookout landslide as currently mapped is at a depth of 2,600 m (8,530.2 ft), although it may be significantly shallower.

Florida Straits Miocene Debris Flows

Ocean Drilling Program (ODP) Leg 101, Site 626 drilled in the Straits of Florida (Figure 2.4.6.4.3-2), penetrated a 50 m (164 ft) thick interval of mid-Miocene age, clast-heavy, carbonate debris flow sediments between 120 m (393.7 ft) and 170 m (557.7 ft) (below seafloor) (Fulthorpe and Melillo, 1988). The clasts and matrix material of this debris flow unit (Unit II of Austin et al., 1986) have a similar composition to the winnowed periplatform sediments found on the modern upper-slope along the eastern margin of the Straits of Florida (Mullins and Newmann, 1979). Based on analysis of seismic reflection profiles, the debris flow unit pinches out to the north and west, suggesting a source along the eastern margin of the Straits of Florida (Fulthorpe and Melillo, 1988). Although the true dimensions of this slope failure are unknown due to limited data, an estimate of the area and volume of failed material involved in this event is made based on the geometry of other platform-edge slope failures identified around the Bahamas (see below) and the estimated thickness of the modern-day periplatform deposits and winnowed sand units along the upper slope of the eastern margin of the Straits of Florida. Assuming a landslide headwall length of 5 km (3.1 mi), a downslope length of 1.7 km (1.1 mi), and a maximum thickness of 0.1 km, the area and volume of the excavation zone are 8.5 km^2 (2,125 acres) and 0.425 km^3 (0.1 mi^3), respectively.

Other Miocene gravity/debris flow and turbidite deposits were identified on seismic reflection profiles and drilled at ODP Leg 101 sites 627, 628, and 630, along the northern margin of Little Bahama Bank (LBB). Harwood and Towers (1988) provide estimates of the volumes of these deposits, although they appear to be erroneous (given Harwood and Towers (1988) measured areas of these deposits, the thickness of sediments required to achieve their stated volumes would need to be in the tens to hundreds of kilometers thick).

Modern (Holocene-late Pliocene) debris flow and turbidite deposits have been identified throughout the Bahamas. These deposits have been found in the inter-island basins (Tongue of the Ocean, Columbus basin, Exhuma Sound) and associated with platform margin gully wall collapse. Turbidite deposits in Columbus basin occur every 3,000-6,000 years and have volumes on the order of 0.1 km^3 (0.02 mi^3) (Bornhold and Pilkey, 1971).

Far-Field Submarine Landslides

Puerto Rico Trench

Numerous landslide scarps of various sizes are present along the southern margin of the Puerto Rico Trench. They are primarily within the Arecibo and Loiza amphitheaters but also elsewhere along the edge of the PR-VI carbonate platform and within Mona Canyon. While the Aricebo and Loiza amphitheaters were initially considered to each be the result of large, potentially catastrophic slope failures (volume estimates of up to 1,500 km³; Schwab and others, 1991; Mercado et al., 2002), recent analysis of high-resolution geophysical data and sediment cores suggests that the amphitheaters were created by numerous, smaller failure events (ten Brink et al., 2006). The largest of the landslides identified by ten Brink and others (2006) has a volume of 22 km³ (5.8 mi³). Lopez-Venegas and others (2009) identified a submarine landslide at the head of Mona Canyon northwest of Puerto Rico (volume of 10 km³ (2.4 mi³)) that may have been initiated by the 1918 Mona Passage earthquake and been the principle source of the tsunami that affected Puerto Rico and nearby coasts.

Summary

The following findings of the staff's independent confirmatory analysis of the tsunami source characteristics are provided below:

- There was sufficient evidence to consider submarine landslides in the Florida Straits and north of Puerto Rico as a present-day tsunami hazard for the purpose of defining the PMT at the Turkey Point site.
- Parameters for the maximum submarine landslide were determined for each of the provinces using regional data past: i.e., past landslides around the Bahamas and along the south wall of the Puerto Rico Trench.
- Important additional sources to determine the PMT include landslide sources along the mid-Atlantic margin and the Canary Islands and seismogenic sources along the northern Caribbean subduction zone.

2.4.6.4.4 Tsunami Analysis

Information Submitted by the Applicant

Several tsunami computational models are currently used in the National Tsunami Hazard Mitigation Program, sponsored by the National Oceanic and Atmospheric Administration, to produce tsunami inundation and evacuation maps for the states of Alaska, California, Hawaii, Oregon, and Washington. The computational models include MOST (Method of Splitting Tsunami), developed originally by researchers at the University of Southern California (Titov and Synolakis, 1998); COMCOT (Cornell Multi-grid Coupled Tsunami Model), developed at Cornell University (Liu et al., 28 1995); and TSUNAMI2, developed at Tohoku University in Japan (Imamura, 1996). All three models solve the same depth-integrated and 2D horizontal (2HD) nonlinear shallow-water (NSW) equations with different finite-difference algorithms. There are a number of other tsunami models as well, including the finite element model ADCIRC (ADvanced CIRCulation Model for Oceanic, Coastal, and Estuarine Waters) (e.g., Myers and Baptista, 1995). However, the shallow-water equation models lack the capability of simulating dispersive waves, which could be the dominating features in landslide-generated tsunamis and for tsunamis traveling a long distance. Several high-order depth-integrated wave hydrodynamics models (Boussinesq models) are now available for simulating nonlinear and weakly dispersive waves, such as COULWAVE (Cornell University Long and Intermediate Wave Modeling Package) (Lynett and Liu, 2002) and FUNWAVE (Kennedy et al., 2000). The major

difference between the two is their treatment of moving shoreline boundaries. Lynett et al. (2003) applied COULWAVE to the 1998 PNG tsunami with the landslide source: the results agreed well with field survey data.

Originally, the applicant did not perform hydrodynamic modeling according to any of the aforementioned methods in establishing tsunami water levels at the site. The applicant's tsunami analysis primarily consists of applying past studies to ascertain the tsunami-wave-propagation characteristics from the two source regions discussed in Section 2.4.6.3 and to estimate tsunami amplitudes offshore of the site. The applicant used different types of tsunami analysis to estimate tsunami water levels for each of the two source regions, as further described in COL FSAR Section 2.4.6.5.

For the Azores-Gibraltar earthquake scenario, the applicant cited the results of Mader (2001a). The Mader (2001a) study used the SWAN code based on nonlinear shallow-water wave equations that includes Coriolis and frictional effects. A 10 minute bathymetric grid was used in this study to calculate tsunami amplitudes. The applicant further cited studies by ten Brink et al. (2008) for this source zone.

For the Puerto Rico Trench earthquake scenario, the applicant cited an analysis of open-ocean propagation by Knight (2006). The tsunami analysis method used by Knight (2006) is generally a depth-averaged model from the University of Alaska, Fairbanks, but not further specified either by the applicant or by Knight (2006). The bathymetric grid spacing varies in Knight's (2006) study, depending on the resolution of the available data.

The staff issued RAI 4809, Question 02.04.06-2 requesting that the applicant provide a complete description of the numerical modeling methodology used for the revised tsunami analysis and supply water level results specific to the site, taking into account the regional and local (site-specific) bathymetry/topography. The applicant responded to the staff's RAI 4809, Question 02.04.06-2 in a letter dated September 22, 2010 (ADAMS Accession No. ML102670160).

The applicant provided a reasonable description of the site-specific numerical modeling they performed to determine water levels related to an offshore Lisbon earthquake tsunami source that they determine is the PMT source. The applicant used Delft3D, which includes the effects of nonlinearity but not dispersion (Stelling and van Kester, 1994; Stelling and Leendertse, 1991). This model is commonly used for a variety of hydrodynamic problems, including some forms of tsunami waves. Previous studies (Apotsos et al., 2011a, 2011b, 2011c) indicate that this model can predict the run-up associated with benchmark-like tsunami experiments and analytical solutions well, and approximates the inundation for the 2004 tsunami at Kuala Meurisi, Sumatra well. The applicant also indicated that no wave breaking is included in the model. However, although the non-conservative form of the non-linear shallow-water equations (NLSWEs) has no unique solution at local discontinuities, the use of conservative properties, as is done with the Delft3D framework, is often sufficient to provide solutions that are acceptable in terms of the local energy losses in and the propagation speed of a bore. The PMT conducted under the independent confirmatory analysis primarily uses the COULWAVE model above that includes the effects of nonlinearity and dispersion.

In the applicant's response to RAI 4809, Question 02.04.06-2, there were some unresolved issues listed below that relate to theoretical basis of the model, its verification and the conservatism of all input parameters:

1. In terms of setting up the model, the applicant did not specify what type of offshore boundary condition is used. The applicant should verify that artificial reflections off this boundary do not influence its predictions (note there is a way to create a non-reflective boundary condition for sinusoidal waves but they do not mention using it).
2. It is unclear as to the effect of having a closed southwest boundary. There may be spurious reflections off this closed boundary. It would be reassuring if the applicant ran another simulation where the southwest boundary is extended a bit further into the Gulf of Mexico to show that shifting this boundary does not affect the model results, especially because the boundary is still fairly close to the site.
3. The applicant indicated that the water level at the site is larger when they used a Manning's n value of 0.02 instead of 0.025 that they prefer (pg. 14 of the RAI response). For conservatism, the applicant should use the lower n -value unless the water-level difference is negligible.
4. In the applicant's description of DELFT3D on pg. 7 of the RAI response, the applicant indicated that the model does not include a wave breaking mechanism. This statement needs to be verified. Some discussion should be included in the FSAR as to the general conservatism of DELFT3D under the assumption listed in Section 2.4.6.4.1 of the FSAR revision.
5. It is unclear that the sinusoidal wave that the applicant uses is the most conservative waveform. Although they tune it to the wave amplitude and period obtained by Mader (2001) for the 1755 Lisbon tsunami at 238.7 m (783 feet) water depth, it is possible that a steeper non-sinusoidal wave would have larger run-up.

The staff issued RAI 5818, Question 02.04.06-5 to address the unresolved issues from RAI 4809, Question 02.04.06-2, requesting the applicant provide the following: (1) specify what type of offshore boundary condition is used and verify that any artificial reflections off this boundary do not influence water level predictions, (2) verify that shifting the southwest boundary of the model does not affect water level predictions at the site, (3) clarify whether a Manning's n value of 0.02 yields more conservative water level predictions at the site, compared to a Manning's n value of 0.025, (4) clarify whether DELFT 3D includes the effects of wave breaking as used to determine PMT water levels, and (5) determine whether alternate boundary conditions yield higher runup values compared to the sinusoid waveforms used for the model boundary conditions in the deep Atlantic Ocean.

The applicant responded to the staff's RAI 5818, Question 02.04.06-5 in a letter dated October 28, 2010 (ADAMS Accession No. ML11304A201), and acceptably responded to the issues. The applicant completed reasonably comprehensive sensitivity analysis, looking at the variation induced through changes in bottom friction, offshore boundary conditions, and incident wave forms. The applicant's new modeling results have led to greater wave heights at the site, and these larger wave heights are the new tsunami design water levels. Applicant's response was still unclear on whether the shallow water model was conservative as compared to a Boussinesq model (statement at the end of its Part 2 discussion on page 6 and its ending statement in the first paragraph on page 22 of the RAI 5818, Question 02.04.06-5 response). The basis of this statement is on the concept that dispersion spreads the wave energy out along the train, and so this dispersed energy should lead to lower wave heights. That is reasonable, but in practice in shallow water, the interplay between nonlinearity, dispersion, and viscous dissipation are too complex to make such a statement. Past experience suggests that the

differences are pretty well scattered about +/-10 percent, depending on bathymetry, height, etc. Thus, the additional detail provided by the applicant clarified the methodology and the staff considers RAI 02.04.06-2 and RAI 02.04.06-5 resolved.

Staff's Technical Evaluation

Earthquake-generated tsunamis, with their very long wavelengths, are ideally matched with NSW for transoceanic propagation. Models such as those by Titov and Synolakis (1995) and Liu et al. (1995) have been shown to be reasonably accurate throughout the evolution of a tsunami, and are in widespread use today. However, when examining tsunamis generated by submarine mass failures, the NSW can lead to significant errors (Lynett et al., 2003). The length scale of a submarine failure tends to be much less than that of an earthquake, and thus the wavelength of the created tsunami is shorter. To correctly simulate the shorter wave phenomenon, one needs equations with excellent shallow to intermediate water properties, such as the Boussinesq equations. Although Boussinesq models also have accuracy limitations on how deep (or short) the landslide can be (Lynett and Liu, 2002), they are able to simulate the majority of tsunami generating landslides.

Thus, for confirmatory analysis the staff used the Boussinesq-based numerical model COULWAVE (Lynett and Liu, 2002). This model solved the fully nonlinear extended Boussinesq equations on a Cartesian grid. A particular advantage of the model is the use of fully non-linear equations for both deep and shallow water. This avoided the common problem of "splitting" the analysis when the wave reaches shallow water. Applications for which COULWAVE has proven very accurate include wave evolution from intermediate depths to the shoreline, including parameterized models for wave breaking and bottom friction.

2.4.6.4.5 Tsunami Water Levels

Information Submitted by the Applicant

Offshore water-level estimates by the applicant were taken directly from previous studies by Mader (2001a), Knight (2006), and ten Brink et al. (2008).

For the Azores-Gibraltar earthquake scenario, the applicant compared the offshore tsunami amplitudes along the southern U.S. Atlantic margin between the studies by Mader (2001a) and ten Brink et al. (2008). The applicant concluded that for offshore tsunami amplitudes relevant to the site, Mader's (2001a) study has the larger estimate. The applicant also concluded that Mader's (2001a) offshore amplitude near the site for the Azores-Gibraltar earthquake scenario was larger than Knight's (2006) offshore amplitude near the site for the Puerto Rico Trench earthquake scenario. Therefore, the applicant concluded that the PMT offshore water levels were from Mader's (2001a) study of Azores-Gibraltar earthquake scenario.

The offshore PMT amplitude that the applicant used is 2 m (6.6 ft) at a location near Miami, FL, in 783 m (2 568.9 ft) water depth. The applicant then applied a runup amplification factor of 2, to obtain a PMT runup height at the site of 4 m (13.1 ft). The applicant added 0.8 m (2.6 ft) for the 10 percent exceedance high-tide and sea-level anomaly and 0.3 m (0.98 ft) for the long-term sea-level rise for the next 100 years to obtain a maximum PMT water level at the site of 5.1 m [16.7 ft] (NAVD88).

The applicant indicated that the design plant grade elevation is 7.9 m [26.0 ft] (NAVD88) and therefore the PMT water level will not impact safety-related facilities at the site.

Staff's Technical Evaluation

The staff performed numerical modeling of three different types of tsunami sources to determine their impacts on the Turkey Point site. Below, coarse-grid modeling is first conducted to determine the effects of tsunamis described in ten Brink (2008) near the site. The staff also included a local earthquake in the Florida Straits during the coarse-grid modeling phase to determine the order-of-magnitude impact at the site. The second phase of the water-level analysis is detailed hydrodynamic modeling of likely PMT sources using a finer computational grid near the site. This was described after the coarse-grid modeling sections. For all conditions, the most conservative source parameters were employed, even when arguably unphysical, to provide an absolute upper limit on the possible tsunami effects at the Turkey Point site.

Coarse-Grid Modeling: Caribbean Earthquake Sources

Regional tsunami propagation patterns offshore of the Turkey Point have been computed by the staff for a number of distant earthquake sources located in the Caribbean as reported in ten Brink and others (2008). In Chapter 8 of that study, earthquake scenarios along five fault systems were examined: (1) west Cayman oceanic transform fault (OTF), (2) east Cayman OTF, (3) northern Caribbean subduction zone, (4) north Panama Oceanic Convergence Boundary, and (5) the northern South America convergent zone. In that report, tsunami propagation was modeled using the leap-frog, finite-difference approximation to the linear-long wave equations computed using Cartesian coordinates. Bottom friction, wave breaking, and runup were not modeled—computations were restricted to water depths of 250 m (820.2 ft) or greater. Results for the western Gulf of Mexico indicate that offshore tsunami amplitudes were less than 1.0 m (3.3 ft) for each earthquake scenario.

For comparative purposes, the staff recalculated the offshore tsunami water levels for earthquake scenarios (3) and (5) using the COMCOT model on coarse computational grid, using the ETOPO1 DEM. The COMCOT model is more accurate than the model used in ten Brink and others (2008) because it includes non-linear terms in the propagation equations (hence, the computations can be carried into shallower water than in ten Brink and others, 2008), a moving boundary condition at the shoreline, and was computed in spherical coordinates. Bottom friction was also included, but was set at a low, conservative value ($f=10^{-4}$) in this case. The results confirm that tsunami amplitudes from distant Caribbean earthquakes are less than 1.0 m (3.3 ft) near the Turkey Point site. Tsunami amplitudes from earthquakes along the Azores-Gibraltar oceanic convergence boundary were also of similar magnitude (Barkan and others, 2009).

Coarse-Grid Modeling: Local Earthquake Sources

Regional tsunami propagation patterns in the Florida Straits have been computed on a coarse computational grid for an intra-plate earthquake of expected maximum magnitude. For this scenario, probable maximum fault dimensions and slip similar to a $M_{max}=7.5$ earthquake (Petersen and others, 2008; Wheeler, 2009; Mueller, 2010) was determined from the empirical scaling relationships for intra-plate earthquakes of Wells and Coppersmith (1994). Conservative values were allowed within one standard deviation of the empirical estimates of all fault types (empirical relationships for reverse faults only are not statistically reliable). This resulted in the following rupture parameters: length=150 km (93.2 mi), width=30 km (18.6 mi), up-dip fault depth=3 km (1.9 mi), average slip=5 m, dip=47°, strike=N18.7°E. The rupture was located in the deepest part of the Florida Straits to maximum shoaling amplification. The corresponding

magnitude, assuming a shear modulus of 30 GPa, is $M_w=7.8$ —slightly greater than $M_{max}=7.5$ because of the conservative assumptions. The geometric parameters of the earthquake were taken so as to maximize the tsunami amplitudes offshore of the Turkey Point site.

The offshore tsunami water levels for this local earthquake scenario were computed using the COMCOT model as previously described for the distant earthquake sources. Bottom friction was also included, but was set at a low, conservative value ($f=10^{-4}$) in this case. In general, tsunami amplitudes from the local $M_w=7.8$ sources were larger than the distant $M\sim 9$ earthquake sources, with peak offshore tsunami amplitudes near 1.2 m (3.9 ft). These amplitudes were significantly less than the tsunami amplitudes produced by the submarine landslide sources described below.

Detailed Hydrodynamic Modeling: Likely PMT Sources

Detailed numerical modeling of likely PMT sources has been performed to determine their impact on the Turkey Point Units 6 and 7 site. The sources include a near field landslide source immediately offshore of Biscayne Bay (the Florida Straits source), a number of far-field landslide sources with extremely large local waves (the Canary Islands source, the Mid-Atlantic source, and the Puerto Rico Trench source), and a far field earthquake source (the Puerto Rico Subduction Zone source). For all conditions, the most conservative source parameters were employed, even when arguably unphysical, to provide an absolute upper limit on the possible tsunami effects at the Turkey Point Units 6 and 7 site.

A general conclusion found from the modeling is that while the Bahamas do not necessarily shield the Turkey Point Units 6 and 7 site from large incident tsunami waves, and the very shallow and irregular nature of Biscayne Bay makes penetration of tsunami wave energy through the Bay to the shoreline difficult. The Puerto Rico Trench landslide source proved to have the largest impact at the Turkey Point Units 6 and 7 site, with maximum water surface elevations due to the tsunami of 3.2 m (10.5 ft). The Florida Straits and Mid-Atlantic landslide sources have the potential to produce multi-meter wave heights, but produce waves less than the Puerto Rico landslide source. Interestingly, the Florida Straits source produces, by far, the largest wave height just offshore of the Bay in a water depth of 250 m (820.2 ft), but due to the relatively short period of these waves they are rapidly damped and scattered within the Bay. The Canary Islands source, despite generating sea surface elevation of 1 km (0.6 mi) at the source, leads to a tsunami crest elevation less than 0.5 m (1.6 ft) offshore of the Turkey Point Units 6 and 7 site. The earthquake source has the smallest effect on the site, with maximum water surface elevations less than 0.15 m (0.5 ft). Thus the Puerto Rico Trench landslide source is the Probable Maximum Tsunami (PMT), however the effects of the PMT are below that of the maximum storm surge event.

Numerical Grid Development

The bathymetry/topography grid required by the hydrodynamic model is created via two main sources: (1) the GEBCO 1-minute global elevation database for open ocean simulations, and (2) relatively fine scale nearshore bathymetry and topography data in Biscayne Bay taken from NOAA Coastal Services Center's Digital Coast repository. Coastal waterways, Bay channels, and rivers are all well resolved.

Numerical Simulations – Physical Limits

The purpose of these simulations was to provide an absolute upper limit on the tsunami wave height that could be generated by the potential sources. Note that these limiting simulations used physical assumptions that are arguably unreasonable for landslide sources; the results of these simulations was used to filter out tsunami sources that are incapable of adversely impacting the Turkey Point Units 6 and 7 site under even the most conservative assumptions. Specifically, these assumptions were:

- (1) Time scale of the seafloor motion was very small compared the period of the generated water wave (tsunami).
- (2) Bottom roughness, and the associated energy dissipation, was negligible in locations that are initially wet (i.e., locations with negative bottom elevation, offshore).

Assumption (1) simplifies the numerical analysis considerably. With this assumption, the sea surface response matches the change in the seafloor profile exactly. This type of approximation was used commonly for subduction-earthquake-generated tsunamis, but was known to be very conservative for landslide tsunamis (Lynett and Liu, 2002). The modeling simplification arises because the need to include the landslide time evolution is removed. The initial pre-landslide bathymetry profile, as estimated by examination of neighboring depth contours, was subtracted by the post (existing) landslide bathymetry profile. This “difference surface” was smoothed and then used directly as a “hot-start” initial free surface condition in the hydrodynamic model.

Assumption (2) did not simplify the analysis significantly; however it does prevent the use of an overly high bottom roughness coefficient, which could artificially reduce the tsunami energy reaching the shoreline. Note that while the offshore regions are assumed to be without bottom friction, such an assumption is too physically unrealistic to accept for the inland regions where the roughness height may be the same order as the flow depth. For tsunami inundation, particularly for regions such as this project location where the wave might inundate long reaches of densely vegetated land, inclusion of some measure of bottom roughness was necessary.

For this tsunami hazard investigation, the simulation domain was divided into two separate, but coupled, components—an *offshore* domain and a *nearshore* domain. First, a simulation was performed to look at the waves near the offshore source and their evolution in shallow water approaching the Bay up to a water depth of 250 m. These simulations provided a time series of water surface elevation and fluid velocity near the Bay entrance. These time series were then used to force the nearshore domain, which encompassed the entire Biscayne Bay. For the far field sources (all sources except the Florida Straits landslide source), offshore modeling was performed utilizing two-horizontal-dimension (2HD) simulations. For each source, a time series of water surface elevation offshore of the Bay was created. For the near field source (Florida Straits), both one-horizontal dimension (1HD) and 2HD simulations were run. The 1HD simulations provided an absolute upper limit of the possible tsunami that might be generated by this source, and was conceptually equivalent to the entire length of the Bahamas shelf failing as a single landslide. A 2HD simulation of the Florida Straits landslide provided a quantitative measure of the conservatism of the 1HD simulation. With comparison of all the offshore simulation results, the PMT was chosen. Finally the offshore PMT time series was used with the nearshore domain to predict site-specific tsunami effects.

Currituck, Cape Fear, and Cape Lookout Landslide Sources

These three slide sources were grouped relatively close together off the Mid-Atlantic region. The Cape Fear Landslide is the closest to the Turkey Point Units 6 and 7 site, and has an average excavation depth of 50 m (164 ft). The Cape Lookout slide has a slightly larger excavation depth of 60 m (197 ft), but has smaller horizontal dimensions than the Cape Fear slide (approximately 50 percent of the volume). Currituck has the greatest excavation depth of 300 m (984.2 ft), but was further north and is oriented east-west. This directivity would yield a smaller level of energy at the southern Turkey Point Units 6 and 7 site. For purposes of conservatism, the various properties of these slides are combined to produce a “hybrid” slide yielding the greatest impact at the slide. The Mid-Atlantic slide would have an excavation depth of 300 m (984.2 ft) (from Currituck), a horizontal area of 7,300 km² (1,825,000 acres) (from Cape Fear), and will be located at the existing Cape Fear slide location with the orientation of the Cape Lookout slide. The horizontal dimensions of the slide source region were 75 km (46.6 mi) in width and 100 km (62.1 mi) in length. With this information, and knowledge of characteristic slide-generated waves taken from the literature (Lynett and Liu, 2002; Lynett and Liu, 2005), a hot-start initial condition was constructed.

A 2HD simulation was performed for the purpose of providing a time series of water surface elevation just offshore of the Bay. The wave energy that was directed toward the Turkey Point Units 6 and 7 site is relatively low. A time series of the ocean surface elevation at the 250 m (820.2 ft) depth contour offshore of Biscayne Bay shows the crest amplitude of the wave approaching the site was 1.5 m (4.9 ft).

Canary Islands Source

The Canary Islands landslide source has initiated significant debate within the tsunami research community. The initial tsunami assessment by Ward and Day (2001) due to a coherent failure of an entire island into the ocean, lead to runup predictions of 10–25 m (33–82 ft) along nearly the entire East Coast of the United States. Subsequent studies (e.g., Mader, 2001) have attempted to downplay the hazard, with reductions in runup by a factor of 10 for the most extreme case. In this study, the most conservative published source values are employed. Similar to the previous examinations, if this conservative setup has a damaging effect on the Turkey Point Units 6 and 7 site, the source parameters are given additional scrutiny and unreasonable conservatism relaxed.

Following Ward and Day (2001), a coherent La Palma collapse will generate an initial wave with amplitude approaching 1000 m (3281 ft). For the simulations here, a hot start condition is placed just offshore of La Palma, with a crest elevation of +1000 m (+3280.8 ft) and a trough elevation of -1000 m (-3280.8 ft). The disturbance has a length of 50 km (31.1 mi) and a width of 25 km (15.5 mi), again taken approximately from the information in Ward and Day (2001). The wave propagation is modeled in the entire northern Atlantic Ocean in the *offshore domain*, using a grid spacing of 2 km (1.2 mi). The simulation is based on the fully nonlinear Boussinesq equations, with wave breaking included. The wave field 30 minutes after generation spreads radially, almost as a point source. Later in time, the wave spreads rapidly both through radial spreading and frequency dispersion. The tsunami transforms into a long train with the longest frequencies at the lead (the largest crest does not in fact occur with the first wave). When reaching the continental shelf break along the eastern U.S., the maximum crest elevation was much less than 10 m (32.8 ft).

Puerto Rico Trench Landslide Source

There was evidence of a pre-historical gigantic submarine slope failure in the Puerto Rico Trench with a displaced volume that has been estimated at approximately 1500 km³ (359.9 mi³) by Schwab and others (1991) and approximately 910—1,050 km³ (210—251 mi³) (by Grindlay (1998). The Puerto Rico Trench was the surface trace of a southward-dipping Benioff zone (Grindlay et al., 1997), and it included the deepest part of the Atlantic Ocean with depths up to 8.4 km (5.2 mi). The landslide was located along the southern slope of the Puerto Rico Trench. This was about 37 km off the north coast of Puerto Rico and is approximately 55 km (34.2 mi) across (east-west), has a crown in a water depth of approximately 3,000 m (9,842.5 ft), and extended to a water depth of approximately 6,000 m (19,685 ft). The maximum change in seafloor elevation of this slide was huge; the scarp depth was 800 m (2,624.7 ft).

Similar to the other landslide sources, an initial hot-start condition was created in the numerical model with the parameters given above. Note again the high conservatism of this approach; the initial height of the tsunami here was 800 m (2,624.7 ft), while in the analysis of Mercado and others (2002) who included time scales of motion and modeled the slide failure, a 15 minute slide event creates a wave with amplitude of 40 m (131.2 ft). Furthermore, the initial condition was angled counter-clockwise such that the directivity toward the Turkey Point Units 6 and 7 site is at a maximum. Along the eastern ridge of the Bahamas, wave energy was concentrated due to refraction. This concentrated energy then wraps around the northern extent of the Bahamas and bends to the south; again a result of refraction. The wave was then directed toward the Turkey Point Units 6 and 7 site, with surprisingly large amplitude, considering the distance of travel and the “protection” of the Bahamas. The most effective path of transit for wave energy to the Turkey Point Units 6 and 7 site from the Puerto Rico slide was not south through the Florida Straits or directly through the Bahamas, but around the Bahamas from the north and then bending to the south. A time series of the ocean surface elevation at the 250 m (820.2 ft) depth contour offshore of Biscayne Bay shows that this wave train with an amplitude of over 4 m (13.1 ft) and a long period of 30 minutes.

Puerto Rico Subduction Zone Source

The only earthquake source to be investigated for the CC site was the subduction zone that borders much of the northeastern and eastern extent of the Caribbean Islands. Here, the staff assumed that the entire fault zone ruptures during a single earthquake event. Seafloor displacements were taken as the expected maximum values that a subduction zone earthquake might generate. The initial sea surface condition is a direct mapping of the vertical seafloor displacement to the ocean surface. Based on the results, it was clear that the total rupture is composed by five individual regions; a simplification used to reasonably characterize the entire length. It is also evident that the largest waves would be directed toward the northeast Atlantic basin.

With a subduction zone earthquake, the generated waves are long in wavelength. This implied that the physics of the waves are simpler, relative to the dispersive waves created by the two landslide sources examined previously. To numerically model this source, the open-source tsunami model COMCOT was used. A grid covering the entire western Atlantic was generated with a spatial grid size of 1 minute (1/60 of a degree latitude or longitude). A single grid layer was used; there was no nesting of domains for refinement. The time step used by the model is 1 second. The linear version of the model was used, and there was no bottom friction applied anywhere in the domain. The linear version of the model was deemed acceptable because, as

will be shown, the wave height to water depth ratio was less than 0.1 at all areas of interest, and usually no greater than 0.01.

Once the wave exits the source area, the crest elevation of the main wave was about 2 m (6.6 ft) in the open ocean; Bermuda would experience an extreme and damaging wave. However, it was clear that the East Coast of the United States, while certainly feeling effects from this source, would see relatively minor wave impact. By the time the wave has reached the shelf offshore of the Turkey Point site in Biscayne Bay, the maximum crest elevation of the wave was approximately 0.15 m (0.5 ft).

Florida Straits Landslide Source

This source, given as “FS,” consisting of a landslide along the western Bahamas platform, was the only significant local source identified for the Turkey Point site. Based on the very limited geotechnical data for a prehistoric slide, the failure region was estimated to be 5 km (3.1 mi) in length. A maximum scarp depth of 150 m (492.1 ft) was used (100 m (328 ft) scarp depth was the best estimate given in Section 2.4.6.4.3), to account for uncertainty in the regional data and its importance for tsunami generation. For the analysis of local events, the modeling procedure was slightly different from that described above for the other sources. Here, for the initial, conservative estimation of tsunami impacts, the effects of lateral spreading are ignored. Thus, simulations in the one-horizontal-dimension (1HD) were performed. This was equivalent to specifying that the entire offshore shelf has failed simultaneously. Furthermore, due to the complexity of the bathymetry and topography of Biscayne Bay, the 1HD simulation was also likely to over-estimate the transmission of energy into the Bay due to a neglect of 2HD scattering.

Three 1HD simulations were undertaken for the FS source for three different values of bottom friction. All three simulations used no friction over initially submerged areas, but for initially dry areas use Manning’s “n” values of 0.0 (no friction), 0.02 (low friction), and 0.05 (high friction). Figure 2.4.6.4.5-18 provided a number of snapshots of the tsunami evolution for the no friction case. Due to the very shallow Bay and irregular topography, the wave height was significantly reduced by the time it reaches the Turkey Point Units 6 and 7 site. The no-friction simulation yielded a maximum tsunami water potential elevation (flow elevation of velocity head elevation) near the Turkey Point Units 6 and 7 site of 18 m (59 ft), while the low friction simulation predicted a potential elevation of 12 m (39.3 ft), and the high friction an elevation of 3 m (9.8 ft). Offshore (350 m (1,148.3 ft) contour), the time series from all three 1HD simulations were very similar; with the only differences due to friction-dependent reflections off of topography. The wave height at this depth was very large but the period is a relatively short: approximately 5 minutes.

PMT Determination and Nearshore, Site-Specific Modeling

Based on the above scoping analysis of the possible candidates for the PMT, it was clear that the FS source produces the largest offshore amplitude. However, the period of this generated wave was very short, and it might be expected that the wave height of this short period motion would be quickly damped out once entering the Bay. On the other hand, the Puerto Rico Landslide source, while producing a wave height that was $\sim 1/5$ of the FS source, had a period that is ~ 5 times larger. When considering the effect of bottom friction and scattering inside the Bay, it was plausible that the Puerto Rico source may in fact be the PMT despite the smaller offshore height. Thus, for the small-scale, 2HD site-specific modeling, both the FS and Puerto Rico source would be included.

For the site-specific modeling, a 10 m (32.8 ft) resolution sub-domain centered on the Bay was used. The offshore time series at the 250 m (820.2 ft) depth for the two sources would be forced into the domain. Note that the 1HD time series was used for the FS source. Compared with the 1HD simulations, the site-specific 2HD modeling to be presented here also included the effects of scattering inside the Bay. For the simulations, a Mannings “n” of 0.02 was used throughout the domain and is considered to be a conservative estimate of the friction in the system.

The tsunami evolution for the FS source clearly shows the offshore wave height was very large, but breaking, bottom friction, and scattering very quickly damp and disperse the wave energy. In fact, these effects transform the short period incident energy into a very slow, long period rise of the water level in the entire Bay. The maximum tsunami runup near the Turkey Point Units 6 and 7 site of the FS source is 1.2 m (3.9 ft); an order of magnitude reduction in elevation as compared with the incident time series signal.

For the Puerto Rico source, the increased period of motion was clearly evident, and the tsunami energy is better able to infiltrate the Bay. The crests break once they enter the very shallow water of the Bay, and they stack on top of each other. The wave was still slow to reach the site, but the runup for this source near Turkey Point Units 6 and 7 site was 3.2 m (10.5 ft). Thus, the PMT for the Turkey Point Units 6 and 7 site according to this analysis was due to the Puerto Rico Trench Landslide, with a maximum water elevation of 3.2 m (10.5 ft). Again, this estimate was conservative, and so it could be stated with some confidence that it is very unlikely that a tsunami might produce water levels greater than 3.2 m (10.5 ft) at the Turkey Point Units 6 and 7 site.

Considering an antecedent water level of 1.1 m (3.6 ft) (NAVD 88) that included 10 percent exceedance high tide and long-term sea-level rise for the next 100 years (0.3 m, 1 ft), the estimated PMT water level was 4.3 m (14.1 ft) (NAVD 88).

Summary

The Puerto Rico Trench landslide source proved to have the largest impact at the Turkey Point Units 6 and 7 site with maximum water surface elevations due to a tsunami of 3.2 m (10.5 ft). Even though the Florida Straits landslide source produces the largest wave height just offshore of Biscayne Bay in a water depth of 250 m, the relatively short period of these waves are rapidly damped and scattered within the Bay. Considering an antecedent water level of 1.1 m (3.6 ft) (NAVD 88) that included 10 percent exceedance high tide and long-term sea-level rise for the next 100 years (0.3 m, 1 ft), the estimated PMT water level was 4.3 m (14.1 ft) (NAVD 88). This PMT water level value was less than that determined by the applicant (5.1 m) (16.1 ft) (NAVD 88), was less than the PMSS water level, and was less than the design plant grade elevation. Therefore, the staff concluded that PMT water level is bounded by that of the PMSS.

2.4.6.4.6 *Hydrography and Harbor or Breakwater Influences on Tsunami*

Information Submitted by the Applicant

The applicant mentioned the absence of breakwaters near the site and indicates that the hydrography of Biscayne Bay and Elliott Key Barrier Island has been considered in estimating of the PMT water level.

Staff's Technical Evaluation

The staff found the applicant's analysis reasonable in that the hydrography and harbor or breakwater influences are not expected to be severe enough to impact safety-related structures. The offshore hydrography and harbor or breakwater influences are specifically accounted for in the numerical modeling performed during the independent confirmatory analysis.

2.4.6.4.7 Effects on Safety-related Facilities

Information Submitted by the Applicant

The applicant indicated that the PMT is not expected to be large enough to affect the operation of safety-related SSCs. The applicant further indicated that consequently, debris, water-borne projectiles, and sediment erosion and deposition are not a concern to the functioning of safety-related SSCs for the site.

Staff's Technical Evaluation

The staff found the applicant's analysis reasonable in that the effects of the PMT are not expected to be severe enough to affect the operation of safety-related structures

2.4.6.5 Conclusions

The staff reviewed the Turkey Point Units 6 and 7 COL FSAR Section 2.4.6 and PTN COL 2.4-2 and confirmed that the COL applicant has addressed the information relevant to design basis for tsunami flooding. The staff also confirms that there is no outstanding information required to be addressed in the Turkey Point Units 6 and 7 COL FSAR Section 2.4.6.

The staff reviewed the information provided and, for the reasons given above, concludes that the COL applicant has provided sufficient details about the site description to allow a staff evaluation, as documented in Section 2.4.6 of this report. Based on the above, the staff concludes that the identified site characteristics meet the requirements of 10 CFR 52.79(a)(1)(iii), 10 CFR 100.20(c) and 10 CFR 100.23(d) with respect to establishing the design basis for SSCs important to safety. The information addressing the COL Information Item 2.4-6 is adequate and acceptable.

2.4.7 Ice Effects

2.4.7.1 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.4.7 addresses the ice effects to ensure that safety-related facilities and water supply are not affected by ice-induced hazards.

SER Section 2.4.7 presents an evaluation of the following topics based on data provided by the applicant in the Turkey Point Units 6 and 7 COL FSAR and information available from other sources: (1) regional history and types of historical ice accumulations (i.e., ice jams, wind-driven ice ridges, floes, frazil ice formation, etc.), (2) potential effects of ice-induced, high- or low-flow levels on safety-related facilities and water supplies, (3) potential effects of a surface ice-sheet to reduce the volume of available liquid water in safety-related water reservoirs, (4) potential effects of ice to produce forces on, or cause blockage of, safety-related facilities,

(5) potential effects of seismic and non-seismic data on the postulated worst-case icing scenario for the proposed plant site, and (6) any additional information requirements prescribed in the “Contents of Application” sections of the applicable subparts to 10 CFR Part 52.

2.4.7.2 *Summary of Application*

The applicant addressed the information related to ice effects as follows:

AP1000 COL Information Item

- PTN COL 2.4-2 Floods

COL License Information Item 2.4-2 requires COL applicants to provide site-specific information related to ice effects on the design basis flooding and safety-related the site.

2.4.7.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for the identification and evaluation of ice effects, and the associated acceptance criteria, are described in Section 2.4.7 of NUREG-0800.

The applicable regulatory requirements for identifying ice effects are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 100.23(d) sets forth the criteria to determine the siting factors for plant design bases with respect to water levels at the site.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The related acceptance criteria are provided in the following Regulatory Guides:

- Regulatory Guide 1.29 as it relates to those SSCs intended to protect against the effects of flooding
- Regulatory Guide 1.59 as supplemented by best current practices;
- RG 1.102 as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.7.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.7 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to ice effects. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.4-2 Floods

The staff reviewed PTN COL 2.4-2 related to ice effects on the design basis flooding and safety-related facilities at the site included in Turkey Point Units 6 and 7 COL FSAR Section 2.4.4.

No further action is required for sites within the bounds of the site parameter for flood level.

Evaluation of the information provided in PTN COL 2.4-2 related to ice-induced hazards at the Turkey Point Units 6 and 7 site is discussed below.

2.4.7.4.1 *Ice Conditions and Historical Ice Formation*

Information Submitted by Applicant

Based on review of historical hydrometeorological data obtained from USGS and NOAA, the applicant described the climate near Turkey Point Units 6 and 7 as subtropical marine with occasional freezing air temperatures. Freezing or subfreezing air temperatures have been recorded, but the daily average temperatures on the days with freezing events always were well above freezing.

The applicant obtained water temperature data from 449 USGS stations within 30 mi (48 km) of the plant area. The applicant stated that data from 13 of the stations met quality requirements for use in analysis. Water temperatures measured at these stations between 1953 and 2007 were consistently well above the freezing point. The lowest water temperature in the records was 54.0 °F, recorded on April 3, 1959, in the Snapper Creek Canal at Miller Drive near S. Miami Station (USGS No. 02290610), 20 mi northwest of the Turkey Point plant.

The applicant obtained air temperature data from the NCDC of NOAA for two stations: the Homestead Experimental Station (12 mi (19 km) west of the plant area, Cooperative ID 084091, period of record from 1910 to 1988 with a continuous record starting in 1931) and the Miami International Airport Station (24 mi (38 km) north of the plant area, Cooperative ID 085663, period of record from 1948 to 2008). Both stations have recorded below-freezing air temperatures, with a minimum of 26°F measured on three occasions (December 13, 1934, March 2, 1941, and February 16, 1943) at the Homestead Experimental Station. All daily average temperatures at both stations are well above freezing. The lowest recorded daily average temperature was 38°F, on December 24, 1989, at Miami International Airport Station.

Staff's Technical Evaluation

The staff reviewed the hydrometeorological data provided by the applicant. Because subfreezing air temperatures have never been sustained for a full day and water temperatures have consistently been well above the freezing point, the staff concludes that ice formation near the Turkey Point site is an unlikely event.

2.4.7.4.2 Ice Jams

Information Submitted by Applicant

To obtain information on the historical occurrences of ice events, the applicant reported conducting a detailed search of the "Ice Jam Database" of the USACE. The applicant stated that the "Ice Jam Database" contains no records of ice jams in Florida. The applicant also stated that ice sheet formation, wind-driven ice ridges, and frazil or anchor ice formation are prevented because the available historical data indicate no occurrences of subfreezing water or subfreezing daily average air temperatures.

Staff's Technical Evaluation

The staff reviewed the applicant's hydrometeorological data, verified key items, and checked the "Ice Jam Database." Based on the review of hydrometeorological data, as well as the lack of historical records of ice jams in Florida, the staff concludes that other ice jams and other ice-related effects such as ice sheet formation, wind-driven ice ridges, and frazil or anchor ice formation are precluded.

2.4.7.4.3 Effect of Ice on Cooling Water Systems

Information Submitted by Applicant

The applicant noted that the design of the AP1000 reactor employs a passive containment cooling system that functions as the safety-related ultimate heat sink, and incorporates by reference a system description in Subsection 6.2.2 of the AP1000 DCD. The applicant stated that because the passive containment cooling system does not require an open surface water source to perform its safety-related function, it is not affected by surface water ice conditions.

Staff's Technical Evaluation

Because the passive containment cooling system does not require an open surface water source to perform its safety-related function and because hydrometeorological data indicate that ice formation is unlikely, the staff concludes that Units 6 and 7 would not be affected by surface water ice conditions.

2.4.7.5 Post Combined License Activities

There are no post-COL activities related to this subsection.

2.4.7.6 *Conclusions*

As set forth above, the applicant presented and substantiated information relative to the ice effects important to the design and siting of this plant in Turkey Point Units 6 and 7 COL FSAR Section 2.4.7 and PTN COL 2.4-2. The staff reviewed the available information and concluded, for the reasons given above, that the identification and consideration of the potential for ice flooding, ice blockage of water intakes, ice forces on structures, and the minimum low water levels (from upstream ice blockage) are acceptable and meet the requirements of 10 CFR 52.79 and 10 CFR 100.20(c), with respect to determining the acceptability of the site.

The staff finds that the applicant has considered the appropriate site phenomena for establishing the design bases for SSCs important to safety. The staff accepted the methodologies used to determine the potential for ice formation and blockage reflected in these site characteristics, as documented in SERs for previous licensing actions. Accordingly, the staff concludes that the use of these methodologies results in site characteristics with a margin sufficient for the limited accuracy, quantity, and period of time in which the data were accumulated. The staff concludes that the COL applicant has provided sufficient information on ice-related hazards to satisfy the applicable requirements of 10 CFR Part 52 and 10 CFR Part 100.

The staff's review confirmed that the applicant has addressed the relevant information, and no outstanding information is expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section.

2.4.8 **Cooling Water Canals and Reservoirs**

2.4.8.1 *Introduction*

Turkey Point Units 6 and 7 COL FSAR Section 2.4.8 addresses the cooling water canals and reservoirs used to transport and impound water supplied to the SSCs.

SER Section 2.4.8 presents an evaluation of the following topics to verify its hydraulic design basis: (1) design bases postulated and used by the applicant to protect structures such as riprap, inasmuch as they apply to safety-related water supply, (2) design bases of canals pertaining to capacity, protection against wind waves, erosion, sedimentation, and freeboard and the ability to withstand a probable maximum flood (PMF) (surges, etc.), inasmuch as they apply to a safety-related water supply, (3) design bases of reservoirs pertaining to capacity, PMF design basis, wind wave and run-up protection, discharge facilities (e.g., low-level outlet, spillways, etc.), outlet protection, freeboard, and erosion and sedimentation processes inasmuch as they apply to a safety-related water supply, (4) potential effects of seismic and non-seismic information on the postulated hydraulic design bases of canals and reservoirs for the proposed plant site, and (5) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.4.8.2 *Summary of Application*

The applicant addressed the information related to cooling water canals and reservoirs in Turkey Point Units 6 and 7 COL FSAR Section 2.4.8.

AP1000 COL Information Item

- PTN COL 2.4-3 Cooling Water Supply

COL License Information Item 2.4-3 requires COL applicants to provide site-specific information related to canals and reservoirs that provide makeup water to the safety-related cooling systems. The design of the AP1000 reactor employs a passive containment cooling system, which is described in Subsection 6.2.2 of the certified AP1000 DCD.

2.4.8.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for the identification of design considerations for cooling water canals and reservoirs, and the associated acceptance criteria, are described in Section 2.4.8 of NUREG-0800.

The applicable regulatory requirements for cooling water canals and reservoirs are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 100.23(d) sets forth the criteria to determine the siting factors for plant design bases with respect to water levels at the site.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The related acceptance criteria are provided in the following Regulatory Guides:

- Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants," as supplemented by best current practices.
- Regulatory Guide 1.102 as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.8.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.8 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to cooling water canals and reservoirs. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

AP1000 COL Information Item

- PTN COL 2.4-3

This section addresses the following COL Information Item 2.4.3 (COL Action Item 2.4.2-1) identified in Section 2.4.1.3 of the DCD. Combined License applicants will address the water supply sources to provide makeup water to the service water system cooling tower.

Evaluation of the information provided in PTN COL 2.4-3 related to cooling water canals and reservoirs at the Turkey Point Units 6 and 7 site is discussed below.

2.4.8.4.1 Cooling Water Canals

Information Submitted by Applicant

The applicant stated that the design of the AP1000 reactor employs a passive containment cooling system that functions as the safety-related ultimate heat sink. The passive containment cooling system does not require an open surface water source to perform its safety-related function. As a result, the applicant stated that Units 6 and 7 are not designed to use cooling water canals for either normal plant cooling or emergency cooling and there are no safety-related cooling water canals or reservoirs related to the operation of Units 6 and 7.

The plant area of Units 6 and 7 is, however, surrounded by an existing system of industrial wastewater facility/cooling canals installed to perform the cooling function for the Turkey Point operating units. The cooling canals consist of 168 mi of recirculating canals that occupy an area approximately of 5,900 acres. The canals are 200 feet wide and are generally shallow, with water depths of 1 to 3 ft. The berms on the canals are approximately 90 ft wide. The cooling canals receive plant effluents from the operating units, as well as blowdown flow from the mechanical draft cooling towers of Unit 5, but there is no surface water discharge from the canals to other water bodies. Because the cooling canals are much lower in elevation than 26.0 ft NAVD 88, the design plant grade of Units 6 and 7, they do not cause any flooding concern to the safety-related SSCs of Units 6 and 7. In addition, there is no reliance of Units 6 and 7 on these existing canals for any plant water use.

Staff Technical Evaluation

The staff reviewed the information in Turkey Point Units 6 and 7 COL FSAR Section 2.4.8 and the function of the AP1000 UHS and confirmed that Units 6 and 7 are not designed to use cooling water canals for normal plant cooling, emergency cooling, or other safety-related purposes. Accordingly, the staff accepts the applicant's determination that there are no safety-related canals proposed for Turkey Point Units 6 and 7.

Additionally, the staff has determined that the large elevation difference between the design plant grade of Units 6 and 7 and the existing system cooling canals precludes any flooding concern from these canals for the safety-related SSCs of Units 6 and 7. The rationale for this determination is consistent with the staff reasoning regarding flooding on streams, rivers, and canals, which is presented in more detail in Section 2.4.3.

2.4.8.4.2 *Makeup Water Reservoirs*

Information Submitted by Applicant

The applicant described the systems and structures as follows: The mechanical draft cooling towers that function as the normal heat sinks for the circulating water system of the main condensers of Units 6 and 7 are designed to operate on two makeup water sources: reclaimed water and saltwater through radial collector wells. Each of the two makeup water sources can independently support full load operation of the station. Reclaimed water is supplied by the Miami-Dade Water and Sewer Department to the FPL reclaimed water facility and is delivered to an onsite makeup water reservoir (MWR) after treatment. Reclaimed water from the reservoir is then transferred to the cooling tower basins through a set of cooling tower makeup pumps when the system is running on reclaimed water. The MWR has no safety-related function. It provides makeup water inventory to support the continuous operation of the cooling towers for both units. When the cooling towers obtain makeup water from the radial collector wells, saltwater is transferred directly to the cooling tower basins, bypassing the MWR.

The MWR, which is made of concrete, is on the south side of the plant area. The north side of the reservoir is approximately 2,200 ft (671 m) long, and the south side is approximately 1,800 ft (549 m) long. The bottom of the reservoir is at elevation –2.0 ft (0.6 m) NAVD 88. The top of the concrete walls is at 24.0 ft NAVD 88, with the maximum storage level at 22.5 ft (6.9 m) NAVD 88. The six cooling towers, three for each unit and their common open channel flumes, occupy part of the footprint of the MWR.

The MWR is a self-contained reservoir with no other contributing drainage area. The only inflows are direct rainfall and reclaimed water. It does not receive effluents from the operation of Units 6 and 7; these effluents are directed to the blowdown sump before being discharged into the underground injection wells. The applicant noted that low flow conditions of the MWR are addressed in Turkey Point Units 6 and 7 COL FSAR Subsection 2.4.11 and the effects of potential breaching of the MWR are considered in Turkey Point Units 6 and 7 COL FSAR Subsection 2.4.4.

Staff's Technical Evaluation

The staff reviewed the information in Turkey Point Units 6 and 7 COL FSAR Section 2.4.8 and confirmed that proposed Units 6 and 7 are not designed to use reservoirs for safety-related purposes. Accordingly, the staff accepts the applicant's determination that there are no safety-related canals or safety-related reservoirs proposed for Turkey Point Units 6 and 7. Potential flooding impacts related to the non-safety-related makeup water reservoir are addressed in SER Section 2.4.4. The potential for seiche effects related to this reservoir is discussed in SER Section 2.4.5.4.

2.4.8.5 *Post Combined License Activities*

There are no post COL activities related to this subsection.

2.4.8.6 *Conclusions*

As set forth above, the applicant presents and substantiates information relative to the design bases of canals and reservoirs important to the design and siting of this plant. The staff reviewed Turkey Point Units 6 and 7 and PTN COL 2.4-3 and concluded, for the reasons given

above, that the identification and consideration of the design bases of canals and reservoirs are acceptable and meet the requirements of 10 CFR 52.79, 10 CFR 100.23(d), and 10 CFR 100.20(c), with respect to determining the acceptability of the site.

The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR.

2.4.9 Channel Diversions

2.4.9.1 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.4.9 addresses channel diversions. It evaluates plant and essential water supplies used to transport and impound water supplies to ensure that they will not be adversely affected by stream or channel diversions. The evaluation includes stream channel diversions away from the site (which may lead to a loss of safety-related water) and stream channel diversions toward the site (which may lead to flooding). In addition, in such an event, it must be ensured that alternate water supplies are available to safety-related equipment.

SER Section 2.4.9 presents an evaluation of the following specific areas: (1) historical channel migration phenomena including cutoffs, subsidence, and uplift, (2) regional topographic evidence that suggests a future channel diversion may or may not occur (used in conjunction with evidence of historical diversions), (3) thermal causes of channel diversion, such as ice jams, which may result from downstream ice blockages that may lead to flooding from backwater, or upstream ice blockages that can divert the flow of water away from the intake, (4) potential for forces on safety-related facilities or the blockage of water supplies resulting from channel migration-induced flooding (flooding not addressed by hydrometeorological-induced flooding scenarios in other sections), (5) potential of channel diversion from human-induced causes (i.e., land-use changes, diking, channelization, armoring, or failure of structures), (6) alternate water sources and operating procedures, (7) potential implications of seismic and nonseismic information on the postulated worst-case channel diversion scenario for the proposed plant site, and (8) any additional information requirement prescribed in the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.4.9.2 Summary of Application

The applicant addressed the information related to channel diversions in Turkey Point Units 6 and 7 COL FSAR Section 2.4.9.

AP1000 COL Information Item

- PTN COL 2.4-3 Cooling Water Supply

COL License Information Item 2.4-3 requires COL applicants to provide site-specific information related to the potential for channel diversions and their effects on the safety-related cooling systems.

2.4.9.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for the identification and evaluation of channel diversions, and the associated acceptance criteria, are described in Section 2.4.9 of NUREG-0800.

The applicable regulatory requirements for identifying and evaluating channel diversions are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 100.23(d) sets forth the criteria to determine the siting factors for plant design bases with respect to water levels at the site.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The related acceptance criteria are provided in the following RG:

- Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants," as supplemented by best current practices
- Regulatory Guide 1.102 as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.9.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.9 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic. The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to channel diversions. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

AP1000 COL Information Item

- PTN COL 2.4-3

This section addresses COL Information Item 2.4.3 (COL Action Item 2.4.2-1), which is identified in Section 2.4.1.3 of the DCD and states:

Combined License applicants will address the water supply sources to provide makeup water to the service water system cooling tower.

The staff reviewed the application information in the Turkey Point Units 6 and 7 COL FSAR and supplemented it with observations made during the staff's site visit on March 22, 2010. The staff also used publicly available data to determine the likelihood of channel diversion and other geomorphic changes near the Turkey Point site. To complete the review, the staff needed an accurate description of the history of channel diversions and other geomorphic changes and the potential for future channel diversions and geomorphic changes, as they relate to the functioning of safety-related SSCs. The descriptive information and the staff review are described below.

2.4.9.4.1 *Stream Channel Diversions*

By providing evidence of past channel diversion and other geomorphic changes, the geologic record can be one indicator of changes that could occur in the future. The historical record of channel diversion and other geomorphic changes also can be an indicator of changes that could occur in the future.

Information Submitted by Applicant

The applicant reviewed the site's geologic setting, including the seismic and stratigraphic properties, as described in Turkey Point Units 6 and 7 COL FSAR Subsection 2.5.1. The applicant described the geologic setting as follows: Turkey Point Units 6 and 7 are located within the Southern Slope subprovince of the Southern Zone physiographic subregion of the Florida Platform (a partly submerged peninsula of the continental shelf) within the Atlantic Coastal Plain physiographic province. The geology was influenced by sea-level fluctuations, processes of carbonate and clastic deposition, and erosion. The Paleogene (early Cenozoic) was dominated by the deposition of carbonate rocks, while the Neogene (late Cenozoic) is primarily characterized by the deposition of quartzitic sands, silts, and clays. Flat, planar bedding predominates. Before site development, the Turkey Point site was within 3 ft of sea level (preconstruction elevations ranged from -2.4 ft to 0.8 ft NAVD 88) and was uniformly flat with the exception of a few isolated vegetated depressions. The local terrain was covered with a thin (less than 6 ft) veneer of organic muck overlying the Pleistocene Miami Limestone. The applicant reported finding no geological or topographic evidence that indicates historical channel diversions in the general area.

The applicant refers to discussion in Turkey Point Units 6 and 7 COL FSAR Section 2.4.1, which indicates that there are no major natural rivers or channels located near Units 6 and 7. The applicant stated as follows: An extensive system of canals was built between Lake Okeechobee and the Atlantic Ocean, Biscayne Bay, and the Gulf of Mexico during the last century for the purposes of drainage, flood protection, and water supply. Consisting of multiple waterways with locks and gates for controlling flow and water levels, the canal system has elevated levees along both of its banks to contain flood flow during storm events. As a controlled system, it is not susceptible to channel migration or cutoff. The applicant reported that there is no evidence of channel diversions in the area as a result of natural flooding events since the canal system was built.

Staff's Technical Evaluation

The staff reviewed the information provided by the applicant and supplemented it with observations of the topography and surficial geology of the site and vicinity made during the staff's site visit on March 22, 2010. The staff observations confirm the absence of natural rivers and channels and the minimal topographic relief in the surrounding landscape. In addition, the

staff has determined that the applicant's interpretation of the geologic evidence is consistent with observed site conditions and published references on the geology of the area. The staff has also determined that the applicant's statement that the canal system is not susceptible to channel migration or cutoff is consistent with observed site conditions and the engineering design of these systems. For these reasons, the staff concludes that there is no geologic and historic evidence of stream channel diversion in the area of the Units 6 and 7 site.

2.4.9.4.3 *Shoreline Changes*

Due to the site's location adjacent to a marine shoreline, the potential effects on SSCs from changes in the shoreline need to be considered.

Information Submitted by Applicant

The applicant stated as follows: Biscayne Bay is bounded by mainland Florida to the west; by barrier islands and a wide, shallow opening of coral shoal near the middle of the bay; and by several channels and cuts to the east. The barrier islands are between the bay and the Atlantic Ocean. Biscayne Bay is a shallow subtropical lagoon with a natural depth ranging from 3 to 9 ft. However, much of the bay has been dredged and the current depth ranges from 6 to 10 ft (Florida Department of Environmental Protection, 2008). There is historical evidence of shoreline changes along the Florida coasts, including the western shore of Biscayne Bay where Turkey Point Units 6 and 7 are located.

The applicant incorporated Turkey Point Units 6 and 7 COL FSAR Section 2.5 by reference in Turkey Point Units 6 and 7 COL FSAR Section 2.4.9. In Turkey Point Units 6 and 7 COL FSAR Section 2.5, the applicant discusses the characteristics of the Florida Keys physiographic sub-province, which is the narrow chain of small islands at the southern tip of the Florida peninsula that also forms the eastern boundary of Biscayne Bay. The applicant stated that the Florida Keys comprise Pleistocene reef sediments. The applicant cited research indicating that a topographic high beneath Key Largo was the focus of reef growth. The applicant indicated further that Late Tertiary siliciclastic sediments underlying the Quaternary carbonate rocks appear to control the position and arc shape of the recent shelf and slope of southern Florida. Additionally, the applicant indicated that the arc pattern of the Florida Keys is related to the bathymetry of the shelf edge and the Florida current. According to the applicant, the growth of patch reefs is dependent upon nutrient availability, sea level, and topography.

The applicant described natural shoreline changes along east Florida as being due to hurricanes, tropical storms, northeasters, and tidal and wave actions, which erode sandy beaches and barrier islands, especially around inlets (Morton and Miller, 2005). The applicant stated as follows: Artificial coastal protection structures amplify shoreline fluctuations by changing the natural longshore sediment transport pattern. Barrier islands protect lagoons such as Biscayne Bay from some of these effects, but wakes generated by boats in the lagoons can contribute to local shore erosion in some areas (Morton and Miller, 2005).

Morton and Miller (2005) summarized long- and short-term shoreline change for the southeast Atlantic coast. Long-term rates of shoreline change were estimated based on surveys of shoreline positions from the 1800s to 1999, and short-term rates of shoreline change were estimated based on 1970s and 1999 shoreline positions. The average long- and short-term shoreline-change rates for east Florida are 0.2 ± 0.6 m/year (0.66 ± 2.0 ft/year) and 0.7 m/year (2.3 ft/year), respectively (plus sign indicates accretion and minus sign indicates erosion). This long-term shoreline rate of change is relatively small compared to shoreline changes for the

other parts of the southeast Atlantic coast because tidal and wave energy levels are low and beach nourishments are common where shore erosion persists. Nevertheless, at least 39 percent of the east Florida shoreline experienced erosion, at a long-term average erosion rate of 0.5 m/year (1.6 ft/year). The study did not estimate the long- and short-term shoreline change rates specifically for Biscayne Bay. However, the applicant's discussion of this topic states that shoreline changes in Biscayne Bay, especially along the western shore, are expected to be smaller than for the open coast because of the protection provided by the barrier islands.

The applicant provided a figure, based on data from the NOAA Shoreline Data Explorer, showing the shorelines near Units 6 and 7 for the years 1928, 1946, and 1971/1972 (Figure 2.4.9-1). The figure indicates that there was some shoreline erosion during the 43-year period between 1928 and 1971/1972, although some areas also experienced accretion. During the latter 25 years of this period, from 1946 through 1971/1972, only minor shoreline changes were observed.

The applicant stated that any shoreline changes that would occur near Units 6 and 7 as a result of long-term tidal and wave actions would be relatively gradual with sufficient warning for mitigating actions to be implemented before the safety facilities will be adversely impacted.

Shoreline changes as a result of hurricanes or tropical storms occur on a shorter time scale, however. The applicant cites a study by Tilmant et al. (1994) on the effects of Hurricane Andrew in 1992 on the mainland coast of Biscayne Bay, from Rickenbacker Causeway to Turkey Point. According to the source, lower beach slope erosion from the hurricane seldom exceeded 0.3 to 1 m (1 to 3.3 ft) and lateral erosion of the shoreline did not exceed 10 m (33 ft). The same source also indicates, however, that earlier slower-moving hurricanes, such as Hurricane Donna in 1960, caused more beach erosion than Hurricane Andrew (Tilmant et al., 1994). The applicant stated that the Units 6 and 7 plant area would be built up to higher elevations from the adjacent grade and protected by a retaining wall structure with the top of

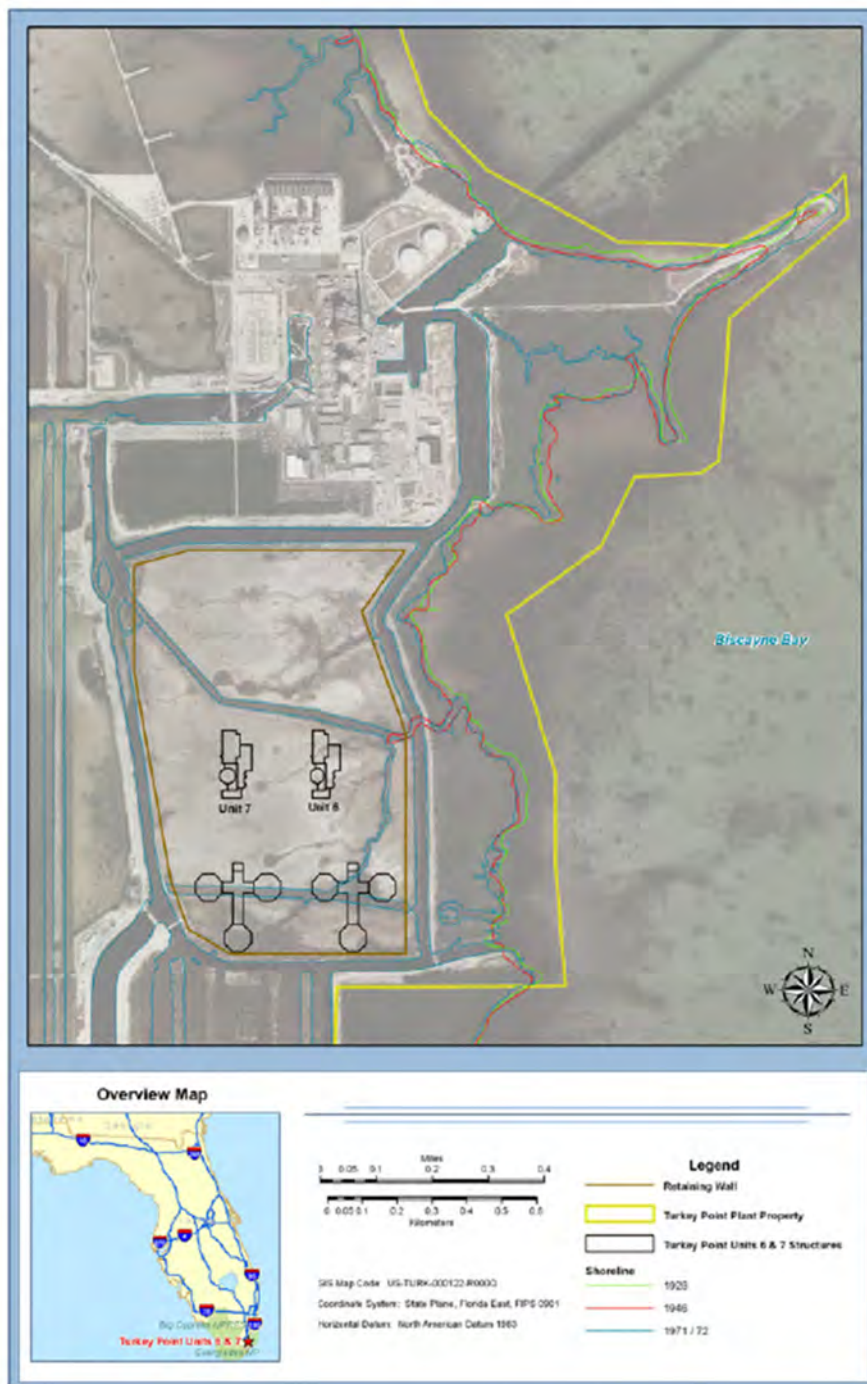


Figure 2.4.9-1 Historical Shoreline Changes at Units 6 & 7 (Modified after Turkey Point Units 6 and 7 COL FSAR Figure 2.4.9-201)

wall elevation varying from 20 ft to 21.5 ft NAVD 88. The retaining wall, though not a safety-related structure, is designed to withstand the hydrostatic and hydrodynamic forces from hurricane surge up to the PMSS and coincidental wave run-up actions. Accordingly, the applicant expected no adverse impact on the structures, systems, or components as a result of shoreline erosion caused by hurricane or tropical storm surges.

The applicant stated that long-term sea-level rise will cause a landward shift of the shoreline position, inundating low-lying areas along the coast. As discussed in Subsection 2.4.5, the applicant estimated that the long-term average sea-level rise at the plant property is expected to be approximately 0.78 ft per century (0.094 in/yr), similar to the sea-level rise rate at Miami Beach, FL. The applicant stated that this rate of the sea-level rise is too slow to cause any significant short-term shoreline change and points out that this sea-level rise is accounted for in determining the flood level from the probable maximum hurricane storm surge.

Additionally, the applicant stated that any erosion or inundation of the barrier islands due to long-term wave action would be gradual with sufficient warning for mitigating actions to be implemented before the safety-related facilities are adversely impacted. Similarly, the applicant indicated that any migration of the shoreline due to coastal protection structures, dredging, and other human activities near and around the plant site would be gradual and will be addressed before the safety-related facilities are adversely impacted.

Staff's Technical Evaluation

The staff reviewed the information supplied by the applicant and supplemented it with observations of the site and vicinity topography made during the staff's site visit on March 22, 2010, and review of information in published references. Regarding the potential for shoreline change, the staff confirmed that the historical record of shoreline changes at the Turkey Point site indicates that the long-term shoreline rate of change is relatively small. Additionally, the staff observes that most of the historical changes recorded at that site before development of the Turkey Point plant (as illustrated by Figure 2.4.9-1) can be attributed to human actions such as canal development, rather than to natural phenomena. Furthermore, long-term shoreline changes on the western shore of Biscayne Bay would be moderated by the protection provided by the barrier islands. Because the barrier islands on the eastern shore of the bay were formed from reef sediments, unlike most eastern U.S. barrier islands that formed as spits, shoals, or dunes (Morton and Miller, 2005), they are less susceptible to erosion or breaching by storm events than typical barrier islands, and therefore can be expected to remain relatively stable throughout the operating life of the proposed units. Additionally, erosion or inundation of the barrier islands due to long-term wave action, coastal protection structures, dredging, and other human activities are gradual processes, and there would be sufficient warning for mitigating actions to be implemented before the safety-related facilities are adversely impacted.

The applicant's information on the effects of Hurricane Andrew and other hurricanes indicates that dramatic changes in shoreline position can occur in a short time as a result of storm events. However, the staff agrees that an engineered retaining wall surrounding the built-up site of Units 6 and 7 that is designed to withstand the hydrostatic and hydrodynamic forces associated with hurricanes and tropical storm surges and wave action would be sufficient to prevent adverse impacts on the structures, systems, or components as a result of shoreline erosion caused by such events. The staff notes that the distance between the shoreline and the SSCs (i.e., at least 690 ft from the top of the retaining wall to the SSCs) is large in comparison with the maximum lateral erosion reported from Hurricane Andrew, which helps to support the conclusion that shoreline erosion would not affect the SSCs.

Regarding long-term sea-level rise, the reported long-term average rate of sea-level rise (which is approximately 0.78 foot in 100 years) determined from Miami Beach records is too slow to cause significant short-term shoreline change. Any shoreline changes associated with this rate of sea-level rise would occur with sufficient warning that mitigating actions could be implemented before the safety-related facilities are adversely impacted. As discussed in

Section 2.4.5.4, the staff requested and received additional information and analysis regarding the rate of sea-level rise and, for the reasons stated in that SER section, accepted the licensee's analysis.

2.4.9.4.4 Flooding of the Site due to Channel Diversion

Flooding can be caused by phenomena that divert streams, such as landslides and ice jams.

Information Submitted by Applicant

Because the plant property is flat and no major rivers are located nearby, the applicant found that there is no potential for subaerial landslide-generated flooding. Potential impacts on the site from underwater landslides (that is, submarine landslide-generated tsunamis) are addressed in Section 2.4.6.

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.7, the applicant indicates that there are no records of ice jams in the region of South Florida where Turkey Point Units 6 and 7 are located. Therefore, the applicant concluded that there is no potential for flooding or low water concerns as a result of channel diversions both upstream and downstream of Turkey Point Units 6 and 7 from ice blockage or breaching of ice jams.

Staff's Technical Evaluation

As described in Section 2.4.7, the staff reviewed information related to the potential for ice jams and concluded that ice jams and other ice-related effects are precluded. Based on this conclusion, the minimal topographic relief of the site and vicinity, and the absence of rivers and streams, the staff accept the applicant's reasoning regarding flooding due to stream diversion by phenomena such as landslides and ice jams. For the reasons given by the applicant, these phenomena are not concerns for Turkey Point Units 6 and 7.

2.4.9.4.5 Potential for Impacts to Safety-Related Water Supply

Low water conditions caused by channel diversion or shoreline migration events have the potential to disrupt access to surface-water sources.

Information Submitted by Applicant

On the consideration of the plant's safety-related water supply, the applicant noted that the design of the AP1000 reactor employs a passive containment cooling system that functions as the safety-related ultimate heat sink. Because this passive containment cooling system does not rely on an open surface water source or groundwater source to perform its safety-related function, its operation could not be adversely affected by the interruption of plant water supply as a result of low water conditions caused by channel diversion or shoreline migration events.

Staff's Technical Evaluation

Because the AP1000 passive containment cooling system does not credit an open surface water source to perform its safety-related function, the staff accepts the applicant's reasoning regarding potential for impacts to safety-related water supply due to channel diversion or shoreline migration events. For the reasons given by the applicant, this is not a concern for Turkey Point Units 6 and 7.

2.4.9.5 *Post Combined License Activities*

There are no post COL activities related to this subsection.

2.4.9.6 *Conclusions*

The staff reviewed the application and confirmed that the applicant has adequately addressed the information related to the potential for and effects of channel diversions on safety-related cooling systems, and that there is no outstanding information required to be addressed in Turkey Point Units 6 and 7 COL FSAR Section 2.4.9.

As set forth above, the applicant has presented and substantiated information to establish the site description ensuring that the plant and essential water supplies will not be adversely affected by potential channel diversions. The staff has reviewed the information submitted by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.4.9 and PTN COL 2.4-3 and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description to allow the staff to evaluate, as documented in SER Section 2.4.9, whether the applicant has met the relevant requirements of 10 CFR 52.79(a)(1) and 10 CFR Part 100 with respect to determining the acceptability of the site. In conclusion, the applicant has satisfied 10 CFR Part 52 and 10 CFR Part 100 with respect to channel diversions. This addresses the part of COL Information Item 2.4-3 related to channel diversions.

2.4.10 Flooding Protection Requirements

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.10 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to flooding protection requirements. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

2.4.10.1 *Introduction*

Turkey Point Units 6 and 7 COL FSAR Section 2.4.10 addresses the locations and elevations of safety-related facilities and those of structures and components required for protection of safety-related facilities. These requirements are then compared with design-basis flood conditions to determine whether flood effects need to be considered in the plant's design or in emergency procedures.

Section 2.4.10 of this SER presents an evaluation of the following specific areas: (1) safety-related facilities exposed to flooding, (2) type of flood protection (e.g., "hardened facilities," sandbags, flood doors, bulkheads, etc.) provided to the SSCs exposed to floods, (3) emergency procedures needed to implement flood protection activities and warning times available for their implementation reviewed by the organization responsible for reviewing issues related to plant emergency procedures, (4) potential implications of seismic and non-seismic information on the postulated flooding protection for the proposed plant site, and (5) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.4.10.2 *Summary of Application*

This subsection of the Turkey Point Units 6 and 7 COL FSAR addresses the needs for site-specific information on flooding protection. The applicant addressed the information as follows:

COL License Information Items

- PTN COL 2.4-2 Floods
- PTN COL 2.4-6 Flood Protection Emergency Operation Procedures

COL License Information Item 2.4-2 and 2.4-6 require COL applicants to provide site-specific information related to any flood protection measures needed to protect the plant facilities from potential floods.

2.4.10.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for the identification and evaluation of flooding protection measures, and the associated acceptance criteria, are described in Section 2.4.10 of NUREG-0800.

The applicable regulatory requirements for identifying and evaluating flooding protection measures are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 100.23(d) sets forth the criteria to determine the siting factors for plant design bases with respect to water levels at the site.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The related acceptance criteria are provided in the following Regulatory Guides:

- Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants," as supplemented by best current practices
- Regulatory Guide 1.102 as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.10.4 *Technical Evaluation*

Turkey Point Units 6 and 7 COL FSAR Section 2.4.10 addresses the needs for site-specific information on flooding protection. The applicant addressed the information as follows:

AP1000 COL Information Item

- PTN COL 2.4-2

In addition, this section addresses the COL Information Item 2.4.2 (COL Action Item 2.4.1-2) identified in Section 2.4.1.2 of the DCD.

This section of the SER relates to the flood protection part of COL Information Item 2.4.2.

- PTN COL 2.4-6

In addition, this section addresses the following COL Information Item 2.4-6 (COL Action Item 2.4.1-1) identified in Section 2.4.1.6 of the DCD.

Combined License applicants referencing the AP1000 certified design will address any flood protection emergency procedures required to meet the site parameter for flood level.

Evaluation of the information provided in PTN COL 2.4-2 and PTN-COL 2.4-6 related to any flood protection measures needed to protect the plant facilities from potential floods at the Turkey Point Units 6 and 7 site is discussed below.

Information Submitted by Applicant

The applicant identified the design-basis flood elevation for Units 6 and 7 as 24.8 ft NAVD 88, determined by PMSS. The elevations of floor entrances and openings of all safety-related structures are at 26 ft NAVD 88. Because the design-basis flood elevation is below the entrance floor elevations of the safety-related structures, the applicant stated that the safety functions of the plant are not affected by the design basis flood event.

Additionally, the applicant referred to the analysis in Turkey Point Units 6 and 7 COL FSAR Subsection 2.4.2.3 regarding the flood elevation resulting from local intense precipitation (also referred to as local PMP) at Units 6 and 7. The applicant's analysis, which conservatively assumes that all underground storm drains and culverts are clogged, found the maximum flood water level of 24.5 ft (7.5 m) NAVD 88 in the Units 6 and 7 power block area where safety-related SSCs are located. Consequently, the applicant stated that local PMP storm event does not cause flooding impacts to the safety-related SSCs.

The applicant stated that because none of the Units 6 and 7 safety-related SSCs are impaired by any of the postulated flood events, no flood protection measures are required. Thus, the applicant finds that no technical specifications or emergency procedures to implement flood protection activities are required.

The applicant noted that the Units 6 and 7 plant area would be surrounded by a non-safety-related retaining wall structure with the top of the wall elevation varying from 20 ft (6 m) to 21.5 ft (6.6 m) NAVD 88. This is a retaining wall with earthen material behind it; it is not a dike or seawall. Accordingly, as described in Section 2.4.5.4.6, storm waves that reach shore at elevations above the top of the wall would dissipate as they move up the sloping surface above the wall. The applicant stated that the safety-related structures of Unit 6 and Unit 7 are

(respectively) at least 750 ft (229 m) and 690 ft (210 m) away from the nearest retaining wall. The applicant stated that the retaining wall is designed to withstand the hydrostatic and hydrodynamic forces from hurricane surge up to the PMSS and coincidental wave run-up actions.

Staff's Technical Evaluation

The staff reviewed the applicant's information regarding flood protection requirements. The staff finds that the applicant's analysis is adequate to address flood protection requirements. The maximum floodwater surface elevation of 24.8 ft (7.6 m) NAVD 88 is below 26.0 ft (7.9 m) NAVD 88, which is equivalent to the design plant grade elevation of 100 ft in the DCD reference datum. The staff concluded therefore, that the DCD maximum flood level parameter would not be exceeded. Therefore, no additional flood protection is needed for Turkey Point Units 6 and 7.

2.4.10.5 Post Combined License Activities

There are no post COL activities related to this subsection.

2.4.10.6 Conclusions

The staff reviewed the application and confirmed that the applicant has addressed the information to demonstrate that the characteristics of the site fall within the site parameters specified in the DC rule, and that there is no outstanding information in regard to flood protection remaining to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section.

As set forth above, the applicant has presented and substantiated information relative to the flood protection measures important to the design and siting of this plant. The staff finds that the applicant has considered the appropriate site phenomena in establishing the flood protection measures for SSCs. The staff has reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.10, PTN COL 2.4-2, and PTN COL 2.4-6, and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description to allow the staff to evaluate, as documented in Section 2.4.10, of this SER, whether the applicant has met the relevant requirements of 10 CFR 52.79(a)(1)(iii) and 10 CFR Part 100 with respect to determining the acceptability of the site. This addresses the part of COL Information Item 2.4-2 related to flood protection requirements and COL Information Item 2.4-6.

2.4.11 Low Water Considerations

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.11 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to low water considerations. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

2.4.11.1 *Introduction*

Turkey Point Units 6 and 7 COL FSAR Section 2.4.11 addresses natural events that may reduce or limit the available safety-related cooling water supply. The applicant ensures that an adequate water supply will exist to shut down the plant under conditions calling for safety-related cooling.

Section 2.4.11 of this SER presents an evaluation of the following specific areas: (1) low water conditions due to the worst drought considered reasonably possible in the region, (2) effects of low water surface elevations caused by various hydrometeorological events and a potential blockage of intakes by sediment, debris, littoral drift, and ice because they can affect the safety-related water supply, (3) effects of low water on the intake structure and pump design bases in relation to the events described in SER Sections 2.4.7, 2.4.8, 2.4.9, and 2.4.11, which consider the range of water supply needed by the plant (including minimum operating and shutdown flows during anticipated operational occurrences and emergency conditions) compared with availability (considering the capability of the UHS to provide adequate cooling water under conditions calling for safety-related cooling), (4) use limitations imposed or under discussion by Federal, State, or local agencies authorizing the use of the water, (5) potential implications of seismic and non-seismic information on the postulated worst-case low water scenario for the proposed plant site, and (6) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.4.11.2 *Summary of Application*

The applicant addressed the information related to low water considerations in Turkey Point Units 6 and 7 COL FSAR Section 2.4.10.

AP1000 COL Information Item

- PTN COL 2.4-3 Cooling Water Supply

COL License Information Item 2.4-3 requires COL applicants to provide site-specific information related to the water supply resources to provide makeup water to the service water system cooling tower.

2.4.11.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for low water considerations, and the associated acceptance criteria, are described in Section 2.4.11 of NUREG-0800.

The applicable regulatory requirements for identifying the effects of low water are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 100.23(d) sets forth the criteria to determine the siting factors for plant design bases with respect to seismically induced floods and water waves at the site.

- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

Appropriate sections of the following Regulatory Guides are used by the staff for the identified acceptance criteria:

- Regulatory Guide 1.59 as supplemented by best current practices; and
- Regulatory Guide 1.102 as it relates to providing assurance that SSCs important to safety have been designed to withstand the effects of natural flooding phenomena likely to occur at the site

2.4.11.4 *Technical Evaluation*

Information Submitted by Applicant

The applicant referred to the AP1000 DCD and incorporated it by reference. The applicant noted that the passive containment cooling system for Turkey Point Units 6 and 7 does not need an open surface water source to perform its safety-related function, and, therefore, its operation is not impaired by low flow conditions in surface water bodies. The applicant referred to AP1000 DCD Subsection 6.2.2 for a detailed description of the UHS design.

The applicant stated that for the AP1000 design, the passive containment cooling system serves as the ultimate heat sink for design basis accident events. The passive containment cooling system is not reliant on the source of water from the cooling towers' makeup water system. In the Turkey Point Units 6 and 7 design, makeup for the passive containment cooling system is provided by means of a connection to the municipal water supply.

Additionally, the applicant stated that the non-safety-related raw water system has 100 percent redundancy because either of its two makeup water sources (i.e., reclaimed water supplied by the Miami-Dade County Water and Sewer Department and saltwater withdrawn from radial collector wells) could fully supply the need for makeup water.

Based on this information, the applicant stated that no warning of impending low flow from the cooling tower makeup water system is required, and makeup water supply during low flow conditions would not affect the ability of the safety-related UHS to provide the necessary cooling for emergency conditions.

Staff's Technical Evaluation

The staff reviewed the information supplied by the applicant. The staff accepts the applicant's conclusion that because the passive containment cooling system for Turkey Point Units 6 and 7 does not depend on an open surface water source to perform its safety-related function, its operation is not adversely affected by low flow conditions in surface water bodies. There are no site characteristics in the DCD associated with low water conditions.

The applicant has provided the information needed to address the water supply sources to provide makeup water to the service water system cooling tower. The staff confirmed that the raw water system for Units 6 and 7 is designed with redundancy, as either of its two raw water sources could fully supply the need for makeup water for the service water system cooling tower. These two water sources can also provide makeup to the passive containment cooling system tank. Staff also notes that neither of these two sources would be sensitive to low-water conditions in a surface water body. Therefore, the staff finds that low water conditions would not affect the safety of Turkey Point Units 6 and 7.

2.4.11.5 *Post Combined License Actions*

There are no post COL activities related to this subsection.

2.4.11.6 *Conclusions*

The staff reviewed the application and confirmed that the applicant has addressed the information related to low water conditions and the water supply resources to provide makeup water to the service water system cooling tower, and that there is no outstanding information remaining to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section.

As set forth above, the applicant has presented and substantiated information relative to the low water effects important to the design and siting of this plant. The staff finds that the applicant has considered the appropriate site phenomena in establishing the design bases for SSCs. The staff has reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.11, PTN COL 2.4-3, and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description to allow the staff to evaluate, as documented in Section 2.4.11, of this SER, whether the applicant has met the relevant requirements of 10 CFR Part 52.79(a)(1) and 10 CFR Part 100 with respect to determining the acceptability of the site. In conclusion, the applicant has provided sufficient information for satisfying 10 CFR Part 52 and 10 CFR Part 100 in regard to low water concerns.

2.4.12 Groundwater

2.4.12.1 *Introduction*

Turkey Point Units 6 and 7 COL FSAR Section 2.4.12 describes the hydrogeological characteristics of the site. The most significant objective of groundwater investigations and monitoring at this site is to evaluate the effects of groundwater on safety-related plant facilities. The evaluation is performed to assure that the maximum groundwater elevation remains below the AP1000 DCD site parameter value. The other significant objectives are to examine whether groundwater provides any safety-related water supply; to determine whether dewatering systems are necessary to maintain groundwater elevation below the maximum specified level; to measure characteristics and properties of the site needed to develop a conceptual site model of groundwater movement; and to estimate the direction and velocity of movement of potential radioactive contaminants.

This section presents an evaluation of the following specific areas: (1) identification of the aquifers, types of onsite groundwater use, sources of recharge, present withdrawals and known and likely future withdrawals, flow rates, travel time, gradients and other properties that affect the movement of accidental contaminants in groundwater, groundwater levels beneath the site, seasonal and climatic fluctuations, monitoring and protection requirements, and manmade

changes that have the potential to cause long-term changes in local groundwater regime, and (2) effects of groundwater levels and other hydrodynamic effects of groundwater on the design.

2.4.12.2 *Summary of Application*

This section of the Turkey Point Units 6 and 7 COL FSAR addresses groundwater conditions in terms of influences on structures and water supply.

The applicant submitted Turkey Point Units 6 and 7 COL FSAR Section 2.4.12 as a site-specific supplement designed to address COL Information Item 2.4-4.

AP1000 COL Information Item

- PTN COL 2.4-4

COL Information Item 2.4-4 requires COL applicants to provide site-specific information on groundwater.

This COL item is addressed by Turkey Point Units 6 and 7 COL FSAR Section 2.4.12. In particular, this section addresses the site-related parameter for groundwater level that is specified in Table 2-1 of Revision 19 of the DCD, and is defined and discussed in Section 2.4.1.4 of Revision 19 of the DCD. Section 2.4.1.4 states:

Combined License applicants referencing the AP1000 certified design will address site-specific information on groundwater. No further action is required for the sites within the bounds of the site parameter for groundwater.

2.4.12.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for groundwater, and the associated acceptance criteria, are described in Section 2.4.12 of NUREG-0800.

The applicable regulatory requirements are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR 100.23(d) sets forth the criteria to determine the siting factors for plant design bases with respect to seismically induced floods and water waves at the site.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

2.4.12.4 *Technical Evaluation*

The NRC staff reviewed Section 2.4.12 of the COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic. The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to groundwater. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design" and its supplements.

2.4.12.4.1 Regional Hydrogeologic Description

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.1.2, the applicant described the geologic formations, regional and local groundwater aquifers, aquifer recharge and discharge regions, and onsite groundwater use. The hydrogeologic conceptual model of the Turkey Point Units 6 and 7 site was formulated by the applicant using data sources that included:

- A desktop study of the regional groundwater system derived from State, Federal, and other sources of information;
- A review of Florida Power and Light FSAR Units 3 and 4 documentation with regard to groundwater;
- The evaluation of site-specific geotechnical and geologic data collected during characterization of the Turkey Point Units 6 and 7 site;
- The evaluation of regional and local hydrogeology through review of studies, data and information, such as proximal deep-well injection sites; and
- The evaluation of site-specific hydrogeology through review of data and information obtained during construction and testing of Class V Exploratory Well EW-1 and Dual Zone Monitoring Well DZMW-1.

The site-specific Turkey Point Units 6 and 7 data were considered by the applicant along with data from existing Units 3 and 4 to formulate the conceptual groundwater and transport model for the site with a focus on the proposed location for Turkey Point Units 6 and 7.

In Turkey Point Units 6 and 7 COL FSAR, Section 2.4.12.1.1, the applicant described the Turkey Point Units 6 and 7 site, which is in Miami-Dade County, FL, as follows: The site is in the Southern Slope subprovince of the Southern Zone of the Florida Platform, which is a partly submerged peninsula of the continental shelf, in the Atlantic Coastal Plain physiographic province. The subprovince is characterized by relatively flat topography ranging from sea level at the coast to 2.4 to 0.8 ft mean sea level (MSL) NAVD 88 along the northern and western inland boundaries of the sub-province. The plant is bordered on the east by Biscayne Bay, on the west by FPL Everglades Mitigation Bank, and on the north by Biscayne Bay National Park. The applicant stated that the plant area consists primarily of coastal mangroves and tidal flats along the western margin of Biscayne Bay that have been modified to accommodate the industrial wastewater facility consisting of cooling canals for Turkey Point Units 3 and 4. The applicant stated that the canals contain approximately 4 billion gallons of water, and are unlined. Additionally, there is an interceptor ditch between the western side of the cooling canals and the

L-31E canal in which the water level is carefully controlled as to inhibit landward movement of shallow saline groundwater from the site. The water levels in all canals are carefully controlled to maintain static groundwater-surface water interactions. Underlying the Turkey Point Units 6 and 7 site are 4,000 to 15,000 feet of sedimentary deposits including clastics consisting of quartz sands, silt, marl, and clay and nonclastics consisting of carbonate materials such as shell beds, calcareous sandstone, limestone, dolostone, dolomite, and anhydrite.

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.1.2, the applicant stated that there are three regional aquifer systems (or hydrogeologic units) that are present at the Turkey Point Units 6 and 7 site. The applicant stated that these systems include the surficial aquifer system, the intermediate aquifer system/confining unit, and the Floridan aquifer system (Southeastern Geological Society, 1986). Regional thicknesses and depths are presented in Turkey Point Units 6 and 7 COL FSAR Figure 2.4.12-202 and site thicknesses and depths for upper units are presented in Turkey Point Units 6 and 7 COL FSAR Figure 2.4.12-204.

The applicant indicated that the surficial aquifer system consists of unconsolidated quartz sands, shell beds, and carbonates ranging in age from Upper Miocene (Tamiami Formation) to Holocene. The applicant indicated further that the surficial aquifer system consists of the lower Tamiami aquifer, which is in some cases overlain by confining beds of the Tamiami Formation; and the overlying water table aquifer, which is referred to as the Biscayne aquifer. The entire surficial aquifer system is often referred to as the Biscayne aquifer, and in this report and the Turkey Point Units 6 and 7 FSAR, the terms Biscayne aquifer and surficial aquifer are used interchangeably. In the region, the thickness of the Biscayne aquifer ranges from approximately 20 to 400 ft (6 to 122 m). Detailed geological, physiographical, and geomorphological information are presented in Turkey Point Units 6 and 7 COL FSAR Subsections 2.5.1.1 and 2.5.1.2.

The applicant stated the intermediate aquifer system/confining unit underlies the Biscayne and consists of a thick sequence (around 900 feet) of fine-grained siliciclastics interbedded with carbonate strata of late Oligocene to Miocene age of the Hawthorn Group. The intermediate aquifer/confining unit comprises the Hawthorn Group sediments (composed of the Peace River and the Arcadia Formations) at elevations starting at 100 to 200 ft (30 to 61 m) below ground surface (bgs) and continuing to 700 to 1,250 ft (213 to 381 m) bgs MSL in the region of the Turkey Point Units 6 and 7 site. The applicant indicated that the unit is defined by the Southeastern Geological Society (1986) as the system of rocks that collectively retards exchange of water between the overlying surficial aquifer system and the underlying Floridan aquifer system. The applicant stated that transmissive units may occur within the intermediate confining unit and be used as local aquifers where they are present. As a result, the applicant stated that this hydrogeologic unit may be referred to locally as either the "intermediate confining unit" or the "intermediate aquifer system," which is a consequence of its observed variability in permeability throughout the State. The applicant stated that overall, this unit provides good confinement for the underlying Floridan aquifer system.

The applicant described the Floridan aquifer system in southern Florida as a thick sequence (2,300–3,400 ft (701–1036 m)) of permeable, Tertiary age interbedded carbonate rocks underlying approximately 100,000 mi² (258,999 km²) in the southeastern coastal U.S. The applicant described the Floridan aquifer system as follows: The Floridan aquifer comprises three different hydrogeologic units, the Upper Floridan aquifer, the middle confining unit, and the Lower Floridan aquifer. The Floridan aquifer comprises (from oldest to youngest) the Paleocene age Cedar Keys Formation, the Eocene age Oldsmar Formation, the Avon Park Formation, the Ocala Limestone (where it occurs), the early Oligocene age Suwannee

Limestone, and in some areas, the lower Hawthorn Group. The Upper Floridan aquifer is described by the applicant as thin water-bearing zones of high permeability interlayered with thick zones of low permeability, which could be between 100 to 400 ft (30 to 122 m) thick (Turkey Point Units 6 and 7 COL FSAR Figure 2.4.12-208).

The applicant indicated that the middle confining unit of the Floridan aquifer system underlies the Upper Floridan aquifer. In the Turkey Point Units 6 and 7 COL FSAR, the applicant reports that in the vicinity of the site, the top of the MCU occurs around 1,200 ft (366 m) deep and is greater than 1,000 ft (305 m) thick. The applicant states in the Turkey Point Units 6 and 7 COL FSAR that the middle confining unit can often occur as an upper and lower low permeability unit separated by a higher permeability zone (the Avon Park permeable zone).

Based on regional studies, the applicant estimated the top of the Lower Floridan aquifer to be at depths greater than 2,400 ft (732 m) bgs in the vicinity of the site. The applicant indicated that this unit consists of a thick sequence of low permeable zones that are similar in lithology to the middle confining unit. The applicant indicated that a highly permeable zone in the Lower Floridan aquifer known as the Boulder Zone occurs beneath the top of the Lower Floridan aquifer and can be up to 700 ft (213 m) thick. The applicant reports that based on previous studies in southern Florida, the Boulder Zone top elevation may vary from 2,000 to 3,400 ft (610 to 1,036 m) below ground surface. The applicant also stated that Boulder Zone contains saltwater and is used widely in Florida for wastewater disposal through deep injection wells. The applicant indicated further that the base of the Lower Floridan aquifer is marked by massive impermeable anhydrite beds of the Cedar Keys Formation.

Staff's Technical Evaluation

The staff reviewed subsections 2.4.12.1.1 "Physiography and Geomorphology" and 2.4.12.1.2 "Regional Groundwater Aquifers" of the Turkey Point Units 6 and 7 COL FSAR as well as supporting site studies, such as reports from the construction and testing of on-site wells EW-1 and DZMW-1 (McNabb HCl, 2012a and 2012b). The staff's review confirmed that the applicant addressed relevant information. In its review of the application, staff also reviewed documents on the hydrology and aquifers of the region by the United States Geological Survey (USGS) (Cunningham, 2015; Williams and Kuniansky, 2015; Reese and Richardson, 2008; Klein and Hull, 1978; Miller, 1986), and the Southeastern Geological Society (Southeastern Geological Society, 1986). The staff also reviewed studies detailing the hydrogeology of the vicinity including sites where deep well injection occurs (Maliva, Guo, and Missimer 2007; Walsh and Price, 2010; Starr, Green and Hull 2001; and, EPA 2003). The staff determined that the variability in depths and thicknesses of important hydrogeologic units reported from regional, local and site studies cited by the applicant and summarized above are reasonable and are consistent with observations made by others in the vicinity of the site and the region. Because the staff verified the applicant's description of the regional hydrogeologic setting and groundwater aquifers consistent with the data and information cited in the studies and literature above, the staff determined that the applicant's description is acceptable.

2.4.12.4.2 Hydrogeologic Site Description and Characteristics

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR, Sections 2.4.12.1.3 and 2.4.12.1.4, the applicant described site-specific data from the major geological and hydrogeological units shown in Turkey Point Units 6 and 7 COL FSAR Figure 2.4.12-202.

Biscayne Aquifer

The applicant indicated that the surface consists of a muck layer from 2-7 feet thick, followed by sediments and rocks comprising the Biscayne aquifer, including the Miami Limestone, the Key Largo Limestone, the Fort Thompson Formation, and the Tamiami Formation (Turkey Point Units 6 and 7 COL FSAR Fig. 2.4.12-204). The applicant indicated that at the site, the most productive parts of the Biscayne aquifer are composed of the Miami Limestone, Key Largo Limestone, and Fort Thompson Formation. The applicant stated that the surficial (Biscayne) aquifer extends to an elevation of -10 ft NGVD 29 in the southern portions of Miami-Dade County to more than -240 ft (-73 ft) NGVD 29 in the northern portions of Palm Beach and Broward Counties. The applicant indicated further as follows: Site specific boring data and characterization data from exploratory well EW-1 indicate that the Biscayne aquifer could be around 115 ft (35 m) thick with a base elevation of around 140 ft (43 m), as indicated by the presence of a dark greenish-gray, clay rich silt marker bed (EW-1 drilling report (McNabb HCL, 2012a and 2012b)). The EW-1 drilling report (McNabb, 2012a) referenced by the applicant, indicates that the base of the Tamiami Formation is located at a depth of 210 ft (64 m) at the site. The applicant stated that at the Turkey Point Units 6 and 7 site, the Biscayne aquifer is saline due to seawater intrusion.

The applicant stated further as follows: A subsurface investigation of the geological and hydrogeological environment from the ground surface to 615 ft below ground surface (bgs) was conducted by the applicant at the Turkey Point Units 6 and 7 site from February 2008 through June 2008. Results from 94 geotechnical borings, 4 cone penetrometer tests, 22 groundwater observation wells, and 2 test pits from the MACTEC (2008) report are incorporated into the Turkey Point Units 6 and 7 COL FSAR. Boring logs, core photographs, and soil testing data are presented in Turkey Point Units 6 and 7 COL FSAR, Section 2.5.4. Ten paired observation wells (20 individual wells) were completed in the Miami Limestone/Key Largo Limestone (screened from 15–28 ft (4.6–8.5 m) bgs) and the Fort Thompson Formation (screened from 98 to 110 ft (30 to 34 m) bgs). Two deep geotechnical piezometers (at Turkey Point Units 6 and 7, respectively) were installed at 135 ft (41 m) bgs to monitor pressure in the Tamiami Formation. Pressure transducers were installed in two surface water stations in cooling canals surrounding the Turkey Point Units 6 and 7 plant area. Groundwater levels were monitored hourly using piezometers beginning in June 2008 and through July 2010. Based on the investigations, the applicant divided the Biscayne aquifer into five targeted aquifer test zones:

- The upper aquitard (Miami Limestone);
- The upper Biscayne aquifer test zone (Key Largo Limestone);
- The middle aquitard (freshwater limestone unit);
- The lower Biscayne aquifer test zone (Fort Thompson Formation); and,
- The lower aquitard (Upper Tamiami Formation).

The applicant conducted thirty-one in situ hydraulic conductivity slug tests in these wells, and reported estimates of hydraulic conductivity ranging from 3–319 ft/d (0.9-97 m/d) (geometric mean, 61.3 ft/d) in the upper aquifer (Key Largo Limestone) wells; and 1–20 ft/d (0.3-6 m/d) (geometric mean, 20.1 ft/d) in the lower aquifer (Fort Thompson Formation) wells. Results are

presented in Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-208. The applicant stated that the estimates for the Fort Thompson Formation interval are lower than regional averages and local aquifer tests. The applicant suggested that the filter pack surrounding the screened interval may have artificially depressed the observed hydraulic conductivity.

The applicant performed four aquifer pump tests in the Biscayne aquifer from January to March 2009 in order to determine the properties and performance of the Biscayne aquifer and the overlying and underlying aquitards for evaluation of construction dewatering, modeling of groundwater flow, postulated release of liquid radionuclides, and simulation of radial collector well performance. The applicant stated that it “amended” the usual definition of the term “aquitard” from a “low permeability unit” to one which “has a lower permeability than the aquifer units.” The applicant indicated as follows: The resolution within the Biscayne aquifer is finer in the pump test study than in the slug test study above. Four test wells and 50 temporary observation wells were monitored during the pump tests. Two open-hole pumping wells (30 in (76 cm) diameter) were located at each reactor site, one each in the upper Biscayne aquifer (Key Largo Limestone) and the lower Biscayne aquifer (Fort Thompson Formation). Following the convention of upper (“U”) and lower (“L”), the applicant designated pumping wells as PW-6U, PW-6L, PW-7U, and PW-7L. The upper aquifer wells were 45 ft (13.7 m) deep, PW-6L was 105 ft, and PW-7L was 87 ft (26.5) deep. The observation wells at each reactor site consisted of five well clusters containing five temporary wells each. For each pumping well at each unit, two well clusters were located at right angles to and approximately 10 ft (3 m) away. An additional shared well cluster was located 25 ft (7.6 m) away and positioned between the two pump test wells at each unit. The wells were installed in each aquifer or aquitard zone.

The results of the pump tests were discussed in detail by the applicant in Turkey Point Units 6 and 7 COL FSAR Appendix 2BB and were presented in Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-209 . The applicant’s aquifer test results and a summary of regional studies are summarized in SER Tables 2.4.12-1 and 2.4.12-2 below for the confining or low permeability intervals (Table 2.4.12-1) and the aquifer or permeable intervals (Table 2.4.12-2).

Table 2.4.12-1. Representative Properties of Confining (Low Permeability) Layers in the shallow Turkey Point Units 6 and 7 site Hydrogeologic Strata (from Turkey Point Units 6 and 7 COL FSAR).

Hydrogeologic Unit	Property	Units	Representative		FSAR Source
			Value *	Range	
Muck	Thickness	ft	3	3-5	Figure 2.4.12-204
	Vertical hyd cond	gpd/ft ²			
	Horizontal hyd	Cm/s	3.5e-3		Langevin, 2001
	cond	Cm/s	3.5e-5		Langevin, 2001
	Vertical hyd cond	Cm/s	3.5e-3		Merritt, 1996
	Horizontal hyd	Cm/s	3.5e-4		Merritt, 1996
	cond	Pcf			

Hydrogeologic Unit	Property	Units	Representative		FSAR Source
			Value *	Range	
Miami Limestone	Vertical hyd cond				
	Bulk (dry) density				
	Total porosity	%			
	Thickness	Ft	25	7-25	Figure 2.4.12-204
	Vertical hyd gradient	-			
	Vertical hyd cond	gpd/ft2	138	103-173	Table 2BB-207
	Vertical hyd cond	Cm/s	7.9e-2		Dames and
	Bulk (dry) density	pcf			Moore, 1971
	Total porosity	%			
Freshwater limestone	Thickness	Ft	15	11-19	Table 2BB-207
	Thickness	Ft	11, 19, 11, 19		Table 2.4.12-209
	Thickness	Ft	<= 9		Appendix 2.3
	Vertical hyd cond	gpd/ft2	26	2-54	Table 2BB-207
	Vertical hyd cond	Cm/s	0.17		Fish and Stewart, 1991
	Vertical hyd cond	cm/s	0.2, 0.4, 6, 7		Table 2.4.12-209
	Bulk (dry) density	pcf			
	Total porosity	%			
	Thickness	Ft	105		Figure 2.4.12-204
Tamiami limestone	Vertical hyd cond	gpd/ft2	4340	740-7940	Table 2BB-207
	Vertical hyd cond	Cm/s	5.6e-2		Fish and Stewart, 1991
	Bulk (dry) density	pcf			
	Total porosity	%		0.1-0.31	Table 2.4.12-205

* Values are arithmetic mean except where noted

gm = geometric mean, am = arithmetic mean

Table 2.4.12-2. Representative Properties of Aquifers (Permeable Intervals) in the shallow Hydrogeologic Strata (from Turkey Point Units 6 and 7 COL FSAR)

Hydrogeologic		Representative			
Unit	Property	Units	Value *	Range	FSAR Source
Upper Biscayne (Key Largo Limestone)	Thickness	ft	22	24-33	Figure 2.4.12-204
	Transmissivity	gpd/ft	2,265,500	2,200,000-2,331,000	Table 2BB-207
	Transmissivity	Gpd/ft	3,000,000		App 2BB Dames and Moore, 1971
	Storage coefficient	-	0.0012	0.00015-0.0022	Table 2BB-207
	Horizontal hyd cond	gpd/ft2	81,500	71,000-92,000	Table 2BB-207
	Horizontal hyd cond	Ft/d	61.3 (gm)	3-319	Table 2.4.12-209
	Horizontal hyd cond	Cm/s	5.1		Dames and Moore, 1971
	Horizontal hyd gradient				
	Bulk (dry) density	pcf			
	Total porosity	%	0.31		Table 2.4.12-205
	Effective porosity	%			
Lower Biscayne (Fort Thompson Formation)	Thickness	ft	65		Figure 2.4.12-204
	Transmissivity	gpd/ft	126,600	122,000-131,200	Table 2BB-207
	Transmissivity	Gpd/ft	1,000,000		App. 2BB, Dames and Moore, 1971
	Storage coefficient	-	0.00158	0.00016-0.0003	Table 2BB-207
	Storage coefficient	-	2.4e-4		Table 2.4.12-209
	Horizontal hyd cond	Ft/d	20.1(gm)	1-120	Table 2.4.12-209
	Horizontal hyd cond	Cm/s	1.6		Dames and Moore, 1971

Hydrogeologic		Representative			
Unit	Property	Units	Value *	Range	FSAR Source
	Hydraulic gradient				
	Bulk (dry) density	pcf			
	Total porosity	%	0.31		Table 2.4.12-205
	Effective porosity	%			

* Value = arithmetic mean except where noted

gm = geometric mean, am = arithmetic mean

Based on the aquifer testing, the applicant determined that there is an Upper Higher Flow Zone (UHFZ) within the Miami/Key Largo Limestone boundary and a more localized and discontinuous Lower Higher Flow Zone (LHFZ) in the Fort Thompson Formation within the area of the site. The applicant stated that the UHFZ and LHFZ are relatively thin layers of high secondary porosity.

Intermediate Aquifer/Confining Unit

Turkey Point Units 6 and 7 COL The applicant described the intermediate confining unit as follows: The unit lies between the Biscayne aquifer and the Floridan aquifer system. It is described by the applicant as a thick unit with very low saturated hydraulic conductivity of the confining units that provides good confinement for the Upper Floridan aquifer. Site-specific studies conducted as part of the drilling, construction and testing of exploratory well EW-1 and monitoring well DZMW-1 at the Turkey Point 6 and 7 site (McNabb HCI, 2012a and 2012b) indicate that the unit is slightly less than 900 ft (274 m) thick, which is consistent with regional thicknesses discussed in the section above. The unit is not exposed at the ground surface at the Turkey Point Units 6 and 7 site, and recharge occurs via infiltration from the overlying surficial aquifer and/or from the underlying Upper Floridan aquifer.

Floridan Aquifer

The applicant described the unit beneath the intermediate confining unit as follows: Below the intermediate confining unit is the Floridan aquifer system, comprising the Upper Floridan aquifer, the Middle Confining Unit, and the Lower Floridan aquifer (Turkey Point Units 6 and 7 COL FSAR Figure 12.4-202). The Floridan aquifer is found at depth around 1010 ft bgs and is approximately 3,000 ft thick in the vicinity of the Turkey Point Units 6 and 7 site.

The Upper Floridan consists of several thin water-bearing zones of higher permeability interbedded with zones of low permeability. The primary geologic units associated with the Upper Floridan include the Suwannee Limestone and the top of the Avon Park Formation. The Upper Floridan is a major aquifer in Florida. However, water in Miami-Dade County and in the area of the site is brackish and of variable quality. The aquifer has an upward hydraulic gradients in the vicinity of the Turkey Point Units 6 and 7 site. Site-specific information obtained by the applicant at well EW-1 indicates that the Upper Floridan aquifer thickness at the site is approximately 400 ft (122 m) (McNabb HCI, 2012a and 2012b).

The Middle Confining Unit of the Floridan separates the Upper Floridan aquifer from the Lower Floridan aquifer and consists primarily of the Avon Park Formation, which is over 1,000 ft (305 m) thick in the vicinity of the Turkey Point Units 6 and 7 site. In the Turkey Point Units 6 and 7 COL FSAR, the applicant reports that in the vicinity of the site, the top of the MCU occurs around 1,200 ft (366 m) deep (based on regional mapping) or as deep as 1,930 ft (588 m) bgs (based on data from well EW-1 at the site). This variation in depths is likely because, as the applicant states in the Turkey Point Units 6 and 7 COL FSAR, the middle confining unit can often occur as both an upper and lower unit separated by a higher permeability zone (the Avon Park permeable zone). The EW-1 report indicates that the top confining unit may occur around 1,450 ft (442 m) bgs, where the TDS increases above 10,000 mg/L and the Avon Park Formation becomes more confining, while the top of the bottom confining unit occurs at 1,930 ft (588 m) deep, as discussed above. Based on this, the total estimated thickness of this unit could be nearly 1,500 ft (457 m), including the Avon Park Permeable Zone, if it is present.

The Lower Floridan aquifer is a sequence of thin permeable zones interbedded with thicker less permeable zones, and is comprised of the Oldsmar Formation and the upper portion of the Cedar Keys Formation. Based on information from well EW-1, the applicant indicates that at the site, the Lower Floridan aquifer top is located at 2,915 ft (888 m) bgs. The applicant indicates further as follows: The Lower Floridan aquifer unit consists of a thick sequence of low permeable zones with a highly permeable (Boulder Zone) near the base. The “Boulder Zone” is used extensively by coastal municipalities and industries for disposal of treated sewage and other wastewaters via injection wells. In Table 2.4.12-205, which is summarized from an EPA relative risk assessment for management of treated wastewater in south Florida, FPL reports that the top of the Boulder Zone is located between 2,750 and 3,250 ft (838 and 991 m) bgs (FPL 2015). Data collected from well EW-1 indicate that the top of the Boulder Zone at the site is 3,030 ft (924 m) bgs, which is within this range. The base of the Floridan was not encountered in well EW-1 at the Turkey Point site.

The applicant provided typical values of hydraulic parameters for different formations in Miami-Dade County as compiled by EPA in COL FSAR Table 2.4.12-205. Values from tests within a radius of 15 mi (24 km) of the site, including the 1971 Dames and Moore investigation for Turkey Point Units 3 and 4 and data from the South Florida Water Management District (SFWMD) are presented in Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-206.

Staff's Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Sections 2.4.12.1.3 “Local Hydrogeology” and Section 2.4.12.1.4 “Site-Specific Hydrogeology” of the Turkey Point Units 6 and 7 COL FSAR on hydraulic site characteristics. The staff examined site-specific geotechnical borings, observation well data, geophysical data, and test pit data collected by the applicant to characterize the Biscayne aquifer in the vicinity of the site (MACTEC, 2008). Staff reviewed the applicant's data and results from aquifer tests conducted within multiple intervals of the Biscayne aquifer and determined that the applicant's assessment of the influence on the filter pack during aquifer slug tests is reasonable, as follows: Slug tests, although useful, are limited to testing an aquifer volume in the immediate area of the well screen and are subject to the influences of the well filter pack. Aquifer pumping tests sample a much larger volume of the aquifer during the test and better represent aquifer parameters over a larger area of the aquifer. Therefore, the staff concludes that the applicant's assessment of a better resolution of aquifer parameters from the pumping tests to be acceptable.

The applicant performed four aquifer pumping tests with two tests performed adjacent to locations of each proposed reactor building, one in the Key Largo Limestone and the other in the Fort Thompson formation. Staff confirmed that the parameters pumping test results were within the ranges of other studies in the vicinity of the site (e.g., Fish and Stewart, 1991) and that the highest permeabilities in the limestones (Miami and Key Largo Limestones) and calcareous sandstones (Fort Thompson Formation) of the Biscayne aquifer determined by the applicant are also consistent with the study findings. The UHFZ designated by the applicant is located at the boundary of the Miami/Thompson Limestones while the LHFZ as designated by the applicant is within the Fort Thompson Formation. As Fish and Stewart (1991) note, clayey or silty sands, such as those in the upper clastic unit of the Tamiami Formation, are less permeable. The staff confirmed that the silt, clay, and mixtures of lime mud, shell, and sand in the upper and lower clastic units of the Tamiami Formation have relatively low permeabilities, consistent with the results of the applicant's pumping test results (e.g., transmissivities in Tables 2.4.12-1 and 2.4.12-2 above).

The applicant described an intermediate aquifer/confining unit below the Biscayne aquifer consisting of the Hawthorn Group as low permeability and providing good confinement for the Upper Floridan aquifer. The staff notes that the low permeability bottom portion of the Tamiami Formation is also included in this unit in southeastern Florida (Meyer, 1989), which would be consistent with characterization of this group as a confining unit in the area of the site. Scott (1988, 1990) has described the lithology of the Hawthorn as varying greatly between areas, but consisting primarily of phosphatic clay, silt, and sand. A joint SFWMD/USGS cooperative study has characterized the intermediate confining unit as a confining unit or aquifer system depending on the variable lithology of this unit (Reese and Richardson, 2008). However, in east-central and southeastern Florida, the intermediate aquifer system, which includes the Hawthorn Group, has been characterized as an intermediate confining unit (Reese and Richardson, 2008). Based on the information cited above, the staff finds the applicant's characterization of the intermediate confining unit acceptable.

The applicant described the Floridan aquifer in the vicinity of the site as comprised of the Upper Floridan, Middle Confining Unit, and the Lower Floridan. The applicant's estimate of the thickness of the unit is consistent with USGS studies (Meyer, 1989) showing thicknesses of over approximately 3,000 ft in southeastern Florida. The applicant's characterization of the Upper Floridan containing thin water-bearing zones of high permeability interlayered with thick zones of low permeability is consistent with USGS descriptions (e.g., Reese and Richardson, 2008, Reese, 1994) of this interval. Staff notes that USGS studies (Meyer, 1989) confirm the applicant's description of the brackish water quality of the Upper Floridan. The applicant's description of the Avon Park Formation within the Middle Confining Unit and extending into the Lower Floridan in places agrees with USGS (i.e., Meyer, 1989 and Reese, 1994) descriptions. The base of the Lower Floridan has been characterized as being at approximately 4,000 ft bgs, which is in general agreement with the applicant's estimate of greater than 4,000 ft bgs. As the applicant states, the highly permeable Boulder Zone is used for disposal of wastewater as governed by the FDEP Underground Injection Control Program (Chapter 62-528 Florida Administrative Code). Accordingly, and for the reasons stated above, the staff finds the applicant's description of the Floridan aquifer to be acceptable.

The FPL constructed wells EW-1 and DZMW-1 at the Turkey Point site to confirm and refine geology, hydrogeologic parameters, and general expectations for groundwater movement at the site. This was performed primarily to evaluate the feasibility of disposal of plant blowdown through proposed deep injection wells. Lithologic, hydrogeologic, and geophysical data was gathered at each well (McNabb HCl, 2012a and 2012b). Injection testing was also performed to

test the ability of the Boulder Zone to receive proposed effluent and the ability of the Middle Confining Unit to confine the injected effluent (FPL 2015). Staff evaluated data from these wells and confirmed that the depths, thicknesses, hydrogeologic properties, and potential results of injection at the site were reasonable and consistent with results determined through more recent studies at other sites in the vicinity and region (e.g., Cunningham, 2015; Williams and Kuniansky, 2015; and, Reese and Richardson, 2008). Reese and Richardson (2008) recognized that the Avon Park Permeable Zone in southeastern Florida, which is part of the Middle Confining Unit, had been identified in previous studies as, "...the lower part of the Upper Floridan Aquifer" (Reese, 1994). As a result, the later studies do not treat the Upper Floridan aquifer as thick as presented in earlier studies, while the later studies treat the Middle Confining Unit as more vertically extensive than earlier studies (including Starr et al 2001, EPA 2003). Reese and Richardson (2008) and later reports also confirm that the Middle Confining Unit in southeastern Florida may occur as two lower permeability units, with a more permeable zone known as the Avon Park Permeable Zone, in between. Staff's review of the reports from on-site exploratory wells indicate that the brackish Upper Floridan aquifer is separated from the Lower Floridan aquifer and Boulder Zone by a thick section of less permeable rocks with elevated TDS which is identified as the Middle Confining Unit. This is consistent with the description of the Middle Confining Unit provided in the sources mentioned above.

Documents on the hydrology and aquifers of the region reviewed by staff include those by the USGS (Klein and Hull, 1978; Meyer, 1989; Johnston and Bush, 1988; Fish and Stewart, 1991; Starr et al., 2001; Reese and Richardson, 2008) and site-specific documents on the hydrology and aquifers of the site developed by the applicant (Dames and Moore, 1971, 1975, for Turkey Point Units 3 and 4) including the applicant's observation well data, aquifer test results, and hydrologic and geotechnical investigations of the site. As described above, the staff reviewed analysis, data, and reports compiled by the applicant, and confirmed that the applicant's evaluation and characterization of the aquifer system is acceptable and addressed the relevant information.

2.4.12.4.3 Groundwater Sources and Sinks

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.1.5, "Groundwater Sources and Sinks," the applicant described the regional, local, and site-specific sources of recharge and locations of discharge. The applicant stated that recharge to the Biscayne aquifer occurs over most of Miami-Dade County. The applicant stated that recharge to the Biscayne aquifer occurs through four major sources:

- Directly from rainwater and irrigation water infiltrating surface materials;
- Infiltration of surface water imported by run-off from the north in water conservation areas or by canals;
- Infiltration of urban runoff via drains, wells, and ponds; and,
- Groundwater inflow from southwestern Broward County located directly to the north of the site.

The applicant indicated that recharge by rainfall is greatest during the wet season from June through November, and recharge by canal seepage is greatest from December through May during the dry season.

The applicant stated that discharge from all aquifers occurs as baseflow to the Florida Bay and Biscayne Bay. The applicant stated that discharge of groundwater in the Biscayne aquifer is through seepage into streams, canals, or the ocean, evaporation, transpiration by plants, and through groundwater pumping. The applicant notes that the regional canal systems exert a major influence on groundwater levels and pathways, and most of the water that circulates in the Biscayne aquifer system is discharged into the canals and into the ocean, accounting for 15 to 25 in (38 to 64 cm) of equivalent precipitation per year. The applicant indicated that of the 60 in of annual precipitation, approximately 20 in (51 cm) per year are lost due to evapotranspiration, 16 to 18 in (41 to 46 cm) per year to discharge through canals and by coastal seepage, and the remainder to human consumption. The applicant also stated that recharge was typically on the order of 38 in (97 cm) per year.

The applicant stated that the water in the 5,900 acre (24 km²) industrial wastewater cooling canals for the existing and operating Turkey Point Units condenser cooling water interacts with groundwater because the canals are not lined. The applicant described the canals as follows: Most cooling water canals are 3 ft (0.9 m) deep. Major, deeper canals (18 ft (5.5 m)) are the eastern return canal, the northern discharge canal, the south collector canal, and the main return canal ("grand canal"). A steady-state hydraulic head difference of 3 ft (0.9 m) is maintained between the Turkey Point Units 3 and 4 discharge location at the western side and the intake location on the eastern side, which promotes full circulation throughout the canal system. The applicant stated that canals convey warm waters away from and return cool water back to the currently operating units. The canals in the industrial wastewater facility do not discharge directly to surface water. Evaporative loss from the canals is significant and is replenished by inflow from the Biscayne aquifer, discharge of operating unit process water, rainfall, and storm water run-off. The applicant stated that there is net inflow from the saline Biscayne aquifer into the canal system, and that due to evaporation, water in the canals is more saline than Biscayne groundwater. The applicant stated further as follows: An interceptor ditch on the western side of the canal system was constructed to limit westward migration of water infiltrated into the Biscayne aquifer from the cooling canals. During the wet season a natural freshwater gradient is maintained, while during the dry season, water is pumped from the interceptor ditch into the westernmost cooling canal (Canal 32). The L-31E Canal located to the west of the interceptor ditch provides delivery of water to farmlands and wetlands to the south, and is designed to impede inland migration of saline groundwater.

In regard to the deeper Floridan units, the applicant stated as follows: The intermediate aquifer/confining unit is not exposed at the surface locally and recharge is believed to occur via downward leakage through the overlying Biscayne aquifer. Recharge to the Floridan aquifer system is therefore related to the extent of confinement by the intermediate aquifer/confining unit, and also the extent of karst drainage through this system. At the site, the Floridan system does not directly outcrop and is considered to be confined with an upward hydraulic gradient. Regional flow in the deeper Floridan aquifer involves deep circulation over long time periods where seawater is drawn into the Lower Floridan aquifer and is heated as it migrates landward, as shown in Turkey Point Units 6 and 7 COL FSAR Figure 2.4.12-243. The regional flow direction in the Upper Floridan and Biscayne aquifers is from west to east in southeastern Florida, and ultimately results in discharge into Biscayne Bay.

Staff's Technical Evaluation

The staff reviewed Section 2.4.12.1.5 "Groundwater Sources and Sinks" of the Turkey Point Units 6 and 7 COL FSAR. The staff independently reviewed the data, information and studies used by the applicant and confirmed that the applicant's evaluation adequately describes the aquifer conditions addressing the relevant information.

Staff reviewed the recharge to the Biscayne aquifer and determined that the applicant's characterization is in agreement with Biscayne aquifer hydrogeologic framework and modeling studies conducted by the USGS (e.g., Langevin, 2001; Klein and Hull, 1978; Reese and Richardson, 2008). These studies describe recharge sources and groundwater sinks within the Biscayne aquifer and characterize groundwater discharges and interactions with canals and discharge to the ocean during the wet and dry seasons. The staff reviewed additional documents on hydrology and aquifers of the region by USGS (Klein and Hull, 1978; Meyer, 1989; Fish and Stewart, 1991; Starr et al., 2001; Maliva et al 2007), which characterize the hydrology. The staff determined the applicant's evaluation of groundwater sources and sinks to be consistent with these independent studies and therefore acceptable.

The staff reviewed and confirmed historical, current, and projected groundwater use provided in the FSAR and checked the provided data through reviews of the reports and electronic databases available from the SFWMD (<http://www.sfwmd.gov/watersupply>). The staff confirmed the data described by the applicant to be acceptable. The applicant stated that the Floridan aquifer is considered a confined aquifer in the site vicinity, which is consistent with USGS studies (Johnson and Bush, 1988), and slow upward groundwater migration in the site vicinity as described by the applicant is consistent with USGS studies (e.g., Meyer, 1989). Accordingly, the staff concludes that the applicant's description of groundwater sources and sinks is consistent with independent studies and that the description of on-site hydrologic features is acceptable and adequate.

2.4.12.4.4 Plant Groundwater Use

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR, Sections 2.4.12.2.1.2, 2.4.12.2.1.3, and 2.4.12.2.1.6, the applicant described current and planned groundwater use for plant water supply and liquid waste disposal. In Turkey Point Units 6 and 7 COL FSAR, Section 2.4.12.2.1.2, the applicant stated that cooling water for the operating units is supplied via a closed loop system that includes the cooling canal system (or IWF) adjacent to the proposed Units 6 and 7 site. The applicant stated that non-cooling water supply for Units 3 and 4 is provided by the Miami-Dade Water and Sewer District (MDWASD) municipal water supply system. The applicant stated that cooling water for Unit 5 and process water for Units 1, 2, and 5 is tapped from the Upper Floridan aquifer production wells (PW-1, PW-3, and PW-4) at an average production rate of 170 million gallons per month. The maximum pumping rate is limited to a 90-day average of 14.06 million gallons per day and an average annual supply of 4,599 million gallons per year.

The applicant described the use of cooling water for the main condenser in Units 6 & 7 as follows: In Turkey Point Units 6 and 7 COL FSAR, Section 2.4.12.2.1.3, the applicant stated that for planned Units 6 and 7, makeup water for cooling the main condenser is expected to be supplied by two potential sources: the primary supply from reclaimed waste water provided by MDWASD South District Wastewater Treatment Plant, and a backup supply obtained through a system of four radial collector wells installed beneath Biscayne Bay at the Turkey Point

peninsula. Use of reclaimed water provided by MDWASD would eliminate the need for make-up water for Units 6 and 7 to be obtained from water resources near the site. In the FSAR, the applicant stated that radial collector wells would only be used “when reclaimed water cannot supply the quantity and/or quality of water needed for the circulating water system” (FPL 2015). When reclaimed water is used, the mechanical draft cooling towers for units 6 & 7 will use a maximum rate of 38,400 gallons per minute (gpm) based on four cycles of concentration. Due to the difference in water quality, fewer cycles on concentration could be achieved if radial collector wells were used. The reclaimed water from MDWASD will be temporarily stored within an onsite makeup water reservoir (MWR) and transferred to the cooling tower basins via a set of cooling tower makeup pumps.

The radial collector well laterals are expected to be located within the Upper Higher Flow Zone (a relatively thin layer of high secondary porosity) of the Biscayne Aquifer and are designed and located to pull water into the wells from the overlying Biscayne Bay (FPL 2015). The radial collector wells consist of a central concrete caisson from which a number of lateral lines extend at a depth of approximately 25 – 40 ft (8 to 12 m) bgs to approximately 900 ft (274 m) away from the caisson. At the end of each lateral line, a minimum of 300 feet will be screened. The exact dimensions of the wells will be based on site-specific conditions. The total makeup flow needed is estimated at 86,400 gallons per minute, and four radial collector wells capable of producing 45 million gallons per day will be installed. Four wells are planned to be drilled and three operated, leaving one in reserve. The applicant stated that aquifer pumping tests were performed on the Turkey Point peninsula at anticipated installation depths to evaluate the hydrogeologic suitability of that area for installation and operation of radial collector wells. Pump test results were evaluated using industry standard software and techniques to determine aquifer transmissivity values. Makeup supplied from the radial collector well system is delivered directly to the cooling towers basins and is not stored in the MWR.

The applicant stated that the raw water system is designed to supply 100 percent of the makeup water from either source (FPL 2015). The applicant stated that there are no safety-related cooling water canals or reservoirs (including the MWR) related to the operation of Turkey Point Units 6 and 7.

For Turkey Point Units 6 and 7, the applicant proposed to drill 12 Class I Industrial deep injection wells into the Boulder Zone within the Lower Floridan aquifer to dispose of cooling water blowdown and other plant effluents. The applicant described the injection wells and process as follows: Ten of these would be used as the primary injection wells and two would be used as backup wells (FPL 2015). Injection in the Boulder Zone is permitted through the Florida Department of Environmental Protection (FDEP) Underground Injection Control (UIC) process for disposal because of its characteristics, which indicate a natural ability to accept and confine the waste. This includes; (1) a depth of 3,030 ft (924 m) at Units 6 and 7, (2) confinement by more than 1,000 ft of overlying lower permeability limestone and dolomite beds between the Boulder Zone and the base of the Underground Source of Drinking Water (USDW), (3) significant secondary permeability and high transmissivity up to 2.46×10^7 ft²/d in the Boulder Zone, which resulted in a slight increase in pressure during injection testing, and (4) total dissolved solids concentrations in the Boulder Zone exceeding 10,000 mg/L. Deep injection wells are regulated by and must fully comply with the requirements of Rule 62-528 F.A.C. administered by FDEP. As mentioned previously, FPL received a permit (0293962-001-UC) to construct a Class V exploratory well (EW-1) and associated Dual Zone Monitoring Well (DZMW-1) at the proposed site. FPL indicated that since that time, EW-1 was converted to DIW-1 as one of the Class I Industrial deep injection wells after demonstrating the geology and hydrogeology of the site was appropriate for deep well injection, as required by the permit (FPL

2015; pursuant to the provisions of Rule 62-528.603 of the Florida Administrative Code (FAC) (www.dep.state.fl.us/legal/rules/shared/62-528/62-528.doc)).

The applicant estimates the wastewater disposal needs at Turkey Point Units 6 and 7 at approximately 18 million gallons per day when using only reclaimed water from MDSA WD, and as high as approximately 85 million gallons per day when using only saltwater from the radial collector wells. The actual volume will be dependent on the use of makeup water sources but the higher estimate is used for conservative design purposes. The applicant stated that this capacity will call for the installation of 10 primary and 2 backup deep injection wells.

Staff's Technical Evaluation

The staff reviewed Section 2.4.12.1.6, "Plant Groundwater Use," and Appendix 2CC of the Turkey Point Units 6 and 7 COL FSAR, and the applicant response to RAI 5190 Questions 02.04.012-1 to 02.04.12-4 (ADAMS Accession No. ML11129A058) and RAI 5643 Questions 02.04.12-5 and 02.04.12-6 (ADAMS Accession No. ML11180A062), in addition to EPA (2000, 2003), and USGS investigations (Reese, 1994; Reese and Richardson, 2008, Cunningham 2015, Williams and Kuniansky 2015), and FDEP UIC permit requirements (<http://www.dep.state.fl.us/water/uic/index.htm>). While the FSAR did not quantify usage expected for the primary reclaimed water and backup RCW sources, these amounts have been specified in the FDEP Conditions of Certification (COCs) for the UIC permit, which was reviewed by the staff. The staff notes that these COCs state that "it is expected that the reclaimed water will be a reliable primary source of water for this project" (Section B.IV.C.1.a) and that, as the applicant states, "only in the event that reclaimed water is not available in the quantity or the quality required by Licensee for cooling water purposes shall Licensee be authorized to withdraw cooling water from the RCW system" (Section B.VI.C.2.ii.(1)). In that event, the COCs authorize use of the RCWs for up to 60 days per 12 month period at a maximum volume of 7,465 million gallons. The staff also reviewed studies related to deep well injection performed by public, local and Federal agencies (Maliva et al., 2007; EPA, 2003; Maliva and Walker 1998; Haberfield, 1990) including those relating to the MDWASD (Starr et al., 2001; Walsh and Price 2010) as well as UIC permit requirements related to construction, testing and monitoring of injection wells. Staff's evaluation of the anticipated releases from the deep well injection are documented in FSER Section 11.2.

The staff confirmed that the applicant's evaluation is adequate and addressed the relevant information in the application. The staff finds that the applicant's description of the plant groundwater use is acceptable and adequate.

2.4.12.4.5 Historical and Projected Groundwater Use

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Sections 2.4.12.2.1 and 2.4.12.2.1.3, the applicant summarized information from USGS and SFWMD to determine the historical, current, and projected groundwater use in Miami-Dade County). The applicant stated that the only freshwater source in the immediate vicinity of Turkey Point Units 6 and 7 is the Biscayne aquifer, which has been increasingly used since the 1960s. As the applicant explains: The Biscayne aquifer is designated in the region by EPA as a sole-source aquifer. A sole-source aquifer is defined by EPA as "an underground water source that supplies at least 50 percent of the drinking water in the area overlying the aquifer. These areas have no alternative drinking water sources that could physically, legally, and economically supply all those who depend on

the aquifer for drinking water.” In Turkey Point Units 6 and 7 COL FSAR Rev. 3 Section 2.4.12.1.2.1, the applicant stated that the water is saline in the immediate vicinity of the plant due to seawater intrusion (Turkey Point Units 6 and 7 COL FSAR Fig. 2.4.12-206) and that Biscayne aquifer groundwater is not used locally as a source of drinking water. The applicant stated that although the Upper Floridan aquifer is a major source of potable groundwater in much of Florida, water withdrawn from the unit in southeastern Florida, including Miami-Dade County, is brackish and variable in quality (Turkey Point Units 6 and 7 COL FSAR Fig. 2.4.12-229).

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.2.1, the applicant stated that the primary consumers of Biscayne groundwater are the public water supply (400 million gallons per day in 2005) and agriculture (100 million gallons per day in 2005) (Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-202). With the addition of seven power plants in the Lower East Coast Planning area, (which includes Palm Beach, Broward, Miami-Dade and Monroe Counties), since 2005, the applicant stated that power generation needs for water from all groundwater sources are projected to increase to a maximum of 70 million gallons per day by 2025. In the Turkey Point Units 6 and 7 COL FSAR, the applicant stated that radial collector wells would only be used “when reclaimed water cannot supply the quantity and/or quality of water needed for the circulating water system” (FPL 2015). The applicant estimated total makeup flow needed at 86,400 gallons per minute, and indicated that four radial collector wells capable of producing 45 million gallons per day will be installed. The central caisson for each radial collector well will extend below the ground surface to around 40-ft depth, and multiple laterals will extend from each well up to 900 ft from the caisson. The wells are designed to induce infiltration from Biscayne Bay. At any one time, one well will be reserved in the event of unplanned or scheduled outages.

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.2.1, the applicant stated that the Upper Floridan contains saline water (greater than 250 milligrams per liter of chloride) or saltwater (greater than 19,000 milligrams per liter of chloride), and that no groundwater use was reported in Miami-Dade County in 1990 or 1995. The applicant indicated that in 2000, 3.68 million gallons per day were used for industrial processes including mining and power generation. The applicant stated that Unit 5 obtains cooling water from the Upper Floridan at the rate of a 90-day average of 14.06 million gallons per day.

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.2.1.3, the applicant stated that in southern Florida, an additional use of groundwater is for aquifer storage and recovery wells and for disposal of municipal and industrial wastewater through Class I injection wells. In this regard, the applicant further indicated as follows: Aquifer storage and recovery wells are typically within the Upper Floridan, and Class I injection wells are typically within the Boulder Zone of the Lower Floridan. The FDEP permits all subsurface injection wells and FDEP has determined that the Boulder Zone meets the Florida Department of Environmental Regulations criteria for Class I injection wells. Over 125 Class I wells are permitted in Florida releasing over 200 million gallons per day of secondary treated wastewater (Turkey Point Units 6 and 7 COL FSAR Figure 2.4.12-215).

Deep injection wells are regulated by the State of Florida and must fully comply with the requirements of Rule 62-528 F.A.C. administered by FDEP. As mentioned previously, FPL received a permit (0293962-001-UC) to construct a Class V exploratory well (EW-1) and associated Dual Zone Monitoring Well (DZMW-1) at the proposed site. FPL indicated that since that time, EW-1 was converted to DIW-1 as one of the Class I Industrial deep injection wells after demonstrating the geology and hydrogeology of the site was appropriate for deep well

injection, as required by the permit (FPL 2015; pursuant to the provisions of Rule 62-528.603 of the Florida Administrative Code (FAC) (www.dep.state.fl.us/legal/rules/shared/62-528/62-528.doc)).

The applicant stated that dual zone monitoring wells are required at a deep well injection site. The applicant described the monitoring wells as follows: These wells consist of two screened intervals; one within the confining unit above the injection zone and also within the USDW, above the confining unit. The USDW is defined as an aquifer that contains water with dissolved solids concentration of less than 10,000 mg/L. The purpose of these wells is to detect upward migration of fluid out of the injection zone at deep well injection sites. (Turkey Point Units 6 and 7 COL FSAR Figure 2.4.12-244). Regulations and monitoring requirements are described in Chapter 62-528 of the FAC. The applicant stated that monitoring will be focused primarily on fluid buoyancy as indicated by temperature and total dissolved solids (TDS).

In the Turkey Point Units 6 and 7 COL FSAR, the applicant also provided information on the impacts of deep well injection in southeast Florida from a report by Maliva et al (2007) that evaluated the confining capability of the Middle Confining Unit of the Floridan Aquifer System. The applicant stated out of the 32 injection well systems in southeastern Florida, 7 have experienced fluid movement into the lowest monitoring zone (within the MCU) and 3 facilities have experienced upward migration into a monitoring zone within the overlying USDW. The applicant stated that these failures are potentially related to well failure and well construction methods (e.g., leaking from well joints, etc.) and not the subsurface geology (e.g., fractures of the confining unit between Floridan and underlying aquifers). The applicant indicated that injected fluid buoyancy as determined by temperature and TDS is the most important control on fluid density and therefore upward migration, in the absence of well construction issues. The applicant stated that the density of the fluid in the Boulder Zone is estimated to be 1,028.5 kilograms per cubic meter with an average temperature of 50 °F and average TDS of 37,000 milligrams per liter. The applicant indicated further that the temperature of the injected water is projected to vary seasonally in the range from 65 °F to 91 °F. The applicant also indicated that variations in TDS range from 2,721 milligrams per liter when makeup cooling water is sourced exclusively from MDSA WD to 57,030 milligrams per liter when makeup cooling water is sourced exclusively from the radial collector wells. The applicant stated that the resultant fluid density variations are 996.8 kilograms per cubic meter (100 percent reclaimed water in the summer) to 1,042.4 kilograms per cubic meter (100 percent salt water in the winter).

The applicant stated that State of Florida regulations (FAC Section 62-528.415(1)(f)2) dictate that the hourly peak injection flow rate must not exceed 10 ft per second and the applicant concurred with this limit based on a review of other deep well injection systems in southern Florida. The applicant indicated that the blowdown discharge rate from the cooling towers is 10,000 gpm. The applicant identified the disposal needs for Units 6 and 7 as 18 million gallons per day when using reclaimed water from MDWASD and up to 85 million gallons per day when using a combination of reclaimed and salt water. Based upon the maximum estimate, the applicant stated that the injection well gallery will consist of 10 primary and two backup wells.

Staff's Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.2.1 "Historical and Projected Groundwater Use" and Appendix 2CC. The staff reviewed the information provided in the Turkey Point Units 6 and 7 COL FSAR on current and projected groundwater use, and checked the provided data through reviews of the reports and electronic databases available from the SWFWMD for permitted wells. The staff verified that the data were accurate.

Accordingly, the staff's review confirmed that the applicant's evaluation of historical and projected groundwater use is acceptable, and that it addressed relevant information. The staff independently reviewed the characterization of the Biscayne and Floridan Aquifer Systems in the vicinity of the site as characterized by the USGS (Sonenshein, 1995 and Meyer, 1989), and verified the applicant's evaluation of saline conditions and non-potable groundwater in the vicinity of the site to be consistent with USGS studies and therefore acceptable.

The staff reviewed the construction characteristics of the radial collector wells to be constructed in the Biscayne aquifer in regard to the design of horizontal laterals to induce infiltration from Biscayne Bay. The staff reviewed aquifer test data and results conducted by the applicant to support the estimated capacity of these wells and confirmed the methods used to estimate the capacity of these wells reasonable and acceptable.

In its review of the application, the staff reviewed documents on Florida water law governing use by SFWMD (SFWMD, 2008) and on disposal of wastes via underground injection control (UIC) by the Florida Department of Environmental Protection (FDEP) (<http://www.dep.state.fl.us/water/uic/index.htm>), EPA (EPA, 2000, 2003), USGS (Reese and Richardson, 2008, Cunningham 2015), MDWASD (MDWASD, 1981, Walsh and Price 2010), and academic researchers (Maliva et al., 2007; Maliva and Walker 1998; Haberfield, 1990, INEEL 2001). The staff reviewed the data obtained from exploratory well EW-1 constructed under an FDEP permit, and determined the stratigraphy and subsurface hydrogeologic properties obtained from the well boring to be consistent with the applicant's characterization of the aquifer sequence and properties described in their site-specific (Section 2.4.12.1.4) assessment of hydrogeologic conditions. As the applicant stated, vertical migration of wastewater has occurred in a minority of deep injection well locations. Based on the staff's review of the studies cited above for deep injection wells in south Florida, the staff confirmed the applicant's statement that vertical migration of effluent constituents depends on two major components: injection pressure and injectate buoyancy (i.e., temperature and TDS).

The staff notes that vertical migration is also related to the degree of confinement offered by the Middle Confining Unit of the Floridan Aquifer System, which is a thick assemblage of competent, low permeability limestone and dolomites at the site. The staff notes that while Maliva et al (2007) indicates that impact to the USDW has occurred at three locations in southeast Florida (Seacoast, North District WWTP and South District WWTP), more recent studies such as Walsh and Price (2010) conclude that this migration did not reach the Upper Floridan Aquifer despite this finding in older reports (EPA 2003, Starr et al 2001). This is because of two factors: 1) in many areas, the bottom of the USDW (where TDS exceeds 10,000 mg/L) may be within the top of the Middle Confining Unit beneath the Upper Floridan Aquifer and, 2) more recent hydrogeologic studies of the Floridan Aquifer System (beginning with Reese and Richardson, 2008) recognize that the Middle Confining Unit is more vertically extensive than previously thought in Southeastern Florida, and includes an upper and lower confining zone separated by the more permeable Avon Park Permeable Zone. As a result, migration previously thought to have reached the base of the Upper Floridan Aquifer is now recognized to be within the Avon Park Permeable Zone. This is further discussed in the Staff's Technical Evaluation in Section 2.4.12.4.2 above.

Maliva et al (2007) indicated that migration at these sites is not likely the result of matrix flow through a competent MCU due to low vertical hydraulic conductivity values, but rather channelized flow due to improper well construction or fracture related pathways. This is supported by Starr et al. (2001), who earlier evaluated a limited hydrologic data set and concluded that the unit offered better confinement in reality than their limited data set

suggested. While Cunningham (2015) indicated that vertical migration pathways could be created by karst collapse structures mapped using seismic geophysical techniques, Walsh and Price (2010) concluded that migration seen at the SDWWTP was due in part to well related issues. The staff notes that regulations, requirements, and permits for these injection wells are governed by the State of Florida (FAC Section 62-528.415). Evaluation of the expected impacts of deep well injection are discussed in Section 11.2 of this FSER.

Accordingly, and for the reasons stated above, the staff concludes that the applicant's description of the historical and projected groundwater use is acceptable and reasonably represents current and projected groundwater use and, aquifer conditions in the vicinity of the Turkey Point Units 6 and 7 site.

2.4.12.4.6 Groundwater Flow Directions

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.2.2, the applicant reviewed USGS data to determine that regional flow in the Biscayne aquifer is toward the south and southeast in Miami-Dade County (Turkey Point Units 6 and 7 COL FSAR Figures 2.4.12-219 and 2.4.12-220). The applicant stated that minor seasonal changes are observed and cones of depression indicate large withdrawals of groundwater in the vicinity of Miami. The applicant stated that irrigation canals exert a major influence on the shape of the water table. The applicant stated that the regional hydraulic gradient is seaward and estimated at 0.00002 ft/ft.

The applicant monitored on-site wells from June 2008 to January 2010 and measured local-scale potentiometric changes during high and low tides in the Upper Biscayne (Miami and Key Largo Limestones) and Lower Biscayne (Fort Thompson Formation) aquifers. The applicant indicated as follows: All well pairs indicate either upward or minimal hydraulic gradient from the Lower to Upper Biscayne. Specifically, of the 10 well pairs, 4 well pairs consistently indicate upward gradient, 3 well pairs indicate upward gradient until January 2009 and minimal gradient from January 2009 to January 2010, 1 well pair consistently indicates minimal gradient, and 2 wells show only data from the Lower Biscayne. Some data gaps are observed in the raw transducer data due to instrument malfunction or lack of agreement between manual and automated measurements. Vertical hydraulic gradients were calculated by the applicant by comparing hydraulic heads in the Upper and Lower Biscayne, which can be generalized as 0.02 ft/ft and range from 0.009 to 0.042 ft/ft.

The applicant described the flow regimes in the Biscayne aquifer as follows: In the Upper Biscayne, the flow is generally toward the center of the Florida peninsula from the northwest and from the southeast. From the center, flow direction is toward the southwest. Horizontal hydraulic gradients in the Upper Biscayne, are estimated as 0.0003 ft/ft. Potentiometric surface maps, as a function of season, tidal stage, and monitoring interval, are shown in Turkey Point Units 6 and 7 COL FSAR Figures 2.4.12-221 through 2.4.12-228. In the Lower Biscayne, a high point of the potentiometric surface extends from the center of the peninsula toward the south to southwest. Horizontal hydraulic gradients in the Lower Biscayne are estimated as 0.001 ft/ft.

The applicant indicated that seasonal fluctuations were less than 3.5 ft (1.1 m) in all wells. The applicant stated that differences are observed in the Upper and Lower Biscayne potentiometric surfaces with high and low tide, but overall, flow directions are similar regardless of tidal influence. The applicant stated that vertical heads indicate upward flow potential, are consistent

regardless of tidal or seasonal variation, and are an order of magnitude greater than horizontal gradients in the Lower Biscayne and two orders of magnitude greater in the Upper Biscayne.

The applicant investigated the effects of the makeup water reservoir (MWR) on the direction and measurement of hydraulic gradient. The applicant described the MWR and cooling towers as follows: The MWR is constructed of concrete and is on the south side of the proposed plant area around 600 ft from the power block, and is approximately 2,200 ft (671 m) long on the northern side and 1,800 ft long on the southern side. The bottom elevation of the reservoir is approximately -2.0 ft (-0.6 m) NAVD 88, the top elevation of the concrete wall is 24.0 ft (7.3 m) NAVD 88, and the maximum water level is 22.5 ft (6.9 m) NAVD 88. The top of the concrete wall is 2 ft (0.6 m) below the design grade elevation of the safety-related structures. The six cooling towers occupy part of the MWR footprint. The MWR is self-contained and neither contributes to outflow nor receives input of drainage. Based on a simulation of the 3-D groundwater model with the MWR operational, the applicant concluded that any impact to groundwater levels and hydraulic gradients from an overflow of the MWR would be negligible, and that normal operation, catastrophic failure, or overflow of the MWR would not raise water table elevation in a manner that would warrant a permanent dewatering system.

Regarding the Floridan aquifer, the applicant reviewed USGS data to describe flow directions because the pre-construction monitoring program does not include the Floridan. Geochemical and pressure monitoring will be conducted in the Floridan aquifer in accordance with the State of Florida's underground injection control regulations (62-528 FAC).

The applicant indicated that a groundwater divide runs the length of Florida, resulting in flow on the eastern side being toward the east. The applicant calculated the horizontal hydraulic gradient as 0.00006 ft/ft. The applicant stated that determination of groundwater flow directions and hydraulic heads in the Boulder Zone has been unreliable due to the lack of good head data and the transitory effect of tides (FPL 2015). The regional circulation pattern within the Floridan aquifer system is considered to be very slow—on the order of thousands of years (Meyer, 1989) and is conceptualized to involve:

- Horizontal movement of seawater in the deepest reaches of the Lower Floridan;
- Heating of seawater resulting in decreased density;
- Upwelling through the Middle Confining Unit;
- Dilution and seaward migration through the Upper Floridan;

The applicant's conceptual model, shown in Turkey Point Units 6 and 7 COL FSAR Figure 4.12-243, does not suggest movement of Floridan water through the intermediate confining unit and into the Biscayne.

Staff's Technical Evaluation

The staff reviewed Section 2.4.12.2.2 "Groundwater Flow Directions" of the Turkey Point Units 6 and 7 COL FSAR, Appendices 2BB and 2CC, and the applicant's response to RAI 5190, Question 02.04.12-2 (ADAMS Accession No. ML11129A058), and studies cited by the applicant. Data and information in the staff's review included the applicant's observation well data and, aquifer pumping test data and results. The staff's review confirmed that the applicant's evaluation of groundwater flow direction is acceptable and addressed relevant information topics. The staff reviewed documents by USGS (Klein and Hull, 1978; Meyer, 1989;

Fish and Stewart, 1991; Langevin, 2001) and databases from the USGS (e.g., <http://131.247.143.93/index.html>).

To assess the influence of water use in the plant on the regional groundwater flow directions, the staff took an east-west cross section from the applicant's 3-dimensional groundwater model grid (row 260, east-west across the plant) and constructed a 2-dimensional groundwater model using a publicly available spreadsheet tool (Anderson and Bair 2001). The boundary conditions in the east and west were modeled as fixed head boundaries. The results (Figure 2.4.12-1) confirm that the regional hydraulic gradient from the west (inland) to the east (ocean) is controlled by the water levels in the cooling and L-31E irrigation canals. The vertical gradient is even smaller and the variations near the canals are significant only in the first layer (Miami Limestone) and dampen out with depth in the underlying layers 2–4 (Key Largo Limestone, freshwater limestone, and Fort Thompson Formation, respectively). These results show that as long as the water level in the canals is maintained at the designed level, water use at the plant is not expected to alter the regional groundwater flow direction (from the west to the east, and from underground to the ground surface). This is due to the relatively permeable subsurface geologic formations and small hydraulic gradient at the site.

The staff performed an independent confirmatory analysis of the potential impact of the maximum water level of 22.5 ft (6.9 m) in the MWR on the subsurface potentiometric head distribution at Turkey Point Units 6 and 7, as described below. The staff calculated the lateral head losses from the MWR through the 3 ft (0.9 m) thick concrete floor and then through 100 ft of the Miami Limestone aquifer. According to Darcy's law, discharge rate, q , is estimated as $q = k_1 \Delta h_1 / L_1 = k_2 \Delta h_2 / L_2$, and $\Delta h = \Delta h_1 + \Delta h_2$, where k , Δh , and L are the hydraulic conductivity, head loss, and length, and subscripts 1 and 2 stand for the concrete layer and aquifer layer, respectively. It can be derived that $\Delta h_1 / \Delta h = (L_1 / k_1) / (L_1 / k_1 + L_2 / k_2)$. Using conservative values for k_1 and k_2 , i.e., $k_1 = 10^{-8}$ cm/s (Turkey Point Units 6 and 7 COL FSAR 2.4.13.1.3.1 assumes 8.25×10^{-9} cm/s, which is an order of magnitude higher than that of intact concrete in included reference) and $k_2 = 10^{-4}$ cm/s (less than the smallest calibrated value in Turkey Point Units 6 and 7 COL FSAR Table 2CC-205), the calculated head loss in the concrete floor is 22.4 ft (6.8 m). This result indicates that most of the head is expected to be lost over the concrete floor of the MWR due to its low permeability. Therefore, the water in the MWR, even at maximum level, is not expected to raise the groundwater table under Turkey Point Units 6 and 7 significantly (less than a few feet, comparing with the 23.5 ft (7.2 m) design elevation). Accordingly, the staff's review of the studies and reports described above and the staff's evaluation of the applicant's analysis described above confirmed that the applicant's description of the groundwater flow directions is acceptable and adequate.

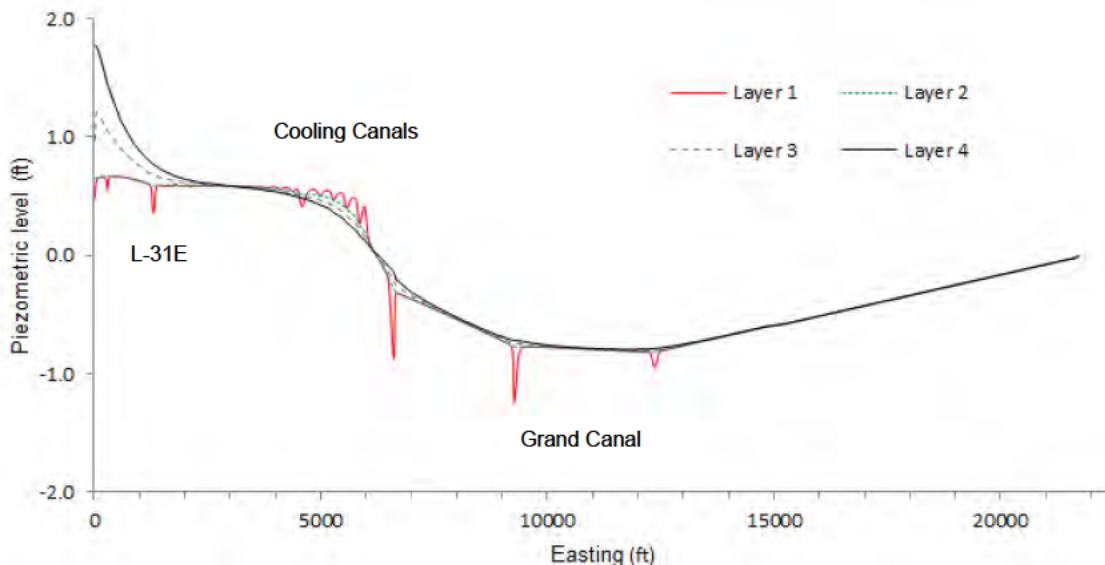


Figure 2.4.12-1. Simulated piezometric levels across the plant area (Layer 1-4 correspond to the four layers: Miami Limestone, Key Largo Limestone, Freshwater Limestone, and Fort Thompson Formation in the numerical model).

2.4.12.4.7 Temporal Groundwater Trends

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.2.3, the applicant presented temporal groundwater trends gleaned from regional- and local-scale data. The applicant stated that regional monitoring of the Biscayne aquifer occurs via a network of SFWMD and USGS wells and surface water/canal locations. Hydrographs presented by the applicant in the Turkey Point Units 6 and 7 COL FSAR indicate steady water levels and short-term fluctuations associated with tides and precipitation in the typical range of 3.5 ft (1.1 m) with a maximum of 6.5 ft (2 m) for wells in the last 15 to 35 years, and typically less than 2.5 ft (0.8 m) for canals in the last 19 years.

The applicant presented limited local monitoring (18 months from June 2008 to June 2010) of the Turkey Point Units 6 and 7 network in the Upper and Lower Biscayne that indicates that seasonal fluctuations are less than 3.5 ft (1 m), and fluctuations resulting from individual larger events are around 1.5 ft (0.5 m). The applicant stated that maximum groundwater elevation in the Upper Biscayne aquifer observed at the Turkey Point Units 6 and 7 site was 0.62 ft (0.19 m) NAVD 88 and the minimum was -3.42 ft (-1 m) NAVD 88. The maximum groundwater level in the Lower Biscayne observed was 2.15 ft NAVD 88 and the minimum was -2.45 ft (-0.75 m) NAVD 88.

For the Upper Floridan aquifer, the applicant presented data obtained from 1965–1997 in one USGS well 17 mi (27.4 km) to the west of Turkey Point Units 6 and 7. These data show a dramatic drop in water levels from 1965 to 1969, followed by a large rebound and steady state from 1970–1986, followed by dropping levels until monitoring stopped in 1997. Head levels inside the well ranged from 30 to 42.6 ft (9.1 to 13.0 m) MSL (NGVD 29) with a wellhead elevation of 4.5 ft (1.4 m) MSL (NGVD 29).

Staff's Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.2.3, "Temporal Groundwater Trends". The staff's independent review of observation well data, well hydrographs, and aquifer tests presented by the applicant confirmed that the applicant's evaluation of temporal groundwater trends was adequate and addressed relevant information topics. The staff also reviewed databases maintained by USGS (USGS, <http://131.247.143.93/index.html>) and SFWMD (www.sfwmd.gov) for the Biscayne and Floridan aquifers and verified the information consistent with the applicant's evaluation of temporal trends. Therefore the staff concludes the applicant's analysis is acceptable.

2.4.12.4.8 Aquifer Properties

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.2.4, the applicant presented hydrological parameters including transmissivity, storativity, specific yield, hydraulic conductivity, and leakage coefficients obtained from the Biscayne and Floridan aquifers and from the various confining layers. Hydrologic data was compiled from Miami-Dade County, the EPA, the SFWMD DBHYDRO database, the Dames and Moore Turkey Point Units 3 and 4 site investigation, USGS investigations, and municipal water supply information. In addition, the applicant presented data from the Turkey Point Units 6 and 7 site investigation for the Biscayne aquifer from pump testing and from the MACTEC investigation (MACTEC, 2008). The applicant also presented anisotropy parameters obtained by physical core testing by USGS at a site to the northwest of the Turkey Point Units 6 and 7 site. Physical parameters obtained with relevance to the Turkey Point Units 6 and 7 COL FSAR include horizontal and vertical permeability.

As a part of the Turkey Point Units 6 and 7 site investigation, the applicant conducted four pumping tests in the Upper and Lower Biscayne aquifer in 2009. The applicant used the results in the design and implementation of the construction dewatering system, development of the site groundwater model, and simulation of the radial collector wells in the site groundwater model. The wells and naming conventions are as described in Section 2.4.12.4.2 (Site Specific Hydrology), and monitor in order from youngest to oldest the Miami Limestone, the Key Largo Limestone, the freshwater limestone unit, the Fort Thompson Formation, and the Tamiami Formation. The applicant indicated that the Key Largo and Fort Thompson are interpreted in the site conceptual model as aquifers, and the Miami, freshwater limestone, and Tamiami are interpreted as aquitards, where the definition of aquitard implies significantly lower permeability than surrounding aquifer units. The applicant stated that each pumping test was conducted at a constant discharge rate of 3,300 to 5,100 gpm for eight hours and was followed by an eight hour recovery period. The applicant used a background well to correct for the influences of the tidal cycle.

Biscayne aquifer

The applicant summarized the results of the aquifer pumping testing analyses for the site in Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-209. From the Theis solution to the pump tests in the aquifer intervals, the applicant determined that the transmissivity of the Upper Biscayne aquifer (Key Largo) was 2.3×10^6 gallons per day per foot (gal/d/ft) with a mean storage coefficient of 1.0×10^{-3} , and transmissivity of the Lower Biscayne aquifer (Fort Thompson) was 1.3×10^5 gal/d/ft with a mean storage coefficient of 2.4×10^{-4} . The applicant

cited regional investigations that did not distinguish between the Upper and Lower Biscayne aquifers and found the transmissivity of the Biscayne aquifer ranged from 4×10^5 to 4×10^6 gallons per day per foot (gal/d/ft), storage coefficients ranged from 0.05 to 0.34, and specific yields of 20–25 percent (Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-206). In the undifferentiated shallow Biscayne aquifer, Dames and Moore (1971, 1975) found transmissivities ranging from 1×10^6 to 3×10^6 gal/d/ft, and the applicant also cited results from Broward County on the order of 4×10^5 to 4×10^6 gal/d/ft.

The EPA compiled hydraulic conductivities of the Biscayne aquifer and found vertical conductivities around 15 ft/d and horizontal conductivities around 1,500 ft/d, which corresponds to 2.6 E6 gal/d/ft (Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-205). The applicant stated that municipal water supply wells typically yield 500–7,000 gpm with minimal drawdowns. The applicant suggested that its estimates for the Lower Biscayne were somewhat lower than other investigations in the region, and proposed that a low conductivity filter pack in the wells may have depressed its measured hydraulic conductivity values.

The applicant's estimates of formation anisotropy from the Biscayne aquifer units were obtained from two studies to the northwest of Turkey Point Units 6 and 7 site performed by USGS. The applicant described the studies as follows: Core samples were tested for horizontal and vertical air permeability, porosity, grain density, lithology, and fossil assemblages. These studies subdivided the aquifer on the basis of depositional cycles ranging from marine to fresh water. The freshwater portions tended to have a lower permeability (less than 1000 milliDarcies) and porosity (less than 20 percent) than the marine portions (greater than 1000 milliDarcies and 20–40 percent porosity) of the aquifer. The aquifer sediments were found to be approximately isotropic. This information was used as a starting point in the applicant's groundwater model calibration.

Aquitard units in Biscayne aquifer

The applicant interpreted the pumping test data and information using two different analytical solutions, the Theis method and the Hantush leaky aquifer solution with aquitard storage. The applicant stated as follows: Because the Theis method does not consider leakage it was applied to the time-drawdown data to provide an upper bound on transmissivity for the aquifer units. The Hantush method was used to evaluate distance-drawdown and time-drawdown relationships in the Key Largo Limestone and Fort Thompson Formation aquifers and aquitards. The results are summarized in Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-209.

The applicant obtained Information on the aquitard units (Miami Limestone, freshwater limestone, and Tamiami Formation) using the Hantush method, which the applicant asserts allows calculation of the extent of leakage through over- and underlying aquitards. For the Miami limestone and the freshwater limestone that bracket the Upper Biscayne (Key Largo), the applicant stated that several responses were inconsistent with the site conceptual model, as follows: Responses in three wells in the Miami (C6-1A, C6-3A, C6-4A) and three wells in the freshwater (C6-1B, C6-2B, C6-4B) at the Unit 6 well field were identical to those in the Key Largo pumped zone. The applicant stated that this may suggest that a portion of the screened interval of the aquitard is actually located in the aquifer, and/or that the vertical hydraulic conductivity of the aquitard is the same as that of the pumped aquifer, indicating the absence of an aquitard in this location. The applicant stated that responses in Well C6-3B in the freshwater showed less drawdown than in the underlying unpumped aquifer indicating a possible connection between the pumped (Upper Biscayne Key Largo Limestone) and unpumped aquifers (Fort Thompson Formation that constitutes the Lower Biscayne aquifer). The applicant

indicated that this suggests that responses in the Unit 6 well field may have been detected in only one well in the Miami (C6-2A) and potentially in no wells in the freshwater limestone. The applicant stated that the average vertical hydraulic conductivity of the Miami Limestone is 14 ft per day (ft/d), and that of the freshwater limestone is 6 ft/d.

The applicant stated that the Lower Biscayne pump tests in the Fort Thompson Formation yielded anomalous results for the freshwater limestone aquitard and for the Upper Biscayne aquifer (Key Largo Limestone) for Wells C6-2B and C6-2D. The applicant stated that these results indicate that a portion of the screened interval of the aquitard is actually located in the aquifer, or that the vertical hydraulic conductivity of the aquitard is the same as that of the pumped aquifer, indicating the absence of an aquitard in this location. The applicant stated that the average vertical hydraulic conductivity of the freshwater limestone is 0.2 ft/d, and that of the Tamiami Formation is 1,061 ft/d.

The applicant observed identical responses beneath Unit 7 in the Upper Biscayne aquifer Wells C7-1B (freshwater limestone) and C7-1E (Fort Thompson aquifer), and for Wells C7-4B (freshwater limestone) and C7-4E (Fort Thompson aquifer). The applicant stated that these responses indicate again that a portion of the screened interval of the aquitard is actually located in the aquifer, or that the vertical hydraulic conductivity of the aquitard is the same as that of the pumped aquifer, indicating the absence of an aquitard in this location. The applicant stated that neither Wells C7-1A (Miami Limestone) nor C7-1D (Key Largo Limestone) had sufficiently detailed measurements for determining the drawdown. The applicant indicated that time-drawdown and distance-drawdown data were successfully obtained for well clusters C7-2 and C7-3 and for well cluster C7-4 with the exception noted above. The applicant stated that data from the C7-1 well cluster were only acceptable for distance-drawdown comparisons. The applicant stated that the average vertical hydraulic conductivity of the Miami was 123 ft/d, and that of the freshwater limestone was 7 ft/d.

The applicant stated that legible and usable data was recorded from the transducers in the Lower Biscayne aquifer at Unit 7 produced for well clusters C7-3, C7-4, and C7-5, with the exception of wells C7-4B (freshwater limestone), C7-4D (Key Largo Limestone) and C7-5C (Tamiami Formation). The applicant stated that the average vertical hydraulic conductivity of the freshwater limestone was 0.4 ft/d and that of the Tamiami Formation was 100 ft/d (30 m/d).

Intermediate confining unit

The applicant cited a regional USGS water supply investigation for information regarding the Intermediate aquifer system/confining unit (Bush and Johnston 1988). The applicant stated that the hydraulic conductivity of the intermediate confining unit is "very low and provides good confinement for the underlying Floridan aquifer system," implying that at the Turkey Point Units 6 and 7 site, the intermediate aquifer system/confining unit acts as a confining unit and not as an aquifer. The applicant did not perform site-specific hydrogeological investigations on the intermediate confining unit because the applicant believes flow and transport for the radioactive release scenario, construction dewatering, and water supply through the radial collector wells will occur exclusively in the Biscayne aquifer. EPA compiled information from sources in Miami-Dade County and estimated the horizontal hydraulic conductivity as 90 ft/d and the vertical hydraulic conductivity as 0.1-0.24 ft/d, and porosities ranging from 0.1-0.31 (Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-205). The applicant stated that the modeled leakage coefficient was variable, and ranges from 0.01 to 1 in/yr/ft, but that measured leakage coefficients range from 0.44 to 88 in/yr/ft, according to Bush and Johnston. The applicant stated that the large measured leakage coefficients indicate a combination of sources including

leakage from the overlying surficial (Biscayne) aquifer and upward leakage from permeable rocks beneath and within the pumped interval.

Floridan aquifer

No new data has been generated in the Turkey Point Units 6 and 7 investigation from the Floridan aquifer and the applicant relies upon regional data sources and site-specific investigations at the Turkey Point site for Units 1-5. This is primarily because the applicant believes flow and transport for the radioactive release scenario, construction dewatering, and water supply (from Biscayne Bay) to the radial collector wells occur exclusively in the Biscayne aquifer. The applicant described the Upper Floridan as approximately 3,000 ft thick with porosity and permeability varying widely depending on the location and formation. For instance, the applicant stated that confinement by clay and low permeability layers tends to inhibit formation of secondary porosity, particularly in southern Florida. Specifically, the applicant stated as follows: Transmissivity tends to be lowest in southern and panhandle Florida with values typically less than 50,000 ft²/d, and highest in central and northern Florida with values typically greater than 1 million ft²/d (Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-206). EPA found the transmissivity from the Upper Floridan was 3.8E5 gal/d/ft (Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-205). Regional storage coefficients range from 1×10^{-1} to 1×10^{-4} (Bush and Johnson, 1971, 1975). From the Turkey Point Units 1 and 2 investigation, site-specific data from a 90-day continuous pump test in production wells of 1130–1400 feet deep indicates transmissivity of 53,600 ft²/d (4×10^5 gal/d/ft), a storage coefficient of 6×10^{-3} , and leakance of 2×10^{-3} gal/d/ft² in the Upper Floridan. Parameters obtained for Turkey Point Unit 5 and Turkey Point Units 1 and 2 cooling and process water wells indicated transmissivity of 2.4E5 gal/d/ft, storage coefficient of 2×10^{-3} , and leakance of 0.005 gal/d/ft².

The applicant stated that the Middle Confining Unit of the Floridan aquifer consists of the Avon Park Formation and the top of the Oldsmar Formation, with the base being the top of the highly transmissive units constituting the top of the Lower Floridan. The applicant explained as follows: In MDWASD Well MDS-112, the base of the MCU is found at 2,460 ft bgs and is 230 ft below the top of the Oldsmar Formation (Reese, 1994). The horizontal hydraulic conductivity is 3×10^{-3} to 3 ft/d and vertical hydraulic conductivity measured from core samples in eastern Broward county ranges from 1×10^{-3} to 2 ft/d (Reese, 1994), and 1.7×10^{-8} cm/s in Palm Beach County (Maliva et al., 2007). The porosity in the Palm Beach County core samples was less than 15 percent. EPA found the transmissivity of the middle confining unit was 1.7×10^{-4} (Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-205).

The applicant stated that the Lower Floridan aquifer is discussed here primarily because it contains a unit of extremely high transmissivity that is used in southern Florida for disposal of treated industrial and sewage wastewaters, the “Boulder Zone.” In regard to the Boulder Zone, the applicant stated as follows: At Turkey Point Units 6 and 7, blowdown will be disposed within the Boulder Zone as described in Section 2.4.12.4.5. The Boulder Zone is not composed of boulders but rather of massively bedded dolostones with extensive secondary porosity. Regionally, the Lower Floridan is encountered around 2,400 ft bgs and extends to over 4,000 ft bgs, and because of its depth is not well characterized. The Boulder Zone is typically located above the top of the Cedar Keys Formation in the lower portions of the Oldsmar Formation, but locally the Boulder Zone may extend upward to the middle of the Oldsmar Formation or downward to the top of the Cedar Keys Formation. At the Turkey Point site, the Boulder Zone is believed to begin at around 3,030 ft bgs. Transmissivity ranges from 3×10^6 to 24×10^6 ft²/d and hydraulic conductivity was estimated as 4,250 ft/d at an injection well at MDWASD, which is around two orders of magnitude higher than the overlying Lower Floridan aquifer and the Middle

Confining Unit of the Floridan aquifer. EPA found the transmissivity of the Lower Floridan was $1.5 \times 10^1 \text{ ft}^2/\text{d}$, and the Boulder Zone was $2.5 \times 10^7 \text{ ft}^2/\text{d}$ (Turkey Point Units 6 and 7 COL FSAR Table 2.4.12-205).

Staff's Technical Evaluation

The staff reviewed Section 2.4.12.2.4 "Aquifer Properties" of the Turkey Point Units 6 and 7 COL FSAR and associated appendices containing observation well records and data and pumping test data and analysis. The staff also reviewed documents on the properties of aquifers in the vicinity of the Turkey Point Units 6 and 7 site by USGS (e.g., Johnston and Bush, 1988; Bush and Johnston, 1988; Reese, 1994; Reese and Richardson, 2008; Merritt, 1996; and, Fish and Stewart, 1991), EPA (US EPA, 2003), the SFWMD DBHYDRO database ([http://www.sfwmd.gov/portal/page/portal/xweb environmental monitoring/dbhydro application](http://www.sfwmd.gov/portal/page/portal/xweb%20environmental%20monitoring/dbhydro%20application)), and previous studies conducted on the site (Dames and Moore, 1971, 1975). The staff verified the applicant's description of the aquifer properties and testing methods and results from on-site investigations to be reasonable and consistent with the independent studies cited. Therefore, the staff concludes that the applicant's description of the aquifer properties is adequate and acceptable.

2.4.12.4.9 Hydrogeochemical Characteristics

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.2.5, the applicant presented data regarding aquifer water quality in the vicinity of Turkey Point Units 6 and 7. The applicant presented water quality data from the Turkey Point Units 6 and 7 investigation, and local and regional data from USGS and SFWMD for the Biscayne and Floridan aquifers and local surface water bodies.

The applicant stated that groundwater from the aquifers in the vicinity of the Turkey Point Units 6 and 7 site was not potable because of excess salinity. The applicant stated that the State of Florida has classified these waters as Class G-III indicating there is no reasonable chance of their use as drinking water. The applicant indicated that Class G-III is defined by the State of Florida as non-potable groundwater in unconfined aquifers that has TDS content of 10,000 mg/L or greater; or which has total dissolved solids of 3,000–10,000 mg/L and either has been reclassified by the Commission as having no reasonable potential as a future source of drinking water, or has been designated by the Department as an exempted aquifer according to Rule 62-528.300(3), F.A.C. The applicant provided two tables (Turkey Point Units 6 and 7 COL FSAR Tables 2.4.12-210 and 2.4.12-211) showing major water quality indicators including TDS, dissolved cations, pH, temperature, dissolved oxygen, specific conductance, turbidity, and redox potential in the site-specific investigation wells at the Turkey Point Units 6 and 7 site, median values of the Surficial and Floridan aquifers obtained from SFWMD, mean values from the Upper Floridan production well at the Turkey Point Units 6 and 7 site, and average values in Biscayne Bay, the L-31N canal, and precipitation at the Everglades National Park. The applicant also provided a Piper trilinear diagram in the FSAR indicating similarities between Biscayne groundwater, Floridan groundwater, Biscayne Bay seawater, and cooling canal water, all of which are classified as a sodium-chloride type.

The tables provided by the applicant suggest that TDS in the Biscayne (surficial) aquifer at Turkey Point Units 6 and 7 ranges from 30,000 to 65,000 mg/L. According to the applicant, the Upper Floridan in the vicinity of the site as monitored by SFWMD contains TDS concentrations

greater than 1000 mg/L, and the Turkey Point Unit 5 production wells have an average concentration of 5,400 mg/L TDS. The applicant stated that the groundwater in the Middle Confining Unit is variable and is a mixture of freshwater from the Upper Floridan and upwelling saline water from the Lower Floridan. The applicant cites a USGS regional water investigation report to suggest that groundwater in the Boulder zone contains approximately 37,000 mg/L TDS. The applicant noted a low temperature anomaly found within the Boulder Zone (50 °F) along Florida's southeastern coast, suggesting recharge of the Boulder Zone by seawater infiltration. The applicant presented a conceptual model (Turkey Point Units 6 and 7 COL FSAR Figure 2.4.12-243) developed by the USGS (Meyer, 1989) describing deep circulation in the Floridan aquifer and the mixing of seawater with groundwater in coastal areas.

Staff's Technical Evaluation

The staff reviewed Turkey Point COL FSAR Section 2.4.12.2.5 "Hydrogeochemical Characteristics" including: site-specific data collected by the applicant (MACTEC, 2008), regional data from FDEP (<http://www.dep.state.fl.us/water/monitoring/>); reports containing a discussion of chemical characteristics of aquifers in the region by the USGS (Merriitt, 1996, Sonenshein, 1995 and Meyer, 1989) and the Florida Geological Survey (FGS, 1992). Based on the staff's review of these data and reports, the staff confirmed that the applicant's evaluation of the hydrogeochemical characteristics of the groundwater in the vicinity of the site is consistent with independent reports by state and federal agencies and is an acceptable description. Additionally, the staff reviewed the State of Florida's criteria for waters classified as Class G-III (<https://www.flrules.org/gateway/RuleNo.asp?ID=62-520.430>), and considers the applicant's characterization to be reasonable. The staff confirmed that the applicant's conceptual description of the Floridan aquifer (including the Boulder Zone) circulation is consistent and based on USGS studies (e.g., Meyer, 1989) and is an acceptable and adequate representation of the aquifer system.

2.4.12.4.10 Subsurface Pathways

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.3, the applicant presented an evaluation of subsurface pathways to an offsite receptor. Information provided by the applicant included an evaluation of alternative pathways, an assessment of advective travel times, and results from a model of post-construction groundwater flow conditions.

The applicant described the pre-construction condition of Turkey Point Units 6 and 7, in which the ground surface at Turkey Point Units 6 and 7 is approximately at sea level (2.5 to 0.8 ft (0.8 to 0.24 m) NAVD 88 MSL) and the Biscayne aquifer is within 5 ft (1.5 m) of the ground surface. The applicant indicated the following: The muck layer found in the first 7 ft (2.1 m) will be removed during construction. The excavation will be -35 ft NAVD 88. Engineered fill will be used to raise the finish grade to 25.5 ft (7.8 m) NAVD 88. The walls of the excavation will be reinforced with concrete grouting to reduce the rate of infiltration of groundwater into the excavation. Reinforced concrete diaphragm walls of thickness 3 ft (0.9 m) will also be emplaced to a depth of -65 ft (-19.8 m) ft NAVD 88 to control groundwater flow into the excavation.

The applicant indicated further, as follows: The effluent holdup tanks will be located within the auxiliary containment building. The building will contain a radioactive tank that is modeled as leaking, for which 80 percent of the simulated leakage is assumed to be released (22,400 gal) in accordance with NUREG-0800 and Branch Technical Position (BTP) 11-6. Instantaneous release into the saturated structural fill adjacent to the building is assumed, which the applicant stated is conservative because it assumes failure of the floor drain system, penetration of the

3 ft (0.9 m) thick exterior concrete walls and 6 ft (1.8 m) thick basemat, and flow of effluent outward into the saturated zone of the water table.

Alternative Pathways Evaluation

Information Submitted by Applicant

The applicant described one potential physical pathway for offsite migration of a postulated accidental release of radionuclides. The applicant used regional groundwater potentiometric surface measurements, which are describe above in Sections 2.4.12.4.6 and 2.4.12.4.7 above, to infer that flow is toward the east and southeast in Miami-Dade County in the Biscayne aquifer. Expanding on this, the applicant stated as follows: Onsite measurements of hydraulic head suggest an upward gradient from the Lower to the Upper Biscayne aquifers, and that the hydraulic gradient in the Upper Biscayne aquifer is also in the upward vertical direction. Local monitoring suggests that flow is generally toward the center and to the southwestern corner of the Turkey Point Units 6 and 7 island in the Upper Biscayne and generally away from the center of the island and toward the cooling canals, i.e., the industrial wastewater facility (IWF), that surround the island in the Lower Biscayne. The most likely release pathway is from the Turkey Point Unit 6 or 7 reactor through the Key Largo Limestone, followed by discharge into the IWF and release into Biscayne Bay through the Biscayne aquifer. Multiple alternate pathways involved exactly the same physical pathway, but alternatively assumed for simulation purposes that the radial collector wells (RCW) at the Turkey Point peninsula were either pumping or were *not* pumping during the release. The RCW system, when fully operational, would pump 87,000 gallons per minute (gpm), which is assumed for the primary advective flowpath. The applicant stated that the RCW will only be fully operational 90 days per year.

The applicant described further as follows: Discharge into the subsurface is within the Key Largo Limestone, followed by discharge to the IWF and dilution, and, ultimately, discharge with regional groundwater flow into Biscayne Bay. This scenario would also not threaten surface water supplies, because public access to the 5,900 acre IWF is entirely restricted. The IWF is engineered to function as a groundwater discharge zone, as the eastern canals are continuously maintained at a lower head than Biscayne Bay to the east and the western canals are continuously maintained at a lower head than fresh groundwater located to the west of TP. Thus, multiple alternate pathways also involved a functional, circulating IWF, or an inactive IWF. The IWF circulates around 4 billion gallons at a rate of 4,000 cubic feet per second (cfs). Thus, a total of four scenarios were investigated:

- IWF operational, RCW off (Case 1)
- IWF operational, RCW on (Case 2)
- IWF non-operational, RCW off (Case 3)
- IWF non-operational, RCW on (Case 4)

Calculations of advective radionuclide travel times after accidental release are presented in Section 2.4.13.1.4. The receptor calculation is based upon using an artificial (i.e., nonexistent) well at a point in the Biscayne aquifer in Biscayne Bay, but the applicant concluded that human consumption of groundwater is not a plausible receptor scenario because the groundwater at the Turkey Point Units 6 and 7 site is saline, is not used for human consumption, and is not likely to be used for human consumption at any point in the future. Instead, a dose calculation is performed to determine the risk of human consumption of seafood in Biscayne Bay that has become contaminated by radionuclides.

The applicant stated that there is no vertical transport downwards from the Biscayne aquifer into the Floridan aquifer, thus the applicant did not consider discharge into the Floridan aquifer in the postulated radionuclide release scenario.

Staff's Technical Evaluation

The staff reviewed Section 2.4.12.3.1 "Biscayne Aquifer", Section 2.4.12.3.2 "Floridan Aquifer System", Section 2.4.13.1 "Groundwater", Section 2.4.13.1.2.1 "Primary Conceptual Model", and Section 2.4.13.1.2.2 "Alternate Conceptual Model" of the Turkey Point Units 6 and 7 COL FSAR, RAI 5643, Question 02.04.12-6, and BTP 11-6 (NRC, 2007) for information on Alternative Pathways Evaluation. The staff's review confirmed that the applicant addressed relevant information topics. Initially, the staff determined that the applicant's description of alternate subsurface pathways in Turkey Point Units 6 and 7 COL FSAR, Revision 2, was not conservative because all pathways traveled through the 19 ft (5.7 m) thick concrete fill layer constructed as the lower portion of the containment building, and because breaches of neither the 19 ft (5.7 m) concrete base layer nor the 3-ft thick reinforced concrete diaphragm walls (neither of which are seismic Category I structures) were considered to provide a pathway to groundwater. Accordingly, the staff sent RAI 5643, Question 02.04.12-6 to the applicant to which the applicant responded June 27, 2011 (ADAMS Accession No. ML11180A062). The staff evaluated the responses and determined that the applicant considered the four scenarios identified above, eliminated any credit for delayed transport through the concrete layer and walls, and revised and recalibrated the groundwater model accordingly. Based on the review of the responses to the alternative scenarios and the groundwater model, the staff concludes that the applicant's evaluation of potential pathways was adequate and addressed each unresolved question and the RAI is closed. Accordingly, the staff finds that the applicant's evaluation of alternative pathways is acceptable.

Advective Travel Times

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Revision 2 Section 2.4.13.1.4 "Radionuclide Transport Analysis," the applicant provided analysis of contaminant transport along a plausible alternative pathway to determine a travel time assuming advective transport (fluid transport that causes changes in density or other physical properties). In Turkey Point Units 6 and 7 COL FSAR Section 2.4.13.1.3 "Pathway Analysis" and in Appendix 2CC, the applicant provided analysis of contaminant transport along a plausible alternative pathway to determine a travel time assuming advective transport using the particle tracking method. The applicant stated that for the analyses, it is assumed the contaminant moves with the groundwater and is not retarded by geochemical reactions. The average velocity of the pore water in a porous media is estimated using the following equation:

$$v = (K \, dh/dx) / n_e$$

Where

- v = average pore water velocity (ft/d)
- K = saturated hydraulic conductivity (ft/d)
- dh/dl = hydraulic gradient (ft/ft)
- n_e = effective porosity (scalar decimal).

Travel time (T in days) is then estimated as the distance from source release point to receptor (D in feet) divided by the pore-water velocity (v in ft/d).

In the conceptual model for the release scenario in Turkey Point Units 6 and 7 COL FSAR Revision 2, the applicant considers flow into the IWF and through the Key Largo Limestone. To be conservative, the applicant does not consider residence time in the IWF. To calculate travel time, the applicant uses a travel distance (D) of 810 ft (247 m), the horizontal hydraulic conductivity of 12,000 ft/d, an average hydraulic gradient of 4×10^{-3} , and an effective porosity of 0.20. The applicant stated that the calculated travel time through groundwater in the Key Largo Limestone to Biscayne Bay is 0.09 years.

In the conceptual model for the release scenario in Turkey Point Units 6 and 7 COL FSAR, the applicant considers particles released into the structural fill around the Units 6 and 7 nuclear islands as shown in Turkey Point Units 6 and 7 COL FSAR Revision Figure 2.4.13-201, and in Appendix 2CC Figure 2CC-255. The resultant travel times to the IWF obtained by the applicant are shown in Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-202. The applicant modeled particle movement through the system until they reach a boundary where flow will occur outside of the system, and calculated the time for particles to reach that point. The applicant stated that for instances where the IWF is operational, Case 1 (RCW off) modeled particle movement was faster than for Case 2 (RCW on), thus, Case 1 (3911 d) is subjected to further evaluation. For Cases 3 and 4 the IWF is not operational, and the RCW is either off (Case 3), or on (Case 4). The applicant stated that Case 3 produced an estimated transport time of 3778 d and Case 4 (IWF-non-operational, RCW-on) an estimated time of 4079 d.

Staff's Technical Evaluation

The staff reviewed Section 2.4.13.1.3 "Pathway Analysis," and Appendix 2CC of the Turkey Point Units 6 and 7 COL FSAR and the applicant's response to RAI 5643, Question 02.04.12-6 for information on advective transport (ADAMS Accession No. ML11180A062). The staff's review confirmed that the applicant used the parameters and inputs consistent with the hydrogeologic characteristics of the site as discussed in SER Sections 2.4.12.12.6, 2.4.12.4.7 and 2.4.12.4.8 above, and that the applicant's conceptualization and evaluation of the advective transport travel times used accepted transport models. Accordingly, the applicant's results are acceptable.

Three-Dimensional Numerical Groundwater Flow Model

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Appendix 2CC, the applicant describes a three-dimensional, steady-state, constant density, numerical groundwater model that was developed to better understand pre-construction and post-construction groundwater conditions within the Biscayne aquifer at the Turkey Point Units 6 and 7 site (ADAMS Accession No. ML110610729). The applicant described the model as follows: In Turkey Point Units 6 and 7 COL FSAR, the model effort is split into Phase I, involving determining groundwater control options for construction and to simulate the operation of the RCW system for production of make-up water; and Phase II, involving specific post-construction issues, e.g., splitting the top model layer into two layers, revision of the top elevation of diaphragm walls to 2 ft (0.6 m) NAVD 88, incorporation of structural backfill into the top model layer, and incorporation of the MWR as an active feature. The model uses the user interface Visual MODFLOW and is based on the USGS-developed MODFLOW 2000 code. Fourteen layers of the Biscayne aquifer were

included in the model framework, as described above beginning in the muck layer and extending to the Tamiami Formation. The layers are as follows:

- Layer 1: Muck layer: organic soils onshore, offshore sand and sediment
- Layers 2, 3: Marine limestone, upper aquitard (Miami Limestone)
- Layer 4: Marine limestone, Upper Higher Flow Zone (RCW source)
- Layers 5, 6: Marine limestone, Upper Biscayne aquifer (Key Largo Limestone)
- Layer 7: Freshwater limestone unit, and where absent = Key Largo Limestone
- Layers 8, 9, 11, 12, 13: Marine limestone, Lower Biscayne aquifer (Fort Thompson Formation)
- Layer 10: Marine limestone, Lower Higher Flow Zone
- Layer 14: Marine limestone or sandstone, lower aquitard (Upper Tamiami Formation)

The Upper Higher Flow Zone and Lower Higher Flow Zone are identified as a result of mud loss during drilling at the contact between the Miami Limestone and the Key Largo Limestone, and 15 ft below the top of the Fort Thompson Formation. Additionally, enlarged boring diameters were observed. Revision 3 of the Turkey Point Units 6 and 7 COL FSAR included these layers.

The applicant obtained hydraulic parameters for parameterization and calibration from three historical onsite pump tests in the Biscayne aquifer on the Turkey Point Units 6 and 7 property, regional groundwater models that include the Turkey Point Units 6 and 7 site in their domain, recent onsite pumping tests at Turkey Point Units 6 and 7 for the development of the Turkey Point Units 6 and 7 COL FSAR, and literature values.

The applicant based precipitation estimates on the 2008 water year, in which 45.47 in (116.26 cm) were received, which the applicant found to be close to the long term average (1968–2008) of 45.77 in (116.26 cm). The applicant treated recharge assuming 100 percent of precipitation is allowed for surface water bodies and for wetland areas, while buildings and paved areas allow no recharge. The applicant used evapotranspiration rates of 54.52 in/yr (139.3 cm/yr) in the calibration runs.

The applicant indicated as follows: Spatially variable recharge and evaporation were assigned to the top layer of the model based on land use. Biscayne Bay was represented by the long-term average elevation of -0.81 ft (-0.25 m) NAVD 88. The elevation of various surface water bodies were specified by adjustment to the elevation of Biscayne Bay. For example, the elevation of the IWF is specifically maintained with respect to the actual surface elevation of Biscayne Bay. Groundwater-surface water interactions are simulated in the model by including Biscayne Bay, the IWF, L-31E Canal, Cardinal Sound Canal, Florida City Canal, and the Model Land Canal (C-107). The river boundary condition was used for surface water features. Evapotranspiration and recharge boundaries were used at the ground surface for the land area. A general head boundary was used for Biscayne Bay and model sides. The horizontal flow barrier boundary was used for the mechanically stabilized earth retaining wall and for the cut-off walls for Turkey Point Units 6 and 7. The bottom of the Tamiami Formation and the bottom of the Turkey Point Units 6 and 7 excavations are represented as no-flow boundaries.

The applicant described model calibration and input data as follows: Calibration of the model was approached by using the response to pumping tests (PW-7L, PW-1, and PW-7U) to adjust the hydraulic conductivities of the units of the Biscayne aquifer, and the conductance of the various head-dependent boundary conditions. Hydraulic conductivity input data from pump tests are summarized in Table 2.4.12-1, and site hydraulic parameters are summarized in Table

2CC-204. To test the efficacy of the model, three tests were employed: (1) the modeled groundwater flow directions were compared to historical data, (2) the calculated groundwater discharge and recharge between cooling water canals and groundwater beneath Biscayne Bay was qualitatively compared to results from surface water modeling, and (3) the response to pumping in test well PW-6U was matched to model predictions.

The applicant concluded that the model was correctly calibrated because (1) observations of regional flow patterns and groundwater levels were reasonably matched by the simulations, (2) the modeled flow exchanges between the cooling water canals and the underlying groundwater agreed between independently developed ground and surface water models, and (3) the 2009 pump test (PW-6U) results.

The applicant subsequently used the model to determine estimates of discharge rates for the construction excavation for the power block, which is expected to extend to a depth of -35 ft (-10.7 m) NAVD. The applicant stated further as follows: A concrete cut-off wall will be installed around the excavation for Turkey Point Units 6 and 7 at a depth of -65 ft (-20 m) NAVD to assist in the dewatering process. To determine dewatering pumping rates, the calibrated base model was used with the following changes: (1) horizontal flow was assumed to occur between the ground surface and the base of the cut-off wall, (2) the interior of the excavation was defined as inactive to flow, and (3) pumping wells were added around the interior perimeter of the excavation between the base of the excavation and the base of the simulated cut-off wall in the lower portion of the Key Largo Limestone, freshwater limestone, and the Fort Thompson Formation. The pumping wells were represented as constant head cells represented as a thin uniform layer with a head of -35 feet NAVD 88. The applicant stated that the results of Phase I calibration suggested that construction dewatering would be aided by grouting within the cut-off walls to produce discharge rates ranging from 100 to 1,000 gpm in the excavation. Grouting was represented using a new hydraulic conductivity of 1×10^{-4} cm/s, while additional tests ranging from 1×10^{-3} to 1×10^{-6} cm/s were also tested. The grouting program is discussed in greater detail in Sections 2.5.4.5.4 and 2.5.4.6.2.

The applicant stated that model simulations demonstrated that the IWF and other regional canals exert a major influence on groundwater levels in the vicinity of Turkey Point Units 6 and 7. The applicant described the canals as follows: The canals in the IWF are engineered for circulation through maintenance of constant head levels at opposing ends of the system. After cooling water passes through Units 1-4 condensers and gains heat, the water is discharged to the northern end of the 32 westernmost canals, which are ~3 ft (0.9 m) deep and are oriented north to south. The warm water flows toward the southern end of the westernmost canals where it is collected and flows eastward across the southern end of the canals. The easternmost canals provide the cooling water return. The circulating pumps on the return side in the northeastern corner maintain a drawdown of about 3 ft (0.9 m) relative to the discharge location. The operation results in higher water levels in the discharge versus return canals, regardless of tidal influences. In the westernmost canals, the head level is always higher than that of Biscayne Bay; in the easternmost canals, the head level is always lower than that of Biscayne Bay; and in the southernmost canals, the head level is approximately equal to that of Biscayne Bay. Based on the surface water elevations for Biscayne Bay, the elevation of the discharge side is assumed to be 0.95 ft (0.3 m) NAVD 88, and that of the intake structure is -2.05 ft (0.6 m) NAVD 88. The canals are assumed to be in steady-state with respect to salinity and chemistry.

The L-31E Canal (SFWMD Salinity Structure) located to the west of the industrial wastewater cooling canals was constructed to act as a barrier to prevent salinity intrusion to locations west

of the canal. The elevation of the water level of the L-31E Canal was assumed to be 0.02 ft (0.61 cm) NAVD 88. The Interceptor Ditch lies between the industrial wastewater cooling canals and the L-31E Canal and is designed to limit the influence of water from the cooling canals on groundwater quality west of the canals in the upper portion of the aquifer. Water levels in the Interceptor Ditch are maintained by pumping to induce a seaward hydraulic gradient. The Interceptor Ditch is about 1,000 ft to the southeast of the L-31E Canal. The Interceptor Ditch is approximately 30 ft (9.1 m) wide, 19 ft (5.8 m) deep, has a total length of approximately 29,000 ft (8,839 m), and the water surface elevation is -0.28 ft (-0.02 m) NAVD 88 and transitions to -1.05 ft (-0.32 m) at the southern end. The westernmost discharge cooling canal surface elevation is assumed to be 1.08 ft (0.33 m) NAVD 88 at the northern end and drops linearly to -1.05 ft (-0.32 m) at the southern end.

The post-construction elevation of the ground surface is expected to be 25.5 ft (7.8 m) NAVD 88. The applicant used the model to determine the elevation of the groundwater table once construction is complete. The applicant made the following assumptions for the simulations: (1) the cut-off walls remain in place, (2) concrete added within the cut-off walls between -35 ft (-11 m) NAVD 88 and -16 ft NAVD 88 has a hydraulic conductivity of 1×10^{-7} cm/s, (3) a concrete “mud mat” for the reactor building having a hydraulic conductivity of 1×10^{-7} cm/s was added within the cut-off walls between -16 and -14 ft NAVD 88, (4) the reactor building is impermeable to flow, (5) zero recharge occurs on the island due to pavement, grass is 2 in/yr, and gravel is 10 in/yr, (6) backfill added between the reactor building and the cut-off walls has a hydraulic conductivity of 0.01 cm/s, and (7) muck is removed entirely and replaced with backfill having hydraulic conductivity of 0.01 cm/s. The applicant indicated further as follows: Simulations resulted in water table elevations at Turkey Point Units 6 and 7 were sufficient to meet the criteria of the Design Control Document (DCD) of the AP1000 (i.e., a water table elevation of less than 3 ft (0.91 m) NAVD 88 given a power block elevation of 25.5 ft (7.8 m) NAVD 88). Test cases included sea-level rise of 1 ft/yr, failure of the north wall of the MWR, and a variety of recharge rates on the island.

The applicant also used the model to simulate the performance of the radial collector wells and to determine the source of the water. The applicant indicated as follows: A new 1-ft thick layer was added into the model of the Key Largo Limestone to represent the lateral wells, effectively splitting the Key Largo into three layers, one of which is located above -26.5 ft NAVD 88 and the other below -27.5 ft NAVD 88. The model predicted that four pumping wells on each lateral would produce a total of 28,800 gallons per minute per radial collector well, with three of the four radial wells operational. The applicant used the particle tracking model to predict that 92 percent of the water would originate in Biscayne Bay and would be filtered through the muck layer, while 8 percent of the water would originate inland. The applicant subsequently revised the modeled shoreline to include the submerged mangrove forest, resulting in an estimate of 95 percent of the water sourcing from Biscayne Bay. The applicant stated that the radial collector wells are not a safety issue because the AP1000 reactor does not credit a water source for cooling.

Staff's Technical Evaluation

The applicant has provided a description of the methods and outcomes of three-dimensional numerical groundwater flow modeling in Section 2.4.12.3.1 “Biscayne Aquifer” and Turkey Point Units 6 and 7 COL FSAR Appendix 2CC. The staff examined the model to determine pre-construction and post-construction groundwater conditions at the Turkey Point Units 6 and 7 site, including the impacts and efficacy of construction dewatering, considering both the increase in site grade and the emplacement of diaphragm walls for groundwater control.

For dewatering simulation for Turkey Point Units 6 and 7 excavations, the staff conducted a bounding analysis to determine the efficacy of planned construction dewatering. The staff assumed an impermeable cutoff wall and the pumping rate was approximated by one-dimensional steady-state flow to the portion of the aquifer contained in the cutoff wall as $Q = kiA$, with k as the hydraulic conductivity, i as the gradient, and A as the cross-sectional area. From Figure 2CC-222 of the Turkey Point Units 6 and 7 COL FSAR Revision 2, A is approximately 54,000 ft² (300 ft × 180 ft). To keep the groundwater level below the excavation elevation of -35 ft, the total head loss is about 35 ft. For the three formations in the cylinder (Figure 2CC-226), the hydraulic conductivity of the freshwater limestone 4×10^{-4} cm/s is orders of magnitudes less than that of the Key Largo Limestone (4 cm/s) and the Fort Thompson Formation (0.2 cm/s) (Turkey Point Units 6 and 7 COL FSAR Table 2CC-205). Therefore, most of the head loss is expected to occur in the freshwater limestone (similar to the MWR case described in Section 2.4.12.4.2 of this SER). According to Turkey Point Units 6 and 7 COL FSAR Appendix 2CC, the freshwater limestone is a thin unit (less than 9 ft). The gradient in this layer will be greater than 1 (9 ft of the 35 ft head loss on a 9 ft layer). The vertical hydraulic conductivity must be less than 32 ft/day (0.01 cm/s). Considering that the freshwater limestone can be absent (Turkey Point Units 6 and 7 COL FSAR Appendix 2CC), a 35-ft total head loss, and the hydraulic conductivity of these formations can be much greater than 0.01 cm/s, the staff determined that the 9,000 gpm pumping rate for dewatering listed in Turkey Point Units 6 and 7 COL FSAR Revision 2 (FPL, 2010b) per excavation was inadequate.

The staff determined that the reasons for this initial underestimation are: (1) use of a calibrated horizontal (10 times greater than vertical) hydraulic conductivity of 0.0004 cm/s for the freshwater limestone (Turkey Point Units 6 and 7 COL FSAR Revision 2 Table 2CC-205) while the geometric mean was reported to be 0.17 cm/s (Turkey Point Units 6 and 7 COL FSAR Revision 2 App. 2CC 5.7.1), and (2) the thickness of this low permeable formation appears to be significantly greater under the excavation sections than elsewhere (Turkey Point Units 6 and 7 COL FSAR Revision 2 Figure 2CC-225). Accordingly, the staff posed RAI 5643, Question 02.04.12-5 (April 28, 2011) to ask the applicant to revise the dewatering estimate to demonstrate more conservatism. In a June 27, 2011, response (ADAMS Accession No. ML11180A062), the applicant revised the groundwater model and changed the dewatering design by proposing to inject approximately 25 ft of grout plug into the rock beneath the base of the excavation. The applicant estimated the hydraulic conductivity of the formation plugged with grout as 1×10^{-4} cm/s, and the applicant tested the efficacy of dewatering by performing calculations with a range of hydraulic conductivity from 1×10^{-3} to 1×10^{-6} cm/s. Furthermore, the staff in its calculations used the conductivity of the Key Largo Limestone with freshwater limestone absent, which was conservative (i.e., the hydraulic conductivity will be higher) and the staff results were in agreement with the applicant's estimates. The accordingly staff finds the revised model to be acceptable and that the applicant had addressed the questions in the RAI and the staff considers the RAI closed.

As described above, based on the results of staff's analysis and the applicant's conceptualization and implementation of the groundwater flow model, input parameters and simulations are acceptable and sufficient to represent the transport processes and dewatering estimates for the aquifer system.

2.4.12.4.11 *Monitoring or Safeguard Requirements*

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR, Section 2.4.12.4, the applicant discussed “monitoring and safeguard requirements.” The applicant stated that it will comply with RG 4.21 and the Nuclear Energy Institute (NEI) groundwater initiatives. The applicant stated that many measurements will be made during construction and after plant start-up, including water level and geochemical measurements (e.g., pH, temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, major anions and cations, total dissolved solids, and silica at minimum). The applicant indicated that wells will include selected observation wells retained from the Turkey Point Units 6 and 7 site investigation, radial collector wells, and on-site water supply wells. The applicant stated that the long-term groundwater monitoring program would involve periodic water level measurements and geochemical sampling and analysis of the radial collector wells to determine changes in the Biscayne aquifer that could impact groundwater supply or the accidental release analysis.

In regard to injection into the Boulder Zone, the applicant stated that it will comply with underground injection control (UIC) regulations determined by the State of Florida in Chapter 62-528 FAC (FDEP, [www](http://www.fdep.com)). The applicant described this as follows: The UIC permit requires monthly reporting of the average, minimum, and maximum injection pressure, flow rate, volume, and annular pressure of each injection well. Mechanical integrity is required to be tested every 5 years. Dual-zone wells are required to be located less than 150 ft from the injection wells in order to detect vertical migration of injected fluids. The upper monitoring zone is above or at the base of the USDW and the lower zone is below the base of the USDW and just above the primary confining unit.

Operational and accident monitoring will be initiated in the event of an accidental release of liquid effluent from the plant. Measurements will be taken quarterly in the downgradient direction of flow.

Staff's Technical Evaluation

The staff reviewed Section 2.4.12.2.4 “Monitoring and Safeguard Requirements” of the Turkey Point Units 6 and 7 COL FSAR. As discussed below, the staff finds the monitoring program components acceptable as described in the FSAR:

- Periodic monitoring of Biscayne aquifer water level and geochemical sampling of radial collector wells;
- Geochemical and pressure monitoring of the Floridan aquifer in accordance with mandates by the State of Florida (Chapter 62-528 FAC); and,
- An effluent and process monitoring program (as described in SER Section 11.5)

For the Biscayne and Floridan aquifers, the staff notes that the applicant will perform analysis during and after construction of pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen, major cations, major anions, total dissolved solids, silica, and any additional water use or injection well permit-required parameters. Sampling is performed in site water supply wells, selected observation wells, and dual-zone monitoring wells as part of

the underground injection control (UIC) permit. The State of Florida regulates monitoring associated with the UIC permit.

The staff also reviewed documents on the use of the Boulder Zone for the disposal of Class I industrial wastes via Underground Controlled Injection (UIC) by USGS (Reese and Richardson, 2008), MDWASD (MDWASD, 1981), academic researchers (Maliva et al., 2007; Maliva and Walker, 1998; Haberfield, 1990), EPA (EPA, 2000, 2003), and FDEP regulations concerning UIC (<http://www.dep.state.fl.us/water/uic/index.htm>). In its review of the application, the staff also reviewed sections of the environmental report addressing groundwater monitoring (FPL, 2010c) and the applicant's approved application to FDEP for a Class V exploratory well and transition to a Class I deep injection well (ADAMS Accession Nos. ML093310169, ML110070251). The information addressing groundwater monitoring in the environmental report is consistent with that in the Turkey Point Units 6 and 7 COL FSAR. Accordingly, and for the reasons described above, the staff concludes that the applicant's Turkey Point Units 6 and 7 site monitoring program and its components are acceptable.

2.4.12.4.12 Site Characteristics for Subsurface Hydrostatic Loading

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR, Section 2.4.12.5, the applicant described subsurface hydrostatic loading estimates, defined plant grade, and defined the site characteristic maximum groundwater level for the Turkey Point Units 6 and 7 site.

The applicant indicated as follows: The current elevation of the proposed location of the nuclear island for Units 6 & 7 is approximately 2.5 to 0.8 ft (0.8 to 2.4 m) MSL (NAVD 88). The muck layer found in the first 7 ft will be removed during construction, and the initial excavation will extend to -35 ft (-11 m) NAVD 88. Engineered fill will be used to raise the finish grade to 25.5 ft (7.8 m) NAVD 88. Reinforced concrete diaphragm walls of thickness 3 ft (0.9 m) will be emplaced at a depth of -65 ft (-20 m) NAVD 88 to control groundwater flow into the excavation. The applicant stated that the Biscayne aquifer is within 5 ft of the current ground surface.

The applicant calculated the estimates of subsurface hydrostatic loading for the projected maximum groundwater level. The maximum groundwater level must be lower than 2 ft below the plant grade (e.g., 23.5 ft (7.2 m) NAVD 88) as specified in Table 5.0-1 (Site Parameters) in Tier 1 Chapter 5 of the AP1000 Design Control Document (DCD). The applicant groundwater model simulations (Turkey Point Units 6 and 7 COL FSAR, Appendix 2CC) predicted a maximum groundwater elevation of 2 ft (0.6 m) NAVD 88 in the power block area. The applicant stated that the estimated maximum groundwater elevation is therefore over 20 ft lower than the DCD site parameter.

The applicant calculated the maximum hydrostatic load using the depth below groundwater and the unit weight of water measured at the site (64.4 pounds per cubic ft (2,274 pounds per cubic m)). The results were shown in Turkey Point Units 6 and 7 COL FSAR, Fig. 12.4.12-247, and the results indicated that the estimated hydrostatic pressure beneath the power block will not exceed the corresponding hydrostatic pressure computed using the maximum groundwater level of 2 ft (0.6 m) below grade as specified in the DCD. The applicant stated that as a result of these analyses a permanent dewatering system is not a design feature for Turkey Point Units 6 and 7.

The applicant stated that subsurface hydrostatic loading on safety-related structures during construction will be less than predicted above because the applicant will implement groundwater control measures. That is, the applicant will perform dewatering to 35 ft (11 m) below the pre-construction grade for the reactor building, as described in Turkey Point Units 6 and 7 COL FSAR Subsections 2.5.4.5.4 and 2.5.4.6.2. The applicant stated that before the excavation is initiated, a groundwater control and recovery plan will be prepared for the system design, installation, and removal.

Staff's Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.2.5 Site Characteristics for Subsurface Hydrostatic Loading." The staff's review confirmed that the applicant addressed relevant information.

The staff conducted independent bounding analyses for a steady-state flow scenario and a transient flow scenario with a 72-hour probable maximum precipitation (55.7 in) (NOAA, 1982). For both scenarios, the power block was simplified as a circular island with constant head (0 ft) at the boundary.

For the steady-state flow scenario with Dupuit's assumption for an unconfined aquifer, the flow rate (Q) is expressed as

$$Q = 2\pi k r b \frac{db}{dr} = -\pi r^2 w,$$

Where k = hydraulic conductivity, b = thickness of the unconfined aquifer, r = distance from the center, and w = infiltration rate. The equation can be rewritten as

$$\frac{db^2}{dr^2} = -\frac{w}{2k}$$

The general solution is

$$b^2 = -\frac{w}{2k}r^2 + c$$

Assuming a boundary condition of $b(r = R) = b_0$ at the edge of the island,

$$b^2 = b_0^2 + \frac{w}{2k}(R^2 - r^2)$$

The maximum groundwater level (h_{max}) in the center ($r = 0$) is

$$h_{max} = \sqrt{b_0^2 + \frac{w}{2k}R^2} - b_0$$

Let $R = 1,330$ ft (405 m), and h_{max} is dependent on the hydraulic conductivity, recharge rate, and aquifer thickness. A hydraulic conductivity of less than 3-4 ft/day (0.9-1.2 m/day) is necessary for the mounding to be over the 23.5 ft (7.2 m) maximum groundwater level (Figure 2.4.12-2) with a recharge equal to the annual precipitation $w = 3.79$ ft/year = 0.01 ft/day and an assumed aquifer thickness of 25 ft (freshwater limestone as the aquitard). As the vertical hydraulic conductivity of the surficial Biscayne aquifer is approximately 15 ft/day (4.6 m/day) (Turkey Point Units 6 and 7

COL FSAR Revision 2, Table 2.4.12-205), the maximum water level is not likely to be exceeded under steady-state flow conditions, given expected conductivity of the fill material used to build up the island. Accordingly, the staff finds that that the maximum groundwater level meets the criteria of the Design Control Document (DCD) of the AP1000 at a maximum of 2 ft (0.6 m) below grade.

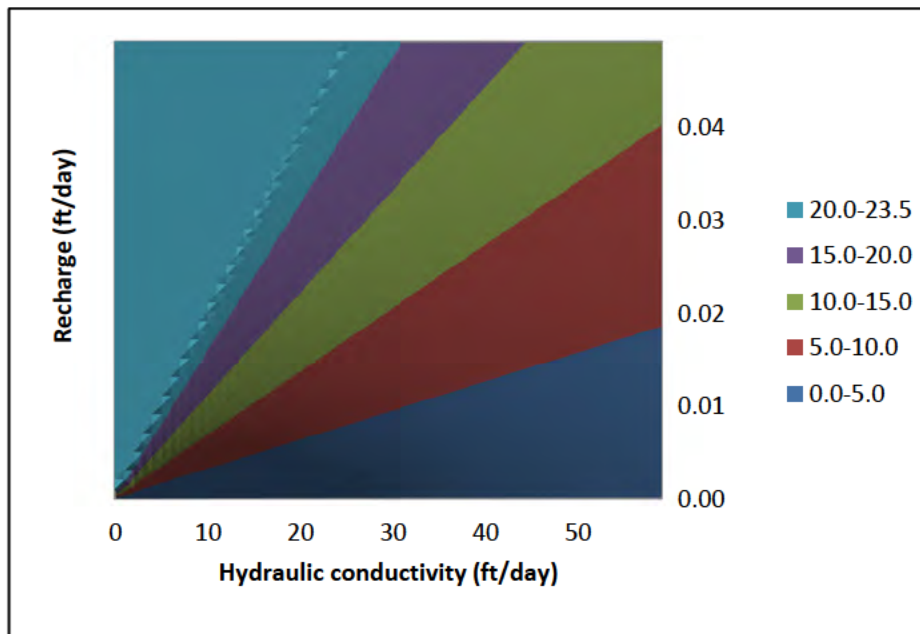


Figure 2.4.12-2. Maximum groundwater mounding under steady-state flow condition with aquifer thickness of 25 ft (7.6 m) (freshwater limestone as the aquitard).

The staff also estimated maximum groundwater elevation under a transient flow scenario. The 72-hour probable maximum precipitation of 55.7 in. for areas of 10 mi² or less in the Florida peninsula was considered. The approximate analytical solution by Basak (1982) was used to calculate the groundwater table mounding. The results (Figure 2.4.12-3) show that the maximum water level of 23.5 ft (7.2 m) is not likely to be exceeded, even when the maximum precipitation occurs for 5 days ($R = 1,330$ ft (405 m), $k = 15$ ft/day (4.6 ft/day), $b_0 = 50$ ft (15.2 m), and specific yield = 0.3). Even though the Basak (1982) solution is accurate only for a small mounding level (say 5 ft (1.5 m) of a 25 ft (7.6 m) thick unconfined island aquifer) and for a hydraulic conductivity greater than the recharge rate, the possible maximum mounding level would be expected to be much less than 23.5 ft (7.2 m) for an expected recharge rate less than 1 ft/day, and hydraulic conductivity greater than 10 ft/day (Figure 2.4.12-4). Accordingly, the staff finds that that the maximum groundwater level under a transient flow scenario meets the criteria of the Design Control Document (DCD) of the AP1000 at a maximum of 2 ft (0.6 m) below grade.

The applicant's analysis assumed that the nuclear island would be fully (100 percent) paved. Because infiltration could enhance or induce groundwater mounding, the staff issued RAI 5190, Question 02.04.12-3 (December 10, 2010) to discern if the zero infiltration scenario was consistent with an absence of groundwater mounding. In a May 5, 2011 response (ADAMS Accession No. ML11129A058), the applicant revised the infiltration rate distribution by including infiltration estimates for grass and gravel, conducted numerical simulations, and confirmed that alternative infiltration scenarios will not raise the mounding level close to the 23.5 ft (7.2 m)

design level. In the staff's analysis, no coverage of ground surface with pavement was assumed. The results of the staff analysis confirmed that the extent of pavement did not influence groundwater mounding

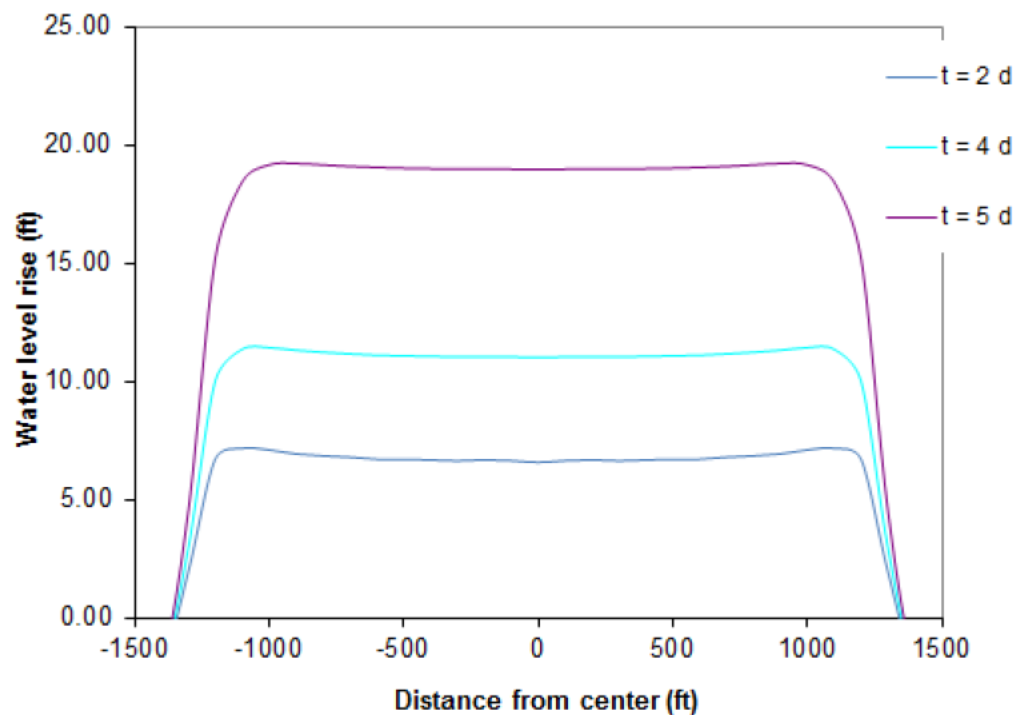


Figure 2.4.12-3. Groundwater mounding calculated using Basak (1982) for the 72-hour probable maximum precipitation of 55.7 in.

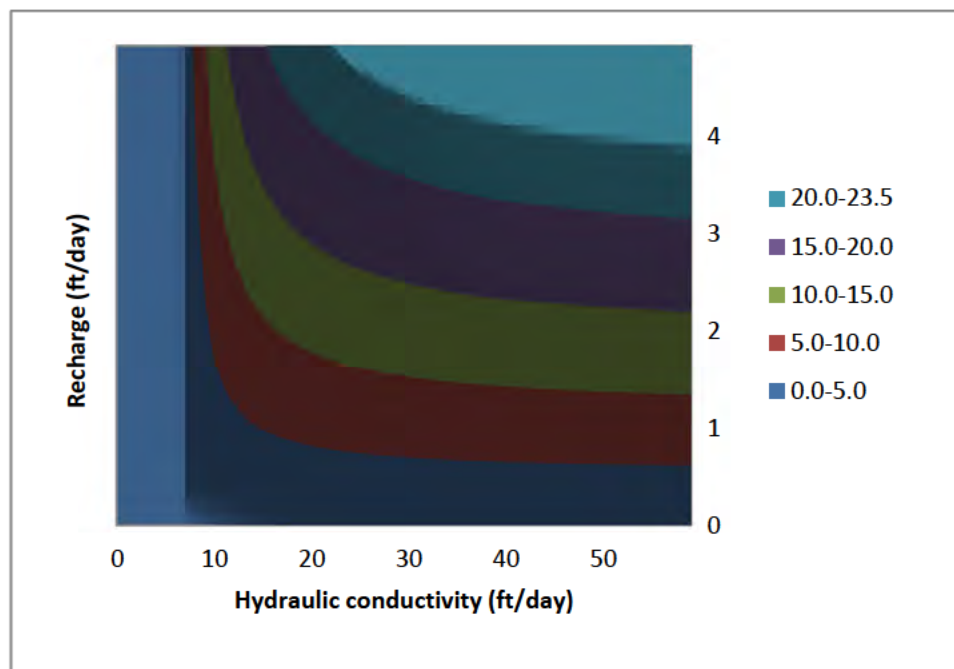


Figure 2.4.12-4. Maximum groundwater mounding due to 3-day recharge with different hydraulic conductivity and recharge rate for a 25 ft (7.6 m) unconfined island aquifer.

beneath the nuclear island, which is consistent with applicant response and revised simulations (ADAMS Accession No. ML11129A058). Accordingly, the staff finds that the maximum groundwater level for this scenario meets the criteria of the Design Control Document (DCD) of the AP1000 at a maximum of 2 ft (0.6 m) below grade.

The applicant's analysis did not consider changes in groundwater elevations due to sea-level rise associated with climate change. In a May 5, 2011 response (ADAMS Accession No. ML11129A058) to RAI 5190, Question 02.04.12-1 (December 16, 2010), to account for sea level rise, the applicant conducted additional numerical simulations. The applicant results indicated that the long-term sea-level change can at most raise the water table by 1-2 ft, far below the designed level of 23.5 ft (7.2 m). The small increase in water level due to sea level rise would have little impact on the more than 20 ft of margin between maximum groundwater level (less than 3 ft (0.91 m) NAVD88) and the nuclear island site grade of 25.5 ft (7.8 m) NAVD88. Accordingly, the staff finds that the maximum groundwater level, including consideration of sea level rise, meets the criteria of the Design Control Document (DCD) of the AP1000 at a maximum of 2 ft (0.6 m) below grade.

Based on the foregoing, the staff concludes that the applicant's evaluations for the scenarios described above for a permanent dewatering system to meet the requirements of the DCD and are acceptable.

2.4.12.5 Post Combined License Activities

There are no post COL activities related to this subsection.

2.4.12.6 Conclusions

The staff has reviewed the application and has confirmed that the applicant addressed the information relevant to groundwater, and that there is no outstanding information required to be addressed in the Turkey Point Units 6 and 7 COL FSAR. As set forth above, the applicant presented and substantiated information to establish the site description. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description to allow the staff to evaluate, as documented in Section 2.4.12, of this SER, whether the applicant has met the relevant requirements of 10 CFR Part 52.79(a)(1) and 10 CFR Part 100 with respect to determining the acceptability of the site. This addresses COL information item 2.4-4. In conclusion, the applicant has provided sufficient information for satisfying 10 CFR Part 52 and 10 CFR Part 100.

2.4.13 Accidental Release of Radioactive Liquid Effluent in Ground and Surface Waters

2.4.13.1 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.4.13 analyzes the potential effects of accidental releases from the Radwaste Management Systems that handle liquid effluents generated during normal plant operations. Such releases would have relatively low levels of radioactivity, but could be large in volume. Normal and severe accidental releases are also considered in the applicant's ER and Turkey Point Units 6 and 7 COL FSAR Chapter 15. The

accidental release of radioactive liquid effluents in ground and surface waters is evaluated based on the hydrogeological characteristics of the site that govern existing uses of groundwater and surface water and their known and likely future uses. The source term from a postulated accidental release is reviewed under SRP 11.2 following the guidance in BTP 11-6, "Postulated Radioactive Releases Due to Liquid-containing Tank Failures." The source term is determined from a postulated release from a single tank outside of the containment.

Section 2.4.13 of this SER presents an evaluation of the following specific areas: (1) alternative conceptual models of the hydrology at the site that reasonably bound hydrogeological conditions at the site inasmuch as these conditions affect the transport of radioactive liquid effluent in the groundwater and surface water environment; (2) a bounding set of plausible surface and subsurface pathways from potential points of an accidental release to determine the critical pathways that may result in the most severe impact on existing uses and known and likely future uses of groundwater and surface water resources in the vicinity of the site; (3) ability of the groundwater and surface water environments to delay, disperse, dilute, or concentrate accidentally released radioactive liquid effluents during transport; and (4) assessment of scenarios wherein an accidental release of radioactive effluents is combined with potential effects of seismic and non-seismic events (e.g., assessing effects of hydraulic structures located upstream and downstream of the plant in the event of structural or operational failures and the ensuing sudden changes in the regime of flow); and (5) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.4.13.2 Summary of Application

Section 2.4.13 of the Turkey Point Units 6 and 7 COL FSAR addresses the accidental release of radioactive liquid effluents in ground and surface waters. The AP1000 Finality Matrix calls for Section 2.4.13 of the Turkey Point Units 6 and 7 COL FSAR to address COL Information Item 2.4-5 on the accidental release of radioactive liquid effluents in ground and surface waters by (1) providing information about the ability of the surface- and subsurface-water environment to disperse, dilute, or concentrate accidental releases, and by (2) describing the effects of these releases on existing and known future uses of water resources.

The applicant submitted Section 2.4.13 as a site-specific supplement designed to address COL Information Items 2.4-5 and 15.7-1. The applicant addressed these issues as follows:

AP1000 COL Information Item

- PTN COL 2.4-5 and PTN COL 15.7-1

COL License Information Item 2.4-5 requires COL applicants to provide site-specific information on the ability of the ground and surface water to disperse, dilute, or concentrate accidental releases of liquid effluents. COL applicants are required to perform an analysis of the consequences of potential release of radioactivity to the environment due to a liquid tank failure. Effects of these releases on existing and known future use of surface water resources will also be addressed.

Turkey Point Units 6 and 7 COL FSAR Section 15.7.6 states that PTN COL 15.7-1 is addressed in Turkey Point Units 6 and 7 COL FSAR Section 2.4.13 where the applicant performed the consequence analysis of a postulated liquid waste tank failure. The staff's review of the applicant's analysis in FSAR Section 2.4.13 is limited to these COL Information Items as described below.

2.4.13.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for the pathways of liquid effluents in ground and surface waters, and the associated acceptance criteria, are described in Section 2.4.13 of NUREG-0800.

The applicable regulatory requirements for liquid effluent pathways for groundwater and surface water are as follows:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).
- 10 CFR Part 20, as it relates to effluent concentration limits.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

Appropriate sections of the following documents are used for the related acceptance criteria:

- BTP 11-6, "Postulated Radioactive Releases Due to Liquid Containing Tank Failures," provides guidance in assessing a potential release of radioactive liquids following the postulated failure of a tank and its components located outside of containment, and the impacts of the release of radioactive materials at the nearest potable water supply located in an unrestricted area for direct human consumption or indirectly through animals, crops, and food processing.
- RG 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose Of Implementing Appendix I"

2.4.13.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.13 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to accidental release of radioactive liquid effluent in ground and surface waters. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 ("Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design, Rev 19") and its supplements.

To improve readability, the staff's discussion of the accidental release of radioactive liquid effluents is organized into the following technical areas as described below which include:

- Direct Release to Groundwater;
- Accident Scenario;
- Conceptual Model;
- Analysis of Accidental Releases to Groundwater;
- Compliance with 10 CFR Part 20; and
- Direct Releases to Surface Waters.

The staff notes that Section 2.4.13 considers a postulated release from a catastrophic tank failure scenario considering the transport through the hydrologic system with the resulting radiological dose evaluated in SER Section 11. Additionally, normal operational radiological releases are addressed in SER Section 11 and not considered in SER Section 2.4.13.

2.4.13.4.1 Direct Release to Groundwater

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.13.1, the applicant provided an analysis of the postulated accidental liquid release to groundwater at the Turkey Point Units 6 and 7 site (FPL 2015). The applicant included in the pathway analysis the processes of advection, radionuclide decay, adsorption, dilution, and dispersion. As described in Turkey Point Units 6 and 7 COL FSAR Section 2.4.12.4.10, "Subsurface Pathways," the applicant applied a simplified model for a single physical pathway, but with slightly different hydraulic controls (RCW system on and off; IWF circulation system on and off). The applicant indicated the following: The physical pathway considers the release of liquid effluent below the auxiliary building to instantaneously enter the structural fill surrounding the building. Once in the groundwater, the effluent migrates upward according to the hydraulic gradient into the IWF, where mixing and dilution occur. Water from the IWF then migrates through the Key Largo Limestone unit of the Biscayne aquifer and is released into Biscayne Bay.

Staff's Technical Evaluation

The staff reviewed the Turkey Point Units 6 and 7 COL FSAR, Section 2.4.13.1, "Direct Release to Groundwater" and confirmed that the applicant's revised analysis included in a June 27, 2011 response to RAI 5643, Question 02.04.12-6 (ADAMS Accession No. ML110610729) regarding instantaneous transport pathway release scenarios was adequately addressed in the Turkey Point Units 6 and 7 COL FSAR, as discussed below, and the staff considers the RAI closed. The staff's review confirmed that the applicant addressed relevant information considering conservative release scenarios. The staff evaluated the applicant's assumptions and parameters to confirm that the applicant's description of the groundwater pathway was conservatively represented by the processes of advection, dispersion, dilution, and decay, in accordance with the guidance of NUREG-0800, Section 2.4.13. As discussed in the Alternative Pathways Evaluation Subsection of Subsection 2.4.12.4.10, "Subsurface Pathways," the staff concludes that the applicant's description of alternate subsurface pathways was conservative because all non-seismic Category I structural features of the buildings and excavation (sealed 3 ft (0.9 m) thick exterior walls, the 6 ft (1.8 m) thick basemat, and floor drains, along with the 3 ft (0.9 m) thick reinforced concrete diaphragm walls and a 19 ft (5.8 m) thick concrete layer beneath the building) were postulated to be instantaneously permeated for a tank failure scenario. The staff confirmed that the release scenario is sufficiently conservative and that the pathway described is considered acceptable and a plausible pathway to groundwater.

2.4.13.4.2 *Accident Scenario*

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR, Section 2.4.13.1.1, the applicant postulated a release to groundwater (and surface water via the groundwater pathway) from a liquid radwaste effluent holdup tank rupture in the auxiliary building at Turkey Point Units 6 and 7. The applicant considered the various radioactive sources and concluded that the volume and radionuclide concentrations of a single effluent holdup tank would be the most conservative choice for accident scenario analyses (Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-201). The applicant explained that the volume of a single effluent holdup tank is 28,000 gallons and, based on NUREG-0800 and BTP 11-6, the postulated rupture of the effluent holdup tank is assumed to release 80 percent of its liquid volume (22,400 gallons) to the groundwater environment. The applicant estimated that radionuclide concentrations resulting from effluent holdup tank rupture would be 101 percent of the reactor coolant activity, which is representative of the effluent holdup tank contents (Turkey Point Units 6 and 7 COL FSAR, Table 2.4.13-201).

Staff's Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.13.1.1, "Source Term" (FPL 2015). The staff reviewed the postulated release and finds the postulated effluent holdup tank rupture in the lowest level of the auxiliary building to be consistent with the AP1000 DCD information and BTP 11-6 (NRC 2007). Consistent with the AP1000 DCD Rev 19, Table 11.1-2, the staff confirmed that the applicant conservatively selected the radwaste system tank with the highest radionuclide concentration inventory and with the highest volume for the postulated tank failure scenario consistent with BTP 11-6 for determining the radionuclide source term. Therefore, the staff accepted the radionuclide concentrations reported in Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-201 as the highest for the radwaste tank system for the reactor AP1000 DCD.

2.4.13.4.3 *Conceptual Model*

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR, Section 2.4.13.1, the applicant described the conceptual model used to evaluate the plausible groundwater pathways that an accidental release of radioactive liquid effluent could follow at the proposed Turkey Point Units 6 and 7 site. The applicant used regional groundwater potentiometric surface measurements to infer that flow is toward the east and southeast in Miami-Dade County in the Biscayne aquifer. Local monitoring suggests that flow is generally toward the center and to the southwestern corner of the Turkey Point Units 6 and 7 island in the Upper Biscayne aquifer and generally away from the center of the island and toward the canals that surround the island in the Lower Biscayne aquifer. Onsite measurements of hydraulic head suggest an upward gradient from the Lower to the Upper Biscayne aquifers, and that the hydraulic gradient in the Upper Biscayne aquifer is also in the upward vertical direction.

The applicant described a single plausible physical groundwater pathway, with slightly different hydraulic controls on the flow and transport characteristics of system components (RCW system on and off; IWF circulation system on and off). The applicant indicated as follows: The physical pathway considers the release of liquid effluent below the auxiliary building to instantaneously enter the structural fill surrounding the building, and subsequently flow through the Key Largo

Limestone in the upper interval of the Biscayne aquifer to the IWF, which serves as the area of groundwater discharge for the plant. Dilution occurs in the IWF, followed by exchange between groundwater and the cooling canal water since the canals are unlined, with final discharge with regional groundwater flow into Biscayne Bay. The water levels within the cooling canals are engineered to function as a groundwater discharge zone. The eastern canals are continuously maintained at a lower head than Biscayne Bay to the east and the western canals are continuously maintained at a lower head than fresh groundwater located to the west of the Turkey Point Units 6 and 8 site. The primary groundwater pathway would not threaten groundwater or surface water supplies, a conclusion primarily based on the lack of receptors that use ground or surface water for drinking water supply. In this scenario, the radionuclides associated with a postulated liquid release would enter the cooling water canals and be diluted. The IWF has an estimated total volume of 4 billion gallons. The cooling water canals also act as a groundwater sink based on cooling water canal water balance studies and local groundwater modeling. For exposure assessment purposes, the applicant assumed the radionuclide concentrations in the cooling canal water are transferred along the overall regional groundwater flow easterly toward Biscayne Bay.

The applicant stated there are no water-supply wells between the postulated effluent holdup tank release point and the IWF or Biscayne Bay that withdraw water from the Biscayne aquifer. The applicant indicated further as follows: The Biscayne aquifer groundwater in the site region is brackish to saline, limiting its potential as a potable water source, and the freshwater/saltwater boundary is located over 6 mi to the west of the Turkey Point Units 6 and 7 site (FPL 2011b). The use of groundwater in the area for domestic purposes is unlikely, thus the applicant identified exposure to groundwater in the vicinity of the site as an incomplete pathway. Within Biscayne Bay, a theoretical well is located, which allows radionuclide concentrations to be estimated at that discharge point. Subsequently, the applicant used an indirect consumption pathway involving human ingestion of contaminated seafood (fish and crustaceans/mollusks).

Staff's Technical Evaluation

The staff has reviewed the conceptualization of the primary and alternative groundwater pathways, which include analyses of potential exposure pathways in the Biscayne aquifer. The conceptualization provides a reasonable assessment of groundwater flow that the staff considered consistent with the hydrogeologic setting. Based on the site conditions described above, there are no direct drinking water receptors for the groundwater and surface water exposure pathways at the Turkey Point Units 6 and 7 site and the surrounding area. The staff's review of the applicant's information and data supporting the conceptual model confirms that the applicant addressed relevant information. Accordingly, the staff concludes that the applicant's description of the conceptual model is acceptable and an adequate representation.

2.4.13.4.4 Analysis of Accidental Releases to Groundwater

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR, Section 2.4.13.1.4 (FPL 2011b), the applicant described an approach for estimating radioactive contaminant concentrations resulting from the postulated release from an effluent holdup tank in the auxiliary building into groundwater surrounding the lower portion of the containment building. The applicant presented several calculations for estimating advection, radionuclide decay, adsorption, dilution, and dispersion through subsurface materials to the IWF, and subsequently discharging within Biscayne Bay.

The applicant considered parent and progeny radionuclides expected to be present in the effluent holdup tank. The applicant also presented a hypothetical dose assessment for human ingestion of marine organisms after biological uptake of radionuclides, which are transported to Biscayne Bay via groundwater.

The applicant indicated the following: The particle tracking method terminates in the IWF, and it is at this point that the applicant evaluates changes to radionuclide concentrations during transport through the subsurface. The shortest travel time (3,778 d) of the four alternative cases (Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-202) for hydraulic conditions in the subsurface is Case 3, in which the IWF is not operational and the RCW are off. The applicant compared simulated concentrations to the effluent concentration limits (ECL) of 10 CFR Part 20, Appendix B, Table 2, Column 2.

The applicant described the analysis as follows: First, the applicant allowed the radionuclides in the effluent holdup tank (Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-201) to decay for 3,800 d, which is similar to Case 3. However, the primary conceptual model for release assumes that the IWF is functional (i.e., Case 1, with RCWs off). Travel time in the Upper Higher Flow Zone (model layer 4) is neglected. The results were shown in Turkey Point Units 6 and 7 COL FSAR, Table 2.4.13-203, where the concentration of radionuclides is calculated with respect to the ECL. Only radionuclides with ratios of their concentrations to ECL exceeding 1×10^{-6} are of concern, and these were carried forward for additional analysis.

Second, the applicant considered adsorption of these radionuclides. Derived from laboratory tests of site-specific fill, native aquifer material and concrete, the applicant provided values of the distribution coefficient (K_d) representing the linear adsorption coefficient of sorption (Turkey Point Units 6 and 7 COL FSAR, Table 2.4.13-204). The applicant evaluated the mean and skewness of its measured K_d to determine that the geometric mean is representative, with the exception of Fe-55. The applicant assumed the K_d of Fe-55 was zero for conservatism (i.e., no sorption/retardation). The applicant indicated further as follows: For daughter products with short half-lives, their K_d was assumed to be equivalent to that of the parent. Retardation coefficients were calculated using site-specific values from the Miami Limestone. The effective porosity of 0.15 and a bulk density of 1.59 g/cm^3 were consistent with and somewhat lower than those published in Merritt (1996) and measured total porosities at the site (Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-206). A lower effective porosity and bulk density is more conservative for adsorption. Only radionuclides with ratios of their concentrations to ECL exceeding 1×10^{-6} are of concern, and these were carried forward for additional analysis (Turkey Point Units 6 and 7 COL FSAR, Table 2.4.13-205).

Third, the applicant considered dilution of these radionuclides. The applicant explained as follows: Dilution was inferred to be $5.6\text{E-}6$ in accordance with a release of 22,400 gal into an IWF volume of 4 billion gal. The background concentration of the IWF was considered since it contains H-3 from current operations at a concentration of approximately 5250 pCi/L. The applicant assumed the IWF is completely mixed because circulation occurs at a rate of 4,000 ft^3/s ($113 \text{ m}^3/\text{s}$). The ratio of the radionuclide concentrations to the ECL after dilution is shown in Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-207. The applicant used the sum of fractions approach and determined the sum after the release scenario is 0.7 and therefore conforms to 10 CFR Part 20 effluent concentration limits of less than 1.0 (Turkey Point Units 6 and 7 COL FSAR, Table 2.4.13-207).

The applicant stated that the IWF itself is not accessible to the public and is not potable due to its salinity. The applicant presented a dose assessment for the biological uptake of key

radionuclides and potential consumption of fish, crustaceans, and mollusks following discharge of groundwater from the IWF to Biscayne Bay (FPL, 2011). The applicant stated that Biscayne Bay is also saline and not potable, and that the underlying Biscayne aquifer is also saline, consequently there are no potential receptors of drinking water. The applicant calculated the fish and invertebrate bioaccumulation (update) of the radionuclides at the concentrations remaining after the dilution calculation (Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-207) following the guidance in Table A-1 of Regulatory Guide 1.109 (NRC, 1977). The applicant did not consider I-129 due to its low concentration (Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-207). The applicant state further as follows: Uptake is influenced by the salinity of Biscayne Bay, which is discussed in Appendix 2AA (FPL, 2011). The dose via each consumption pathway (crustaceans/mollusks and fish) was determined assuming a yearly consumption of 5.4 kilograms (11.9 pounds) of fish and 0.9 kilograms (2 pounds) of crustaceans/mollusks. The resultant dose rate was estimated as 8 mrem/y, which was below the exposure level of 100 mrem per year given in 10 CFR 20.1301, "Dose Limits for Individual Members of the Public."

The applicant describes an alternate conceptual model assuming that the IWF was not operational, i.e., Case 3. The applicant adjusted the model so that the IWF is represented by cells having a high hydraulic conductivity of 100 cm/s to simulate open water where flow is not restricted by the conductivity of the cells. The applicant stated as follows: The advective travel time of 3800 d is still used, and after advection, radioactive decay, and adsorption, several radionuclides still exceed the ECL (Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-205). Flow in the Upper Higher Flow Zone is still neglected. Particle tracking was used to determine that travel time from Unit 6 to Biscayne Bay. However, without making changes to the numerical grid, the model overestimated total activity and also included an adsorption coefficient. The applicant provides the results in Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-209. As before, the applicant stated that the analysis is still conservative because a failure of the auxiliary building exterior walls and the effluent holdup tank would result in groundwater infiltration into the auxiliary building, rather than leakage of tank contents into groundwater; because groundwater infiltration would dilute the tank waste; because the radionuclides would sorb onto the structural fill material; and because a postulated release would occur over time and would not occur instantaneously.

The applicant then calculated parameters for subsurface transport modeling (effective porosity, bulk density, longitudinal and transverse dispersivity, and adsorption), and predicted radionuclide concentrations at a simulated receptor well in Biscayne Bay. The applicant-predicted peak concentrations at the theoretical well CW-2s are shown in Turkey Point Units 6 and 7 COL FSAR, Table 2.4.13-210. The applicant indicated as follows: Cs-137 contours at 10 y are shown in Turkey Point Units 6 and 7 COL FSAR, Fig. 2.4.13-213. A biological uptake calculation similar to the primary conceptual model scenario was subsequently employed for model layer 1 radionuclides at the concentrations in Turkey Point Units 6 and 7 COL FSAR, Table 2.4.13-210, and is shown in Table 2.4.13-211. The sum of fractions method produced a maximum dose of 65 mrem/y, which is again below the 100 mrem/y limit in 10 CFR 20.1301.

Staff's Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR, Section 2.4.13, "Analysis of Accidental Releases to Groundwater and Surface Water" (FPL 2011b) and confirmed that the applicant addressed relevant information. The analysis of an accidental release to groundwater for the Turkey Point Units 6 and 7 site described by the applicant in Turkey Point Units 6 and 7 COL FSAR Revision 2 Section 2.4.13.1, focuses on physical pathways in the upper interval of

the Biscayne aquifer to the IWF, followed by mixing in the IWF because it is operating, and discharge to Biscayne Bay. The alternative pathway is physically identical, but the IWF is not operational, therefore dilution by mixing in the IWF is minimal. For both cases, the dose to humans is calculated through biological uptake of seafood contaminated in Biscayne Bay. There are no potential receptors of groundwater, because the Biscayne aquifer groundwater in the site region is brackish to saline and unsuitable for potable use.

The staff initially performed an independent calculation of effluent wastewater travel time through the basement of the containment structure and the underlying 19 ft (5.8 m) of concrete and confirmed the estimated travel time of 1,480 years. The staff confirmed the modeled decay in radionuclide activity for this 1,480-year travel time presented in Turkey Point Units 6 and 7 COL FSAR Revision 2 (Kennedy 1992; USDOH 1970). Progeny radioisotopes are shown in Turkey Point Units 6 and 7 COL FSAR Revision 2, Table 2.4.13-202, and include members of each decay chain (ICRP 1983; USDOH 1970). Confirmation of hydraulic properties in the Key Largo Limestone and Fort Thompson Formation indicate groundwater travel time through the Key Largo Limestone and the cooling water canals (primary pathway) to be conservatively modeled as instantaneous for radionuclide transport calculations. The staff analysis of these pathways confirmed that the applicant-modeled radionuclide decay and transport through the concrete fill is consistent with the guidance in BTP 11-6 and that the resultant radionuclide concentrations conformed to the ECL and sum of fraction criteria in 10 CFR Part 20, Appendix B, Table 2.

However, as discussed in the Alternative Pathways Evaluation subsection of Subsection 2.4.12.4.10 "Subsurface Pathways", the staff determined that the applicant's description of alternate subsurface pathways was potentially not conservative because all pathways traveled through the 19 ft (5.8 ft) thick concrete layer beneath the containment building, and because breaches of neither the 19 ft (5.8 ft) concrete layer nor the 3 ft (0.9 m) thick reinforced concrete diaphragm walls (neither of which are seismic Category I structures) were considered a plausible pathway to groundwater.

The staff conducted analysis for a bounding case in which the concrete layer is breached. For that bounding case, the staff calculated that the travel time to the IWF would be reduced to 0.09 year. Using the same method as the applicant, the calculated concentrations for Cs-134 and Cs-137 would exceed the corresponding ECLs. Neither adding a retardation factor of 1.3, which corresponds to a partition coefficient of 0.04 (Turkey Point Units 6 and 7 COL FSAR Revision 2, Table 2.4.13-204), nor adding dilution by groundwater result in Cs-134 and Cs-137 concentrations below the ECLs. The IWF dilution (dilution factor 1.75×10^5) used in the applicant's calculations reduces the Cs-137 concentration from $0.242 \mu\text{Ci}/\text{cm}^3$ in the canal to $1.38 \times 10^{-6} \mu\text{Ci}/\text{cm}^3$ ($0.242/1.75 \times 10^5$). With a first order decay, it will take 14 years, with a decay coefficient of 0.00063/day from Turkey Point Units 6 and 7 COL FSAR, Table 2.4.13-203 to further reduce the concentration to the ECL ($1.0 \times 10^{-6} \mu\text{Ci}/\text{cm}^3$).

Accordingly, the staff requested additional information on this subject in RAI 5643, Question 02.04.12-6 (December 16, 2010) to which the applicant responded on June 27, 2011 (ADAMS Accession No. ML11180A062). In its response, the applicant considered four scenarios that did not credit the 19 ft (5.7 m) concrete fill layer. Using particle tracking analysis, the applicant calculated a groundwater travel time of 3,911 days to the cooling canal. The applicant used the geometric mean of K_d for Cs-137 of $0.17 \text{ g}/\text{cm}^3$, bulk density of $1.59 \text{ g}/\text{cm}^3$, and effective porosity of 0.15 to calculate a retardation coefficient equivalent to $R_d = 2.8$. The applicant calculated the Cs-137 concentration arriving at the canal to be $0.124 \mu\text{Ci}/\text{cm}^3$. The applicant further assumed instantaneous complete mixing/dilution of the release of 22,400 gallons with

total volume of 4×10^9 gallons of water in the canal system, which would reduce the Cs-137 concentration to $0.69 \times 10^{-6} \mu\text{Ci}/\text{cm}^3$, which is less than the ECL ($1.0 \times 10^{-6} \mu\text{Ci}/\text{cm}^3$).

The staff calculated the residence time in the cooling canal to be 1.5 days (4×10^9 gallons / ($4000 \text{ cfs} \times 646,317 \text{ gallon/day/cfs}$) = 1.5 days). As the actual groundwater travel time to the cooling canal ranges from months to years, the staff confirmed that the simulated instantaneous complete mixing assumption is conservative. The staff noted that even though use of an effective porosity of 0.15 is conservative for the groundwater travel time calculation it is not conservative for the retardation factor. Using an effective porosity of 0.3, $R_d = 1 + 1.59 \times 0.17 / 0.3 = 1.4$. The staff noted that more conservative scenarios such as using the minimum Cs-137 K_d from the measurements or increasing the hydraulic conductivity would result in exceedance of the Cs-137 ECL in water of the cooling canal.

The applicant stated that the water in the cooling canal is hypersaline, non-potable, and is not accessible by the public. Thus, the applicant postulated the nearest publicly accessible point to be east of the Turkey Point Units 6 and 7 site in Biscayne Bay, and the most likely exposure is through consumption of seafood from an area of the bay affected by a release of radioactive liquid effluent. The staff reviewed the information provided by the applicant and determined that the public does not have access to the cooling canals. Accordingly, the staff finds the likely exposure routes reasonable and acceptable. The staff confirmed the estimated total dose rate from radionuclides in the bay would be below the maximum exposure level of 100 mrem/y given in 10 CFR 20.1301(a).

The applicant evaluated an alternative pathway scenario for accidental release of radioactive liquid effluent and transport via groundwater to Biscayne Bay without dilution in the water of the IWF and without influence of the IWF on groundwater flow pathways. The staff confirmed the radionuclide migration simulations into the bay, with no additional dilution in the IWF, and the estimated maximum Cs-137 concentration exceeded the ECL while the maximum concentration of Cs-134, Fe-55, H-3, Sr-90, and Y-90 did not exceed their respective ECLs. The staff estimated biological uptake of the modeled radionuclides in the bay by marine organisms and conducted an offsite receptor dose assessment.

As described above, based on the staff's independent review of the applicant's analysis, response to RAIs, the results of the staff's calculations as described above, and the staff's evaluation described in SER Section 11.2.4 where the staff discussed their independent dose analysis performed to account for the consumption of fish and invertebrates, the staff determined that the doses were below the 10 CFR 20.1301(a) 100 mrem limits. Accordingly, the staff finds that the potential doses to an offsite receptor from a postulated accidental release of liquid effluents are within acceptable limits.

2.4.13.4.5 Compliance with 10 CFR Part 20

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR, Section 2.4.13.1.4 (FPL 2011b), the applicant described the comparison of the analysis results to the requirements of 10 CFR Part 20. The applicant's analysis (FPL 2011b) evaluated the postulated accidental release of radioactive liquid wastewater from the effluent holdup tank in the auxiliary building along two plausible groundwater pathways. In the both pathways, groundwater and radionuclides travel in groundwater of the Key Largo Limestone followed by mixing in the IWF (before subsurface discharge to Biscayne Bay. In the alternative conceptual model), the pathway was identical but

the IWF did not serve to dilute radionuclide concentrations as it was assumed to be not operational. A requirement of 10 CFR Part 20, Appendix B, Table 2, is that the sum of the ratios of radionuclide concentrations to ECLs for known analytes in the mixture, and each individual ratio for the concentration established in 10 CFR Part 20, Appendix B, Table 2, for specified radionuclides not in a mixture, may not exceed 1, or unity. The applicant has taken the sum of fractions approach and using the estimated radionuclides concentrations asserts that the sum of fractions is below 1 for each pathway.

The applicant stated the nearest, plausible off-site receptor for the site is located to the east of Turkey Point Units 6 and 7 site in Biscayne Bay. The applicant indicated as follows: A dose assessment considering uptake of radionuclides by marine organisms followed by consumption was modeled for a hypothetical receptor located in Biscayne Bay. Doses for key radionuclides in groundwater following the accidental release and subsequent travel in groundwater along the two plausible groundwater pathways were modeled. The applicant concludes that resultant doses based on consumption of crustaceans/mollusks and fish for both the primary and alternative groundwater pathways are below the exposure level of 100 millirem per year given in 10 CFR 20.1301.

Staff's Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.13.1.4, "Compliance with 10 CFR 20" and confirmed that the applicant addressed relevant information. The staff reviewed the representative and sensitivity cases presented by the applicant for the accidental release of radioactive liquid effluent in groundwater and found these cases reasonable with the exception of the issues described in the following discussion.

Upon review of Turkey Point Units 6 and 7 COL FSAR Revision 3, Section 2.4.13, the staff determined that the dose assessment did not meet the criteria of 10 CFR 20.1301, which are only valid for concentrations of radionuclides in well or groundwater, and determined that the applicant's description of alternate subsurface pathways was potentially not conservative because all pathways traveled through the 19 ft (5.8 m) thick concrete layer (lower portion of the containment building), and because breaches of neither the 19 ft (5.8 m) concrete layer nor the 3 ft (0.9 m) thick reinforced concrete diaphragm walls (neither of which are seismic Category I structures) were considered as plausible pathways to groundwater. The staff conducted analysis for a bounding case in which the concrete fill layer is breached and found the ECL is exceeded for Cs-134 and Cs-137.

In a June 27, 2011 response (ADAMS Accession No. ML11180A062) to the staff's RAI 5643, Question 02.04.12-6 (April 28, 2011), the applicant evaluated four scenarios of accidental release of radioactive liquid effluent to groundwater. One scenario considered release and subsequent transport to the industrial waste water cooling canals in the absence of the 19 ft (5.8 m) concrete layer. Once reaching the cooling canals, the applicant further assumed instantaneous complete mixing/dilution of the release of 22,400 gallons with the total volume of 4×10^9 gallons of water in the canal system, thus reducing the concentration of Cs-137, H-3, Sr-90, Cs-134, Y-90, Fe-55 to I-129 to below their respective ECLs (Turkey Point Units 6 and 7 COL FSAR Table 2.4.13-207). In addition, the applicant has taken the sum of fractions approach and using the estimated radionuclide concentrations in the water of the cooling canal has shown the sum of radionuclide concentrations is 0.7, which is below unity (1.0) indicating compliance with 10 CFR 20.1301. For this scenario, the applicant calculated the dose to a hypothetical offsite receptor following consumption of the marine organisms to be 3.78 millirem per year. The staff confirmed the radionuclide transport simulations and the staff's calculated

dose was below the exposure level of 100 millirem per year given in 10 CFR 20.1301 as is evaluated and described in SER Section 11.2.

In further response (ADAMS Accession No. ML11180A062) to the staff's RAI 5643, Question 02.04.12-6, the applicant evaluated an alternative pathway based on the release of radioactive liquid effluent from Unit 6 with subsequent migration in groundwater that reaches Biscayne Bay. The applicant simulated radionuclide transport in groundwater to the bay and subsequent bioaccumulation by marine organisms (fish and crustaceans/mollusks). The applicant calculated the dose to a hypothetical offsite receptor following consumption of the marine organisms to be 65 millirem per year. The staff confirmed the radionuclide transport simulations and the staff's calculated dose from consumption of marine organisms was below the exposure level of 100 millirem per year given in 10 CFR 20.1301 as evaluated and described in SER Section 11.2.

The staff confirmed the analyses of the alternative groundwater pathways and concluded that the applicant provided relevant information. In view of the foregoing, the applicant's analyses of plausible radioactive liquid effluent releases to groundwater and simulated radionuclide concentrations in onsite groundwater, water in the cooling canals, and offsite marine waters of Biscayne Bay are acceptable and indicate compliance with 10 CFR 20.1301.

2.4.13.4.6 Direct Releases to Surface Waters

Information Submitted by Applicant

In Turkey Point Units 6 and 7 COL FSAR Section 2.4.13.2, the applicant stated that there are no outdoor tanks that contain licensed radioactive material in the Turkey Point Units 6 and 7 design. Because no outdoor tanks contain radioactivity, the applicant stated that an accident scenario will not result in the release of liquid effluent directly to the surface water.

Staff's Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.13.2, "Direct Releases to Surface Waters" (FPL 2011b), and concludes that the applicant included relevant information, and that since the design does not include outdoor tanks that contain radioactivity, no release scenario would result in release of liquid effluent directly to surface waters. Accordingly, the staff finds the application acceptable in this regard.

2.4.13.5 Post Combined License Activities

There are no post-COL activities related to this subsection.

2.4.13.6 Conclusions

The staff has determined that the applicant provided complete and sufficient information and that there is no outstanding information remaining to be addressed in the COL FSAR related to this section. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description, and about the design of the liquid waste management system, to allow the staff to evaluate, as documented in this section, whether the applicant has met the relevant requirements of 10 CFR 52.79(a)(1) and 10 CFR Part 100 with respect to determining the acceptability of the site, and with respect to 10 CFR 20.1301 as it relates to radionuclide dose limits. This addresses COL

Information Item 2.4-5 and 15.7-1. In conclusion, the applicant provided sufficient information for satisfying 10 CFR Part 20, 10 CFR Part 52, and 10 CFR Part 100 in regard to accidental radionuclide releases.

2.4.14 Technical Specification And Emergency Operation Requirements

2.4.14.1 *Introduction*

Turkey Point Units 6 and 7 COL FSAR Section 2.4.14 describes the technical specifications and emergency operation requirements as necessary. The requirements described implement protection against floods for safety-related facilities to ensure that an adequate supply of water for shutdown and cool-down purposes is available.

SER Section 2.4.14 presents an evaluation of the following specific areas: (1) controlling hydrological events, as determined in previous hydrology sections of the Turkey Point Units 6 and 7 COL FSAR, to identify bases for emergency actions credited during these events, (2) the amount of time available to initiate and complete emergency procedures before the onset of conditions while controlling hydrological events that may prevent such action, (3) reviewing technical specifications related to all emergency procedures required to ensure adequate plant safety from controlling hydrological events by the organization responsible for the review of issues related to technical specifications, (4) potential implications of seismic and nonseismic information on the postulated technical specifications and emergency operations for the proposed plant site, and (5) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52.

2.4.14.2 *Summary of Application*

This subsection of the Turkey Point Units 6 and 7 COL FSAR addresses technical specifications and emergency operation requirements. The applicant addressed the information as follows:

AP1000 COL Information Item

- PTN COL 2.4-6

Combined License applicants referencing the AP1000 certified design will address any flood protection emergency procedures required to meet the site parameter for flood level.

2.4.14.3 *Regulatory Basis*

The relevant requirements of the NRC regulations for consideration of emergency protective measures, and the associated acceptance criteria, are described in Section 2.4.14 of NUREG-0800.

The applicable regulatory requirements are:

- 10 CFR Part 100, as it relates to identifying and evaluating hydrological features of the site. The requirement to consider physical site characteristics in site evaluations is specified in 10 CFR 100.20(c).

- 10 CFR 100.23(d), as it sets forth the criteria to determine the siting factors for plant design bases with respect to seismically induced floods and water waves at the site.
- 10 CFR 52.79(a)(1)(iii), as it relates to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.
- 10 CFR 50.36, "Technical Specifications," as it relates to identifying technical specifications related to all emergency procedures required to ensure adequate plant safety from controlling hydrological events by the organization responsible for the review of issues related to technical specifications.

2.4.14.4 Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.4.13, and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to technical specification and emergency operation requirements. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

Information Submitted by Applicant

The applicant stated that analysis of design features of the AP1000, as documented in the DCD, and site-specific analysis of hydrologic conditions and phenomena, as documented in Turkey Point Units 6 and 7 COL FSAR Sections 2.4.1 through 2.4.14, led to a conclusion that no emergency protective measures need to be designed to minimize the impact of adverse hydrology-related events on safety-related facilities for Turkey Point Units 6 and 7.

Staff's Technical Evaluation

The NRC staff has concluded in previous sections of this SER that floods caused by natural phenomena at and near the Turkey Point Units 6 and 7 site would not result in inundation of the plant grade. The AP1000 design does not use a safety-related cooling-water system. Therefore, the staff concluded that no technical specification or emergency procedures related to hydrologic events are required at the Turkey Point Units 6 and 7 site.

2.4.14.5 Post Combined License Activities

There are no post COL activities related to this section.

2.4.14.6 Conclusions

The staff reviewed the application and confirmed that the applicant has addressed the information relevant to technical specification and emergency operations requirements, and there is no outstanding information remaining to be addressed in the COL FSAR related to this section.

As set forth above, the applicant has presented and substantiated site-specific information related to technical specifications and emergency operations. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided sufficient details about the site description to allow the staff to evaluate, as documented in Section 2.4.14 of this SER, whether the applicant has met the relevant requirements of 10 CFR 52.79(a)(1) and 10 CFR Part 100 with respect to determining the acceptability of the site. This addresses COL Information Item 2.4-6.

2.5 Geology, Seismology, and Geotechnical Engineering

In Turkey Point Units 6 and 7 COL FSAR Section 2.5, “Geology, Seismology, and Geotechnical Engineering,” the applicant described geologic, seismic, and geotechnical engineering characteristics of the proposed Turkey Point Units 6 and 7 site. Following NRC guidance in RG 1.206 and RG 1.208, “A Performance-Based Approach to Define Site-Specific Earthquake Ground Motion,” the applicant defined the following four zones around the Turkey Point Units 6 and 7 site and conducted technical investigations in those zones that became progressively more detailed passing from site region to site location:

- Site region – Area within a 320 kilometer (km) (200 mi) radius of the site location.
- Site vicinity – Area within a 40 km (25-mi) radius of the site location.
- Site area – Area within an 8 km (5 mi) radius of the site location.
- Site location – Area within a 1 km (0.6 mi) radius of proposed site.

Since the Turkey Point Units 6 and 7 site is adjacent to Turkey Point Units 3 and 4, the applicant used information acquired during the previous site investigations for the Units 3 and 4 facilities as the starting point for characterization of the geologic, seismic, and geotechnical engineering properties of the Turkey Point Units 6 and 7 site. The material in Turkey Point Units 6 and 7 COL FSAR Section 2.5 focuses on information published since the Turkey Point Units 3 and 4 FSAR, which was issued in the 1970s. The Turkey Point Units 6 and 7 COL FSAR Section 2.5 also focuses on recent geologic, seismic, geophysical, and geotechnical investigations performed specifically for the Turkey Point Units 6 and 7 site.

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.5, interacted with the applicant during public meetings and site audits, and issued RAs to support the conclusions presented by the applicant in the Turkey Point Units 6 and 7 COL FSAR. As a result of NRC actions implemented after the March 2011 Fukushima Dai-ichi nuclear power plant accident following the Great Tohoku earthquake and subsequent tsunami in Japan, the NRC formed a Near-Term Task Force (NTTF) that issued a series of recommendations for reevaluating the safety of nuclear power plant facilities located in the United States. Consequently, on March 12, 2012 (ADAMS Accession No. ML12053A340), the NRC issued an information letter requesting that licensees of all operating nuclear power plants in the United States reevaluate seismic hazard at their respective plant sites using the most recent data and evaluation methodologies available. The information request letter also stated that licensees of operating nuclear power plant sites in the Central and Eastern United States (CEUS) should use the new seismic source model provided in NUREG-2115, “Central and Eastern United States Seismic Source Characterization for Nuclear Facilities,” to characterize seismic hazard for their respective plants.

Consistent with existing guidance in RG 1.208, pertaining to the need to consider the latest information in the evaluation of seismic hazard, the staff also issued RAIs to all COL and early site permit (ESP) applicants requesting that they reassess seismic hazard using the newly published NUREG-2115 seismic source model and modify their respective GMRS, if necessary. The staff issued this request for the Turkey Point Units 6 and 7 COL FSAR in RAI 01.05-1. In the February 12, 2013, response to RAI 01.05-1, the applicant stated that it performed sensitivity analyses to compare the results from the older Electric Power Research Institute (EPRI) (1986, 1989) base seismic source models for seismic hazard analysis, with those from the new seismic source characterization model for the CEUS published in NUREG-2115, "Central and Eastern United States Seismic Source Characterization for Nuclear Facilities." These analyses are described in detail in SER Section 2.5.2.

The SER Section 2.5 is divided into five main parts, SER Sections 2.5.1 through 2.5.5, which parallel the five main FSAR sections prepared by the applicant for the Turkey Point Units 6 and 7 COL application. The five sections are: Section 2.5.1, "Basic Geologic and Seismic Information"; Section 2.5.2, "Vibratory Ground Motion"; Section, 2.5.3 "Surface Faulting"; Section, 2.5.4 "Stability of Subsurface Materials and Foundations"; and Section 2.5.5, "Stability of Slopes" (including information regarding embankments and dams). These SER sections follow and summarize the content of the Turkey Point Units 6 and 7 COL FSAR, and present the evaluations, conclusions, and findings of the staff in regard to the geologic, seismic, and geotechnical engineering characteristics of Turkey Point Nuclear Site Units 6 and 7.

2.5.1 Geologic Characterization Information

2.5.1.1 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1 describes basic geologic and seismic information collected by the applicant during site characterization investigations. This information addresses both regional and site-specific geology and seismicity. The investigations included surface and subsurface field studies, performed at progressively greater levels of detail closer to the site, within each of four circumscribed areas corresponding to the site region, site vicinity, site area, and site location, as previously defined. The applicant conducted these investigations to assess geologic and seismic suitability of the Turkey Point Units 6 and 7 site; to determine whether there is significant new information on tectonic features or ground motion that could impact seismic design bases as determined by a probabilistic seismic hazard analysis (PSHA); and to provide the bases for plant design. Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1, "Regional Geology," describes the geologic and tectonic setting within the Turkey Point Units 6 and 7 site region. Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2, "Site Geology," describes the geology and tectonic setting within the site vicinity and site area and at the site location.

2.5.1.2 *Summary of Application*

Section 2.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 2.5.1 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1, the applicant provided site-specific supplemental information to address the following:

AP1000 COL Information Item

- PTN COL 2.5-1

The applicant provided additional information in PTN COL 2.5-1 to address COL Information Item 2.5-1 (COL Action Item 2.5.1-1). PTN COL 2.5-1 addresses the provision of regional and site-specific geologic, seismic, and geophysical information, as well as conditions caused by human activity. This information specifically includes the following topics: structural geology, seismicity, geologic history, evidence of paleoseismicity, site stratigraphy and lithology, engineering significance of geologic features, site groundwater conditions, dynamic behavior during prior earthquakes, zones of alteration, irregular weathering or structural weakness, unrelieved residual stresses in bedrock, materials that could be unstable because of mineralogy or physical properties, and the effect of human activities in the site area.

The Turkey Point Units 6 and 7 COL FSAR Section 2.5.1 is divided into two main sections. Section 2.5.1.1 discusses physiography, geomorphic processes and stratigraphy; and regional tectonic setting, including tectonic structures that are possibly Quaternary in age (i.e., 2.6 million years ago, or 2.6 Ma, to present); and seismicity and paleoseismicity within a 320 km (200 mi) radius of the site. The Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1 also describes specific seismic sources inside the site region. The Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2, describes the physiography, geomorphology, stratigraphy, structural geology, site geologic hazards and engineering geology (including the effects of human activities), seismicity and paleoseismicity, and groundwater conditions in the site area.

The applicant developed Turkey Point Units 6 and 7 COL FSAR Section 2.5.1 based on information derived from geologic maps and reports published by State and Federal agencies and research scientists; aerial photographs; communications with experts in geology, seismology, and tectonics of the site region and site area; and geologic field investigations completed as part of the COL application. These field investigations included geologic field reconnaissance, geophysical surveys, and new borehole data collected at the Turkey Point Units 6 and 7 site.

Based on the results of the geologic and seismic investigations performed for Turkey Point Units 6 and 7, the applicant concluded that the in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1 that no geologic or seismic conditions exist at the site that would negatively affect construction or operation of safety-related structures. The following SER Sections 2.5.1.2.1 ("Regional Geology") and 2.5.1.2.2 ("Site Geology") summarize the basic geologic and seismic information provided by the applicant in the Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.

Supplemental Information

- PTN SUP 2.5-1

The applicant also provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.5, “Geology, Seismology, and Geotechnical Engineering,” which provides summary information of detailed information in Turkey Point Units 6 and 7 FSAR Section 2.5.1, “Basic Geologic and Seismic Information,” for the Turkey Point Units 6 and 7 site.

2.5.1.2.1 Regional Geology

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1 describes the physiography, geomorphic processes, stratigraphy, tectonic setting, stress regime, and geologic history within a 320-km (200-mi) radius from the site as those features may be relevant when evaluating the geologic hazards at the Turkey Point Units 6 and 7 site. The following SER sections summarize the information provided by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.

Regional Physiography

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1 the applicant described the physiography and geomorphic processes of the Florida Peninsula, the Florida Platform, and the Florida portion of the Atlantic Continental Shelf and Slope, including the Blake Plateau, the Bahama Platform and its western continuation through the Straits of Florida, and Cuba. The applicant stated that the Florida Peninsula and continental margin consist of three physiographic areas: Florida Peninsula, the Florida Platform and the Atlantic Continental Shelf and Slope. As shown on Figure 2.5.1-1 the Turkey Point Units 6 and 7 site is in the southern tip of the Florida Peninsula, and its site region encompasses the southern half of the Florida Platform. The applicant indicated that the Florida Peninsula is a stable carbonate platform with Neogene (23 to 2.6 million years ago, or Ma) and Quaternary (2.6 Ma to present) age land derived sediments that accumulated asymmetrically, that is, moderately thick on the east coast of Florida and thinning toward the west. The applicant identified the Florida Peninsula as the emergent portion of the Florida Platform, which forms a rampart between the waters of the Gulf of Mexico and the Atlantic Ocean. The Florida Platform is part of the larger Florida-Bahama Platform, which represents a massive shallow-water, carbonate sedimentary province approximately 900 km (600 mi) long, 1,000 km (620 mi) wide, and over 12 km (7.5 mi) thick.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.1.1, the applicant stated that the Turkey Point units 6 and 7 site is within the Atlantic Coastal Plains physiographic region, which is characterized by a low-lying, gently rolling topography. The applicant indicated that the Florida Department of Environmental Protection along with the Florida Geological Survey reorganized and subdivided the physiographic zones of Florida into seven primary physiographic provinces. The Turkey Point Units 6 and 7 site region encompasses four of the primary physiographic provinces: the Atlantic Coastal Lowlands, Intermediate Coastal Lowlands, Gulf Coastal Lowlands, and Central Highlands. Figure 2.5.1-2 shows these primary physiographic provinces and the secondary and tertiary provinces. The Turkey Point Units 6 and 7 site is situated within the Southern Slope of the Intermediate Coastal Lowlands province.

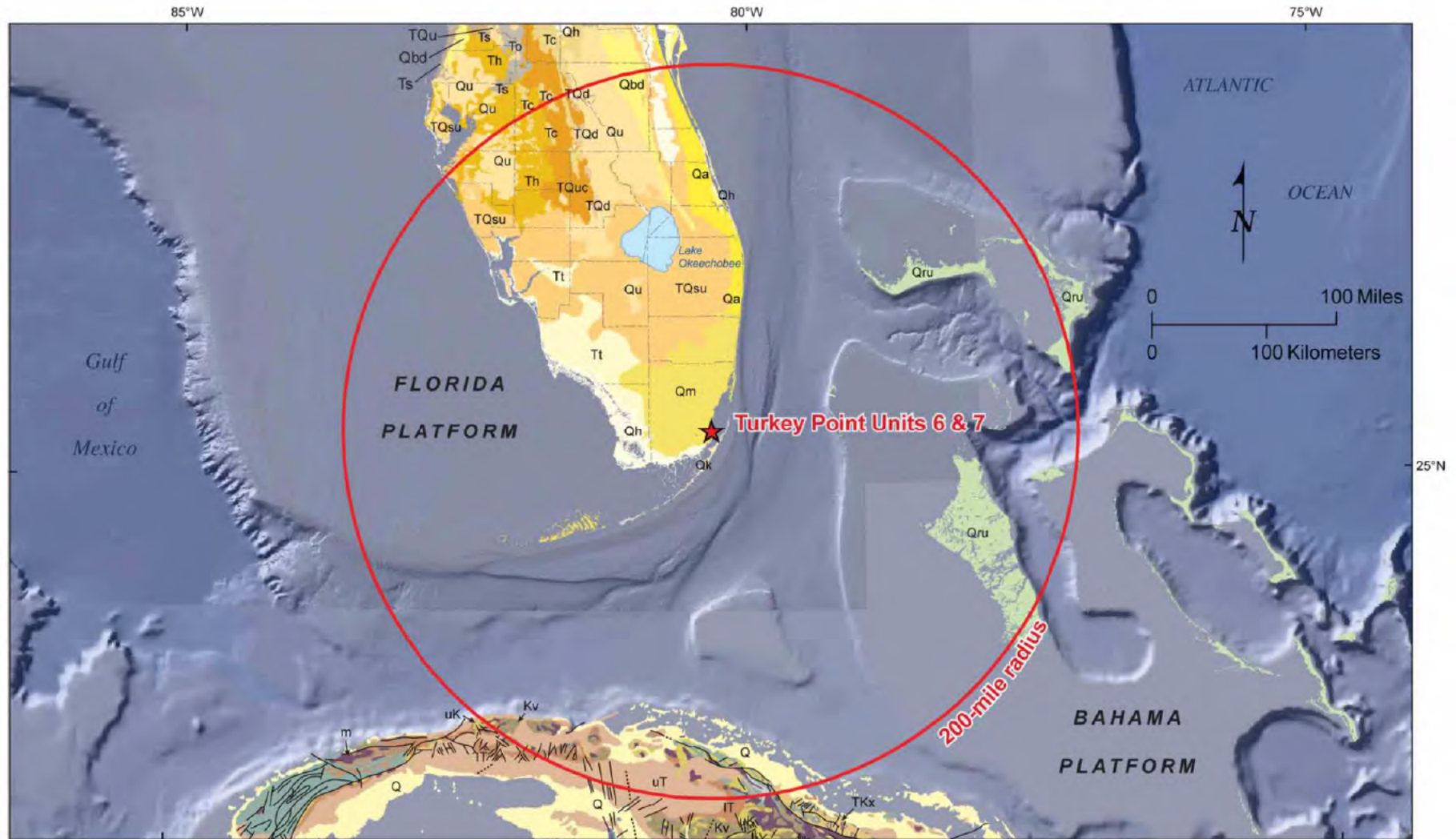


Figure 2.5.1-1. Turkey Point Units 6 and 7 site region (Source: Turkey Point Units 6 and 7 FSAR Figure 2.5.1-201)

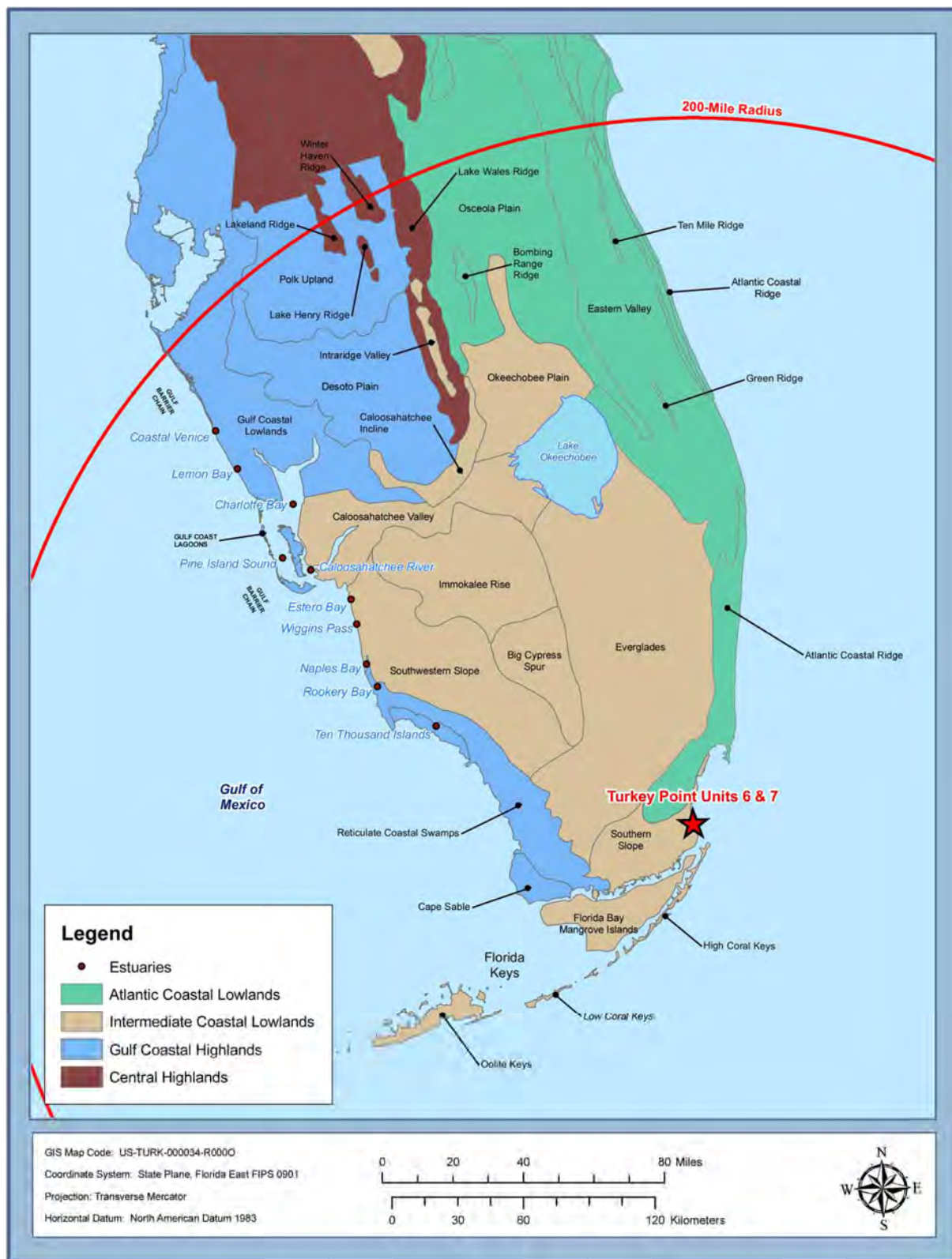


Figure 2.5.1-2. Physiography of Florida
 (Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-217)

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.1.1 also describes limestone dissolution features within the Turkey Point Units 6 and 7 site region and site vicinity, which include the dry caves along the Atlantic Coastal Ridge; vegetated surface depressions; freshwater springs in Biscayne Bay; submarine paleo sinkhole in Key Largo National Marine Sanctuary; and submarine paleo sinkholes in Biscayne Bay. The applicant described the different processes that lead to the development of these features, such as freshwater/saltwater mixing zones in the water table aquifer, surficial rain water dissolution, and deep pore water upwelling from the confined Floridan Aquifer. The applicant indicated that the Turkey Point Units 6 and 7 site is not located in a zone of fresh groundwater discharge or mixing zone of fresh and saltwater, moreover, the interface is approximately 9.6 km (6 mi) west from the site. Therefore, the applicant stated that carbonate dissolution or formation of large solution cavities is not likely to occur at the site. Turkey Point Units 6 and 7 COL FSAR Appendix 2.5AA provides additional details on the potential for carbonate dissolution and karst development at the Turkey Point Units 6 and 7 site.

The applicant indicated that the principal geomorphic features in southern Florida are represented by the barrier island system of the Gulf Coastal Lowlands, the Reticulated Coastal Swamps of southwest Florida, and the swales and swamps of the Everglades as shown on Figure 2.5.1-2. The applicant indicated that, due to changes in sea level and associated erosion patterns, southern Florida is characterized by a broad, flat, gently sloping, and poorly drained plain that is limited on the east by the Atlantic Ridge.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.1.3, the applicant explained that Cuba lies approximately 240 km (150 mi) south of Turkey Point Units 6 and 7. Cuba covers 107,500 square km (44,000 square mi) of which 20 percent is mountainous. The remaining 80 percent consists of gently rolling hills and extensive lowlands, containing sandy clays and fertile alluvial soils in the flood plains. The applicant indicated that nearly two-thirds of the island consists of limestone and thus karst features are well developed, mostly in the eastern section of the island.

Regional Stratigraphy

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.2 indicates that southern Florida is characterized by a thick sequence of Jurassic (201 to 145 Ma) to Holocene sediments lying unconformably on basement volcanic rocks of Jurassic age. Basement rocks in the Florida Peninsula are overlain by up to 4,570 m (15,000 ft) of relatively flat-lying Mesozoic (252 to 66 Ma) evaporate and carbonate units, which are overlain by up to 1,830 m (6,000 ft) of Cenozoic carbonate and siliciclastic sediments. The applicant indicated that most of the units in the sedimentary sequence are carbonates, however, deposition of Appalachian derived siliciclastic sediments occurred during the Miocene (23 to 5.3 Ma) and Pliocene (5.3 to 2.6 Ma).

Cenozoic Stratigraphic Units

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.2 the applicant indicated that the Florida Peninsula section includes Cenozoic (66 Ma to present) carbonate rocks (limestone, dolostone and evaporates) of the Cedar Keys Formation, Oldsmar Formation, Avon Park Formation, Ocala Limestone, Suwannee Limestone, and part of the Arcadia Formation. Figure 2.5.1-3 (Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-231) shows that the location of the oldest Cenozoic strata observed in the site region is the Miocene-Pliocene Peace River Formation, while the oldest Cenozoic formation on the Florida Platform is the Paleocene (66 to 23 Ma) Cedar Keys Formation.

In the Late Oligocene (28.1 to 23 Ma), karst features such as sinkholes, dissolution valleys, and collapse depressions started to form. The applicant indicated that during the Miocene, siliciclastic sediments deposited on the Florida Platform reduced the dissolution of the underlying carbonates. During the Pleistocene, worldwide glaciation resulted in a drop in sea level, which increased Florida's land area. The applicant indicated that sea-level fluctuations during the Quaternary resulted in the deposition of the Fort Thompson Formation, which covers the greatest geographical area of all Quaternary formations in southern Florida. The applicant indicated that during the Pleistocene, the Miami Limestone transitioned into the contemporaneous Key Largo Limestone and Anastasia Formation, although the latter is not present in southern Miami-Dade County (site vicinity).

The Miami Limestone, a highly porous and permeable stratum, constitutes much of the surficial aquifer system of the Biscayne aquifer. The applicant indicated that undifferentiated sediments such as siliciclastics, organic material, and freshwater carbonates of various thicknesses overlie the Pliocene-Pleistocene Anastasia Formation, Key Largo Limestone, and Miami Limestone.

Regional Tectonic Setting

Principal Tectonic Structures

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3 discusses the principal tectonic structures and features within the site region, including principal tectonic structures and features of the Bahamas and Cuba, which are partly within the site region. The applicant addressed gravity and magnetic data of the site region with a focus on anomalous features in the gravity and magnetic fields. The applicant explained that the Florida Platform is cut by the Central Florida Gravity Lineament, which is defined as a northwest-southeast-oriented linear gravity high. The Central Florida Gravity Lineament exhibits a contrasting character in the gravity and magnetic fields with the northeast portion of the lineament having low gravity field values while the southwest portion has high values. In addition, the licensee correlated the location of the lineament to basic changes in the nature of the crust, such as composition or thickness.

1. Late Proterozoic Paleozoic Mesozoic Tectonic Structures

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2, the applicant stated that all Precambrian (4,000 to 541 Ma) to Paleozoic (541 to 252 Ma) features associated with Pangea are covered by a thick sequence of sedimentary strata in the site region. The applicant stated that tectonic and structural features recognized in the Florida Platform are mostly a series of gentle highs and lows that possibly reflect the original basement topography.

The applicant indicated that because Mesozoic rifting is associated with the opening of the Atlantic Ocean, the site region has only recorded sedimentary processes with the exception of the possible tectonic activity of the Straits of Florida normal faults, the Santaren anticline, the Walkers Cay fault, the Cuban Fold and Thrust Belt, and the possibly active faults in northern Cuba. Figure 2.5.1-4 shows the locations of these features relative to the Turkey Point Units 6 and 7 site. The applicant noted that hypothetical faults have been described in various tectonic maps that show the pre-Mesozoic Florida Platform lithology. The applicant stated that if these

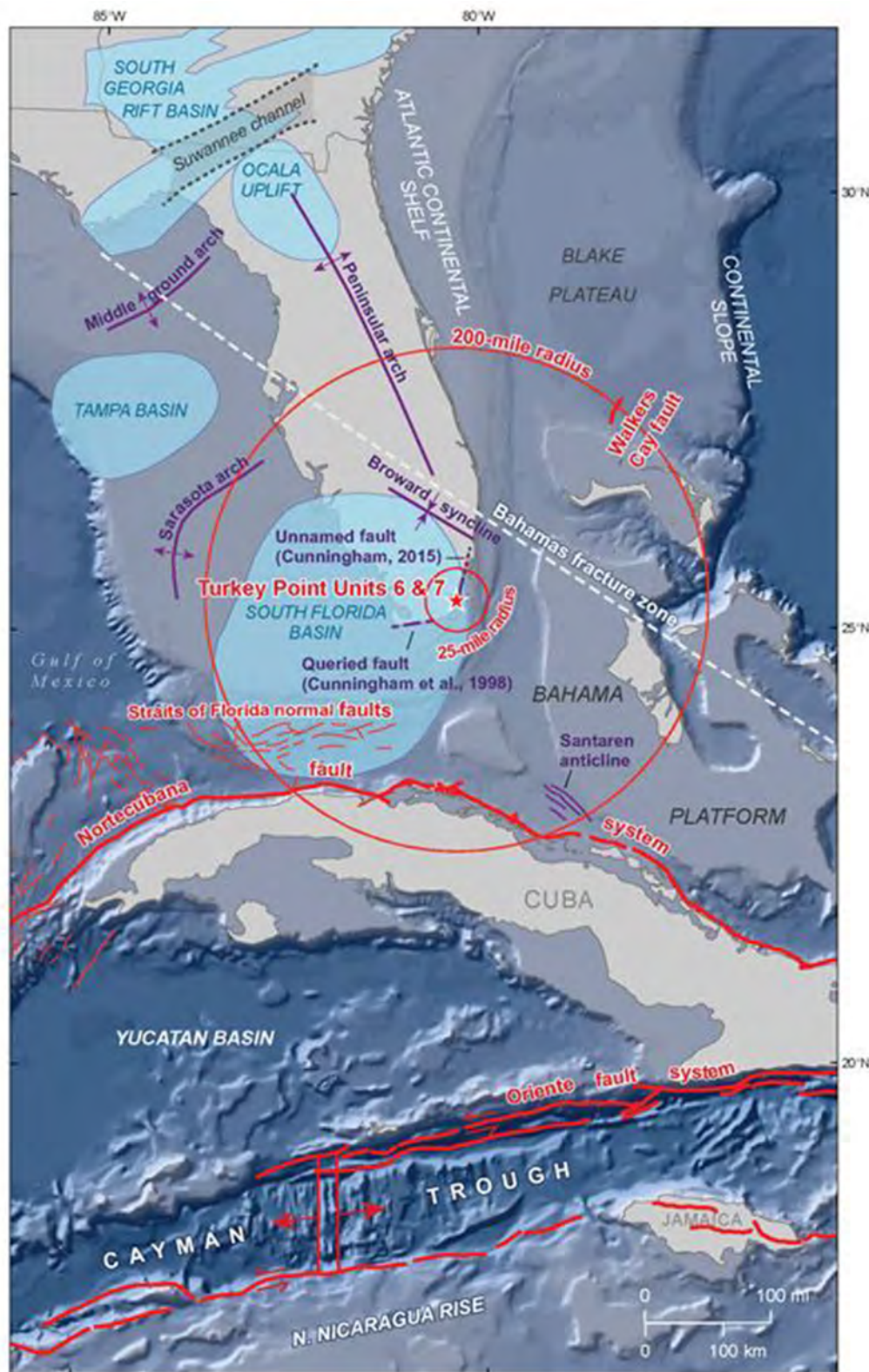


Figure 2.5.1-4. Tectonic features in the site region
(Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-229)

structures exist, they have been inactive since the end of the Jurassic as there is no offset observed in younger strata.

A. Florida Peninsula and Platform Tectonic Structures

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2.1 discusses the tectonic and structural features of the Florida Peninsula and Platform. The applicant stated that seismic reflection data indicate that the basement beneath the Bahama and Florida Platforms is faulted; however, several regional-scale cross sections reveal a smooth varying basement surface beneath the Florida Platform.

The applicant described the following tectonic features on the Florida Peninsula and Platform within the site region: basement faults of the Florida Peninsula Platform, Peninsular Arch, the Sarasota Arch, the Tampa Basin, Broward Syncline, the South Florida Basin, the Ocala Uplift, the South Georgia Rift Basin, the Suwanee Channel, and the Queried Fault from Cunningham et al. (1998). The only tectonic feature within the site vicinity is a possible subsurface unnamed fault (Cunningham et al., 1998), which the applicant described as a 50- to 60-km (30- to 37-mi) long structure located 41 km (25 mi) west of the Turkey Point Units 6 and 7 site. Cunningham et al. (1998) suggested that a fault or paleotopography could be responsible for the elevation variations in the Arcadia Formation. The applicant indicated that the thickness and variations in elevation could be related to paleotopography because the top of the Arcadia Formation is known to be a regional erosional unconformity.

B. Bahama Platform

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2.2 the applicant described the Bahama Platform as a largely undeformed, shallow marine platform. From Late Jurassic to Early Cretaceous, the Bahama Platform was attached to the Florida Platform, the Yucatan Platform and the Gulf of Mexico carbonate platform, forming an extensive carbonate system. Figure 2.5.1-4 shows the main structural features in the Bahama Platform within the site region: the Santaren anticline, normal faults in the Straits of Florida, the Walkers Cay fault, and the eastern Bahama Platform.

Based on seismic reflection data, the applicant indicated that the Walkers Cay fault is a basement structure about 33-km (21-mi) long located about 320 km (200 mi) northeast of the Turkey Point Units 6 and 7 site. The applicant considered seismic and borehole data in the vicinity of these seismic profiles and concluded that only one of five seismic lines that cross the Walkers Cay fault was a fault reaching the seafloor with minimal impact on sediments younger than middle Miocene. The applicant noted that these data do not preclude Quaternary offset on this fault.

The Santaren anticline, as shown on Figure 2.5.1-4, is a structure located about 240 km (150 mi) southeast of the Turkey Point Units 6 and 7 site that corresponds to the northernmost limit of the Cuban Fold and Thrust Belt. The applicant indicated that data from multiple sources revealed that this structure was mainly active in the Eocene, with declining activity throughout the Miocene, and possible deformation into the Quaternary. However, the applicant explained that strata younger than 1 Ma show no evidence of deformation.

The applicant described the Straits of Florida Normal Faults as a set of steep normal faults located in the western Straits of Florida, to the southwest of the Turkey Point Units 6 and 7 site. The applicant indicated that this faulting was the result of the collision of the Cuban foreland basin with the Florida-Bahama Platform. The applicant added that seismic lines in the site

region show unfaulted strata above a late middle Eocene unconformity. However, Moretti and others (2003) concluded that there was a reactivation of the faults in the Late Tertiary.

C. Cuban Fold and Thrust Belt

The applicant described the Cuban Fold and Thrust Belt as an area along the northern edge of Cuba where rocks associated to the North American margin are deformed in a series of overlapping thrusts and anticlines. The applicant indicated that the thrust faulting is Eocene in age and that seismic lines show post-tectonic Tertiary and Quaternary sediments undeformed by the thrusts. However, the applicant noted that research by Moretti et al. (2003) demonstrates Miocene reactivation of some of the early Tertiary thrusts and Jurassic normal faults.

2. Cuba Structures

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2.4, the applicant described 12 faults throughout the island of Cuba classified as active by Cotilla-Rodriguez et al. (2007) as shown on Figure 2.5.1-5 (Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-247). Of the 12, the applicant noted that 6 of the faults occur within the 320-km (200-mi) radius of the Turkey Point Units 6 and 7 site: the Domingo fault, the Cochinos fault, the Hicacos fault, the Las Villas fault, the Nortecubana fault system, and the Pinar fault. The applicant added that although the Oriente fault zone is located more than 644 km (400 mi) southeast of the Turkey Point Units 6 and 7 site along the southeast coast of Cuba, it is the most seismically active area and, as discussed in SER Section 2.5.2, a major contributor to the seismic hazard at the Turkey Point Units 6 and 7 site. The Oriente fault zone is a left-lateral transform fault that forms the northern boundary of the Gonâve microplate and is part of the active North America-Caribbean Plate boundary. The Oriente fault zone has a slip rate of 8 and 13 millimeters/year and is divided into eastern and western segments based on historical seismicity variation and geometry. The largest historical earthquakes on the western Oriente fault are Mw 6.8 to 7.0 events in 1992. The largest historical earthquake on the eastern Oriente fault is the June 1766 Mw 7.53 earthquake. The applicant indicated that the eastern Oriente fault in southern Cuba is characterized by more seismic activity and focal mechanisms that indicate strike-slip, oblique, and reverse motion.

The Domingo fault is located 282 km (175 mi) south of the Turkey Point Units 6 and 7 site. The applicant indicated that the Domingo fault can be considered the former suture between North American and Caribbean plates. The applicant stated that the fault does not cut the uppermost Eocene and younger overlying sedimentary units and, thus concluded that the Domingo fault is not Quaternary in age.

The Cochinos fault is located in south-central Cuba and is mapped as close as 282 km (175 mi), to more than 320 km (200 mi), from the Turkey Point Units 6 and 7 site. The applicant pointed out that Mann et al. (1990) considered the Cochinos fault as the only onshore intraplate fault that is neotectonic. Mann et al. (1990) also mapped the Cochinos fault as two parallel, north-northwest-striking normal faults that form a graben between the faults.

The Hicacos fault (also called Matanzas fault) is located about 250 km (155 mi) south of the Turkey Point Units 6 and 7 site. The applicant indicated that Cotilla-Rodríguez et al. (2007) concluded this fault is active based on associated seismicity. Cotilla-Rodriguez et al. (2007)

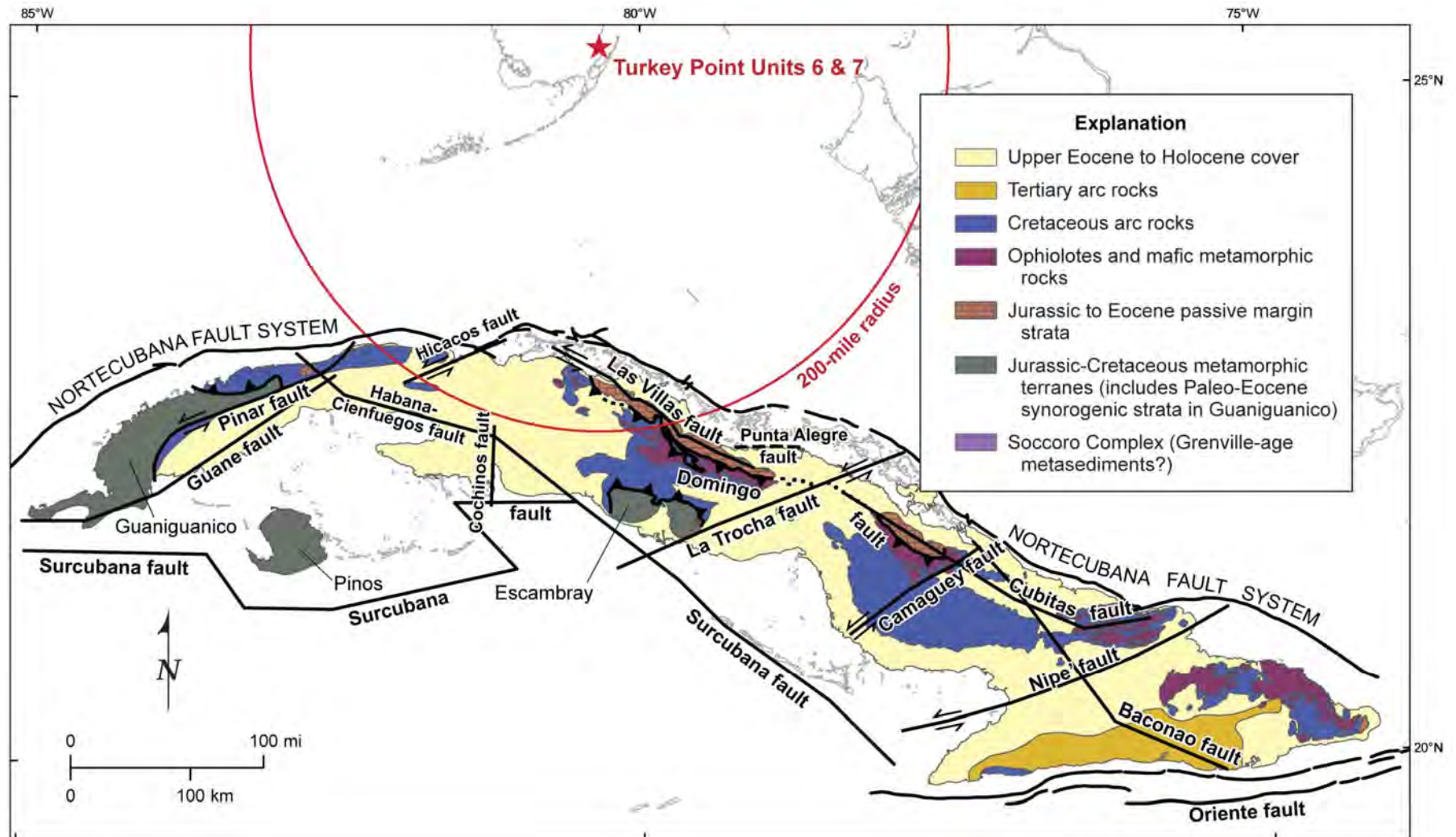


Figure 2.5.1-5. Tectonic features of Cuba (Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-247)

indicate that historical records suggest ten earthquakes of less than or equal to intensity V on the Medvedev-Sonheuer-Karnik seismic intensity scale that occurred in the vicinity of the Hicacos fault. However, the applicant argued that the direct association of these earthquakes to the Hicacos fault is uncertain because of poorly located earthquakes in Cuba.

The Las Villas fault is located in central Cuba about 250 km (155 mi) south of the Turkey Point Units 6 and 7 site. Pardo (2009) indicates that the Las Villas fault displaces middle Eocene units while Cotilla-Rodríguez et al. (2007) suggests that this fault is Pliocene-Quaternary based on seismicity and geomorphic expression. The applicant indicated that both studies provided minimal description of the fault and did not support its interpretations with other publications. The applicant added that although geologic mapping of the area did not reveal faulting of Quaternary units, recent activity cannot be ruled out due to the small scale of the maps. The Nortecubana fault system is the main structure within the Cuban Fold and Thrust Belt and is located 240 km (150 mi) south of the Turkey Point Units 6 and 7 site. The research of Cotilla-Rodríguez et al. (2007) links the seismic activity of this structure to the modern plate boundary and suggests that a 1914 Mw 6.29 earthquake off the north coast of Cuba occurred on the Nortecubana fault. The applicant indicated that due to the lack of permanent seismic monitoring networks in Cuba and the poorly located epicenter of this earthquake, it could not rule out the possibility that the 1914 earthquake occurred on a fault other than the Nortecubana. However, the applicant added that because of uncertainties in both the location of the 1914 earthquake and the mapped location of the Nortecubana fault, it could not rule out the possibility that the 1914 earthquake occurred on the Nortecubana fault.

The Pinar fault is located in western Cuba, approximately 320 km (200 mi) south of the Turkey Point Units 6 and 7 site. The applicant indicated that there are conflicting opinions in the literature regarding whether the Pinar fault is active. Garcia et al. (2003) suggests that the Pinar fault is expressed as a prominent surface escarpment, was reactivated in the Neogene-Quaternary, and may have produced the Mw 6.13, 1880 earthquake. Alternatively, Cotilla-Rodríguez et al. (2007) indicates that the Pinar fault has a relief surface expression but conclude that it is inactive and suggest that the 1880 earthquake occurred on the Guane fault (Figure 2.5.1-5).

The applicant noted the limited availability of studies indicating the most recent timing of faulting in Cuba and the conflicting ages for the structures discussed therein. The applicant concluded that, with the exception of the Oriente fault, most faults in Cuba were active during the Cretaceous to Eocene time due to the subduction of the Bahama Platform beneath the Greater Antilles Arc of Cuba and the later southward migration of the plate boundary to its current position.

Sources beyond the 200 mi (320 km) radius of the site

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.2 the applicant discussed relevant the geologic and seismic information on tectonic structures outside the 320 km (200 mi) radius of the Turkey Point Units 6 and 7 site. The applicant included information on physiography, stratigraphy, structure, and seismicity of portions of the North American Plate and the Caribbean Plate.

2.5.1.2.2 *Site Geology*

Turkey Point Units 6 and 7 COL FSAR Sections 2.5.1.2 describes the geologic characteristics of the Turkey Point Units 6 and 7 site area defined as the area lying within an 8-km (5-mi) radius of the site. These characteristics include physiography and geomorphology, stratigraphy and lithology, structural geology, and geologic hazards. The following SER sections summarize the information provided by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.

Site Area Physiography and Geomorphology

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.1, the applicant described physiography and geomorphology of the Turkey Point Units 6 and 7 site area. As shown on Figure 2.5.1-2, the site area is located within the Southern Slope subprovince of the Florida Platform. The site surface geology is characterized by organic peat/muck sediments and the Miami Limestone. The applicant described the organic peat muck as the dominant surficial sediment type in the area characterized by decomposed organic peat soil with trace amounts of shell fragments. The Miami Limestone is a marine carbonate unit, consisting of oolitic facies with fossils exposed in the northern and western parts of the site area. The applicant stated that the site is mostly flat with the exception of vegetated depressions caused by dissolution within the Miami Limestone.

Site Area Stratigraphy

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.2 describes the site area stratigraphy. As part of the site characterization program for the Turkey Point Units 6 and 7 site, 97 geotechnical borings were drilled providing detailed information about the near-surface geologic characteristics and composition of sediments underlying the site. The Holocene units at the site are classified as marl, saprist wetland soils (muck), and peat. The applicant defined saprist soils as those with two-thirds or more of decomposed material with less than one-third of identifiable plant fibers. The applicant explained that the surficial layers within the vegetated surface depressions at the Turkey Point Units 6 and 7 site were peat, while the flat areas outside the depressions were classified as marl, peat sediments and organic rich elastic silts. The applicant added that laminated surficial deposits outside the vegetated depressions could be the result of cyclical changes in oxidation-reduction conditions. The applicant stated that the bedrock surface through the Turkey Point Units 6 and 7 site consists of the Miami Limestone overlain by muck/peat. Underlying the Miami Limestone is the coralline vuggy Key Largo Limestone beneath, which is the Pleistocene Fort Thompson Formation, a sandy limestone with vugs and zones of interbedded uncemented sand as shown in Figure 2.5.1-3.

Site Area Structural Geology

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.3 describes the structural geology of the site area. Previous reports for the Turkey Point Units 3 and 4 UFSAR, new geologic mapping and the supplemental exploration program are the basis for the applicant's characterization. The applicant indicated that the site is located on the Florida carbonate platform where no faults or folds are mapped within more than 40 km (25 mi). The applicant indicated that field investigations, interpretation of aerial photography, review of published literature, and analysis of the results of the subsurface exploration did not reveal evidence for tectonic deformation within the site vicinity and site area. Boring data in the site vicinity revealed several feet of vertical relief along the contact of the Miami Limestone and the underlying Key Largo

ERA	SYSTEM	SERIES	STRATIGRAPHIC UNIT		LITHOLOGY	APPROXIMATE THICKNESS (ft)
CENOZOIC	QUATERNARY	PLEISTOCENE	Miami Limestone / Key Largo Limestone/ Anastasia Formation		sandy, oolitic, coralline, shelly limestone	10-180
			Caloosahatchee Formation/ Fort Thompson Formation		poor/well indurated sandy, fossiliferous limestone	50-100
	NEOGENE	PLIOCENE	Tamiami Formation/ Cypresshead Formation (Long Key Formation)		fossiliferous sand & silt with limestone	25-220
		MIOCENE	Hawthorn Group	Peace River Formation	sands, clays, & phosphatic carbonates	100-650
				Arcadia Formation	fine crystalline limestone with sand/clay, phosphatic fossiliferous limestone, & dolomite	100-700
		OLIGOCENE	Suwannee Limestone		poor/well indurated fossiliferous vuggy to moldic limestone	200-600
	PALEOGENE	EOCENE	Ocala Limestone		poor/well indurated fossiliferous limestone	200-400
			Avon Park Formation		poor/well indurated fossiliferous limestone & vuggy dolostone	400-1200
			Oldsmar Formation		vuggy limestone & dolomite	500-1500
		PALEOCENE	Cedar Keys Formation		dolomite, gypsum, & anhydrite	500-2000
	TOTAL THICKNESS					

Figure 2.5.1-3. Cenozoic Stratigraphy of southern Florida

Limestone. After further consideration, the applicant concluded that the relief is not due to tectonic or non-tectonic deformation, but considered to be a primary sedimentary feature associated with the reef origin of the Key Largo Limestone.

Site Area Geologic Hazard

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.4 the applicant explained that there is no evidence of active tectonic features, tsunami deposits, evidence for seismically induced paleoliquefaction features indicative of paleoseismic activity, and no known sinkholes in the underlying karst terrane within the Turkey Point Units 6 and 7 site. The applicant particularly described dissolution features at the site as well as tsunami-related features.

The Florida Geological Survey mapped sinkhole zones into four distinct areas (I through IV) based on the predominant type of sinkholes. Area I develops in bare or thinly covered limestone dominated by shallow solution sinkholes. Area II develops in regions of 9.1 to 61 m (30 to 200 ft) thick mostly permeable incohesive sand and is characterized by small cover-subsidence sinkholes. Area III develops in regions of 9.1 to 61 m (30 to 200 ft) thick of mostly cohesive sediments with low permeability and is dominated by cover collapse sinkholes. In Area IV, cover is more than 61 m (200 ft) thick consisting mostly of cohesive sediments interlayered with discontinuous carbonate beds. Turkey Point Units 6 and 7 site is located in Area I, which is characterized by few, generally shallow and broad, gradually developed sinkholes. The applicant explained that if sinkholes were to occur at the site they will be solution sinkholes, as are commonly observed in Area I. Solution sinkholes are bowl-shaped depressions that occur near or at land surface where limestone is exposed or covered with a thin layer of material.

The applicant stated that zones of secondary porosity (i.e., porosity developed in a rock after its deposition or emplacement, through such processes as solution or fracturing) are present beneath the site where microkarst features have developed. These microkarst zones were possibly formed by the enlargement of sedimentary structures caused by groundwater dissolution. The applicant explained that touching-vug porosity, a subdivision of secondary porosity, occurs at the site near the contact of the Miami Limestone and Key Largo Limestone at a depth interval of 6.1 to 10.1 m (20 to 35 ft). The applicant explained that touching-vug porosity develops by the enlargement of fossil molds and that these features are numerous and could form a laterally continuous zone of interconnected voids. The applicant also stated that drilling and coring within these touching-vug porosity zones revealed these features to be generally on a centimeter scale and laterally persistent and that there were few indications, such as rod drops, of possible larger voids. The applicant explained that limestone dissolution in the upper secondary porosity zone possibly occurred during the Wisconsin glacial stage in the Pleistocene, when sea level was lower than when the Miami Limestone and Key Largo Limestone were formed and mixed fresh groundwater and seawater discharged through the zone. The applicant stated that the freshwater/saltwater interface is about 9.6 km (6 mi) inland from the Turkey Point Units 6 and 7 site; therefore, the groundwater within the touching-vug porosity zone is saline and there is no freshwater shoreline flow near the site. Based on this, the applicant stated that the possibility of further dissolution of the limestone within the touching-vug zone of porosity does not exist and the possibility of caverns developing and potential collapse is unlikely. The applicant added that this secondary porosity zone will be completely removed during excavation of the nuclear island foundations. The applicant committed to perform a grouting program under the Nuclear Island area to limit the voids between elevation -10 to -18 m (-35 to -60 ft) within the Key Largo and Fort Thompson

Formations, and to limit the size of potential voids between elevation -18 and -33 m (-60 and -110 ft) in the Fort Thompson Formation.

Site Area Engineering Geology

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.5, the applicant discussed engineering geology of the Turkey Point Units 6 and 7 site including engineering soil properties and behavior of foundation materials, zones of alteration, weathering, dissolution, and structural weakness, prior earthquake effects and effects of human activities at the site. The applicant indicated that no zones of unusual alteration, weathering profiles, or structural weakness in the surface or subsurface of the site were identified during field reconnaissance and evaluation of published literature. Ground and aerial field reconnaissance investigations revealed no evidence of active folding and faulting or earthquake-induced features like liquefaction-related sand blows, lateral spread fractures or other geomorphic, stratigraphic features indicative of recent tectonic deformation within the site vicinity. The applicant cross-referenced FSAR Section 2.5.4 for additional details related to engineering geology of the site area and site location.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.5.4, the applicant explained that numerous anthropogenic activities, such as, agriculture, construction of drainage canals, limestone mining, among others, have affected the regional groundwater table in southeastern Florida. However, the applicant stated that there are no indications that human activities affected the groundwater table at the Turkey Point Units 6 and 7 site.

2.5.1.3 Regulatory Basis

NUREG-1793 and its supplements address the regulatory basis for information incorporated by reference.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for basic geologic and seismic information are given in Section 2.5.1 of NUREG-0800.

The applicable regulatory requirements for reviewing geologic and seismic information are:

- 10 CFR 52.79(a)(1)(iii), "Contents of Applications: Technical Information in Final Safety Analysis Report," as it relates to including in the FSAR information on seismic and geologic characteristics of the proposed site with appropriate consideration of the most severe natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity and period of time in which the historical data have been accumulated.
- 10 CFR 100.23, "Geologic and Seismic Siting Criteria," for evaluating suitability of a proposed site based on consideration of geologic, geotechnical, geophysical, and seismic characteristics of the proposed site. Geologic and seismic siting factors must include the safe shutdown earthquake (SSE) for the site; and the potential for surface tectonic and non-tectonic deformation.

In addition, the acceptance criteria associated with the relevant requirements of NRC regulations for basic geologic and seismic information are given in NUREG-0800, Section 2.5.1, as follows:

- Regional Geology: Requirements of General Design Criterion (GDC) 2 of 10 CFR Part 50, Appendix A, 10 CFR 52.17 and 10 CFR 100.23(c) are met and guidance in RG 1.206, 1.208, and 4.7 followed for this area of review if a complete and documented discussion is presented for the geologic setting, tectonic framework and conditions caused by human activities, that have potential to affect the safe siting and design of the plant. This section should contain a review of regional stratigraphy, lithology, structural geology, geologic and tectonic history, tectonic features (with emphasis on the Quaternary period), seismology, geomorphology, paleoseismology, and physiography within the 320 km (200 mi) site region or beyond as necessary to provide a framework within which significance to safety can be evaluated concerning geology, seismology, and conditions caused by human activities. Geologic maps and cross-sections constructed at scales adequate to illustrate relevant regional features should be included in the application.
- Site Geology: Requirements of GDC 2 and 10 CFR Part 50, Appendix A, 10 CFR 52.17 and 10 CFR 100.23(c) are met and the guidance in RGs 1.206, 1.208, and 4.7 followed for this area of review if it contains a description and evaluation of geologic (including tectonic and non-tectonic) features, and conditions caused by human activities at appropriate levels of detail for determining any potential natural hazards that might affect the design and operation of the proposed facility. This subsection should contain the following information:
 - a. structural geology, including identification and characterization of faults, joints, and other tectonic deformation features and discussion of the relationships between these features and regional tectonic structures
 - b. geologic maps and cross-sections constructed at scales adequate to clearly illustrate pertinent features in the site vicinity, area, and location shall be included in the application
 - c. stratigraphy and lithology of rock units and discussion of their relationships to the regional lithostratigraphic framework
 - d. geomorphologic features as tectonic strain markers or indicators of other potentially hazardous natural phenomena (e.g., landslides, karst development, and dissolution collapse, growth faults)
 - e. geologic and tectonic history, particularly for the Quaternary Period, and discussion of the relationship to regional geologic and tectonic history
 - f. tectonic framework description, including identification of historical and instrumentally recorded earthquakes; identification and characterization of any local tectonic features as they might be related to seismicity; discussion of the relationships between local and regional tectonic structures and any relationship to seismicity; and the nature of the crust beneath the site
 - g. evidence for paleoseismic features, including a description of investigations performed by the applicant to verify the presence or absence of the features

- h. geologic features that have significance for geotechnical engineering:
 - (1) zones of mineralization, alteration, irregular or deep weathering, or structural weakness in surface or subsurface materials
 - (2) surface and subsurface dissolution features in soluble rock such as limestone, gypsum, or salt

2.5.1.4 *Technical Evaluation*

The staff reviewed Section 2.5.1 of the Turkey Point Units 6 and 7 COL FSAR and the referenced DCD to ensure that the combination of information presented in the FSAR and the DCD completely represents the required information related to this review topic.¹ The staff confirmed, as described below, that information contained in the application or incorporated by reference addresses the information required relating to basic geologic and seismic characteristics. NUREG-1793, and its supplements (2005, 2011) document the results of the staff's evaluation of information incorporated by reference into the Turkey Point Units 6 and 7 COL FSAR.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 2.5-1

The staff reviewed PTN COL 2.5-1 regarding the geologic, seismic, and geophysical information included in Section 2.5.1 of the Turkey Point Units 6 and 7 COL FSAR. The COL information item in Section 2.5.1 of the AP1000 DCD states the following:

Combined License applicants referencing the AP1000 certified design will address the following regional and site-specific geological, seismological, and geophysical information as well as conditions caused by human activities: (1) structural geology of the site, (2) seismicity of the site, (3) geological history, (4) evidence of paleoseismicity, (5) site stratigraphy and lithology, (6) engineering significance of geological features, (7) site groundwater conditions, (8) dynamic behavior during prior earthquakes, (9) zones of alteration, irregular weathering, or structural weakness, (10) unrelieved residual stresses in bedrock, (11) materials that could be unstable because of mineralogy or physical properties, and (12) effect of human activities in the area.

Based on the discussion of the basic geologic and seismic information presented in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1, the staff concludes that the applicant provided the information required satisfying PTN COL 2.5-1.

COL FSAR Section 2.5.1

The technical information presented in COL FSAR Section 2.5.1 resulted from the applicant's review of published geologic literature; personal communications with experts in geology and seismotectonics of the site region; aerial photograph analysis, and geologic fieldwork performed

as part of the COL application (including a site subsurface investigation, a geologic field reconnaissance, and a geophysical survey). COL FSAR Section 2.5.1 contains geologic and seismic information presented in support of the vibratory ground motion analysis and the site GMRS provided in COL FSAR Section 2.5.2 as well as the determination for potential future tectonic and non-tectonic deformation in COL FSAR 2.5.3. RG 1.208 recommends that applicants update the geologic, seismic, and geophysical database and evaluate any new data to determine whether revisions to the existing seismic source models are necessary. Through the review of COL FSAR Section 2.5.1, the staff determines whether the applicant had complied with all applicable NRC regulations and conducted its investigations at the appropriate levels of detail within the 320 km (200 mi) radius site region, 40 km (25 mi) site vicinity, 8 km (5 mi) radius site area, and 1 km (0.6 mi) site, as designated in RG 1.208. To evaluate the original geologic, seismic, and geophysical information submitted by the applicant thoroughly, the staff obtained additional assistance from experts at USGS.

Site Visits

The staff visited the Turkey Point Units 6 and 7 site on May 24 and 25, 2011 (ADAMS Accession No. ML111881052), and on August 22 and 23, 2013 (ADAMS Accession No. ML13248A497), and interacted with the applicant and its consultants in regard to the geologic, seismic, geophysical, and geotechnical investigations conducted at the Turkey Point Units 6 and 7 site for the COL application. The purpose of the May 2011 visit was to acquaint the staff with the proposed site, examine drill cores, dissolution features, and calculation packages. The staff examined drill cores from selected intervals of various boreholes completed within the nuclear island footprint and focused on the Key Largo Formation and Fort Thompson Formation cores. These boreholes include B-730, B-704DH, B-701DH, and B-703 from Unit 7 and B-629, B-604DH, B-601DH, and B-606 from Unit 6. Specific runs within these boreholes were examined based on low rock quality designation (RQD) and low recovery. The staff also visited shallow surface depression dissolution features that support distinct woody vegetation at Units 6 and 7 and along the interceptor canal road, near the western plant boundary. The surficial dissolution features along the canal road are in a more natural pristine condition than the ones at Unit 6 and 7 building site. The natural condition of these features can reveal some aspects of their origin.

The August 2013 site visit was an audit of the subsurface investigation work performed at the Turkey Point Units 6 and 7 site by Paul C. Rizzo Associates, Inc. (ADAMS Accession No. ML13248A497). The staff interviewed individuals representing the applicant and Paul C. Rizzo Associates at the Unit 7 drilling site for the new supplemental boring program that included specific sampling of the vegetated depressions at the site. The on-site individuals discussed with the staff the decision to use a Macaulay sampler, a half cylinder barrel with a rotating shuttle that has a cutting edge, to retrieve undisturbed peat samples from the peat filled surface dissolution pits located at the drilling site. The sampler is advanced to the target depth and the operator turns the shuttle to cut a sample of peat, and retrieves an enclosed, protected sample. The undisturbed peat samples were later examined for the presence of tsunami and storm surge deposits from prehistoric events.

The staff also examined newly extracted core from the Miami, Key Largo, and Fort Thompson Limestone formations. This was the first opportunity to directly observe Miami Limestone because the heavily weathered nature of this surface unit previously prevented sufficient RQD. The staff observed the increasing clastic content with depth in the Fort Thompson formation and the open reef like fabric in the Key Largo formation. Terminated calcite crystals were observed covering open surfaces indicating a precipitating, rather than dissolving in situ environment.

The following SER Sections 2.5.1.4.1, “Regional Geology,” and 2.5.1.4.2, “Site Geology,” present the staff’s technical evaluation of the information provided by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1 and the applicant’s responses to RAIs for Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.

2.5.1.4.1 Regional Geology

The staff reviewed the Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1 and the applicant’s description of the regional physiography, geomorphology, stratigraphy, and tectonic setting within the 320 km (200 mi) radius site region around the Turkey Point Units 6 and 7 site (Figure 2.5.1-1). The applicant needed to characterize offshore Florida, Cuba seismic sources, and the active Caribbean–North American plate boundary. Therefore, the staff performed a detailed review of the new information that was not part of the previously endorsed model (NUREG-2115) in addition to conducting its own independent literature review. This resulted in the development of several RAIs evaluated in this section of the review.

The staff focused its review on the structures, stratigraphic relationships, and tectonic interpretations pertaining to geologically young features and characteristics that might have implications for the site PSHA. Geologically young in this context refers to the Cenozoic era (65 Ma) and in particular the Quaternary period (2.6 Ma through today). This includes the characterization of the Florida peninsula, Biscayne Bay, the offshore Straits of Florida and terraces, the Bahama Banks, and the island of Cuba, as its north central portion resides within the Turkey Point site region. In addition, because the Florida platform is essentially a carbonate bank, the staff also focused on the applicant’s characterization of carbonate dissolution features and processes found in the site region that have implications for the site area.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1 describes Large Igneous Province (LIP) magmatic events and the East Coast Margin Igneous Province (ECMIP), which includes the eastern edge of the offshore Blake Plateau and Bahamas Platform. The crustal structure of LIPs are comprised of an extrusive upper crust and a lower crust characterized by high seismic velocities (V_p 7.0-7.6 km/s) and are different from “normal” oceanic or continental crust. In RAI 02.05.01-10, the staff asked the applicant to further describe the location of the ECMIP with respect to transitional continental, thickened and normal oceanic crust and the impact of crustal thickness variations on the ground motion models from Caribbean sources.

In an October 3, 2014, response to RAI 02.05.01-10, the applicant explained that the ECMIP (also called the East Coast Magnetic Anomaly (ECMA)) and its southeast conjugate, the Blake Spur Magnetic Anomaly (BSMA) are part of an LIP located along the North American continental margin that marks the boundary between continental and oceanic crust. Located between rifted continental crust and normal ocean crust, this 100 km (62 mi) wide zone of thick (up to 25 km (15 mi)), high velocity crust is interpreted as massive mafic igneous rock emplaced during the Triassic-Jurassic rifting of Pangea. The applicant indicated that the Appalachian intracrustal reflectivity largely disappears across the boundary, implying that the reflectivity is disrupted by massive intrusion and very little, if any, continental crust can be found east of it. The BSMA underlies the Bahamas and implies that the Bahamas overlies seamounts produced by the LIP magmatic event.

The applicant explained that development of the Caribbean GMPEs was based on the regional attenuation parameters estimated from an empirical dataset of earthquakes recorded in and around the island of Puerto Rico (Motazedian and Atkinson, 2005). The final Caribbean GMPEs

included a variation of the anelastic Q model. This Q variation and resulting variation in the suite of recommended Caribbean GMPEs is intended to capture the range in ground motions from the noted variation in the crust in the region and is consistent with the GMPEs used for the EPRI - Seismicity Owners Group (EPRI-SOG) seismic sources.

Based on review of the response and the fact that the GMPEs included a range of values to account for variation in the crust in the Turkey Point Units 6 and 7 site region, the staff finds that the applicant explained how crustal variations are accounted for. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 02.05.01-10, resolved.

Regional Physiography and Geomorphology

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.1, the applicant described regional physiography and geomorphic processes. In this section, the staff focused on the applicant's characterization of carbonate dissolution processes and features on the Florida Platform because subsurface open cavities and karst could impact site safety from the perspective of surface deformation hazard.

Limestone Dissolution in Southern Florida

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.1.1 describes limestone dissolution features within the site region and the Turkey Point Units 6 and 7 site vicinity, including: the dry caves along the Atlantic Coastal Ridge; the vegetated surface depressions (solution sinkholes) at the Turkey Point Units 6 and 7 site; zones of secondary porosity in the Miami/Key Largo limestone formations and the deeper Fort Thompson Formation (touching vug and moldic porosity) beneath the Turkey Point Units 6 and 7 site; freshwater springs in Biscayne Bay; the paleo-sinkholes at Jewfish Creek and the submarine paleo-sinkhole in the Key Largo National Marine Sanctuary; and submarine paleo-sinkholes in Biscayne Bay (Figure 2.5.1-6). The applicant described the different processes that led to the development of these features. The staff notes that the processes that impact the Turkey Point Units 6 and 7 site vicinity include freshwater/saltwater-mixing zones in the water table aquifer, surficial rainwater dissolution, and deep pore water upwelling from the confined Floridan Aquifer.

The staff issued several RAIs (Question 02.05.01-1, Question 02.05.01-2, and Question 02.05.01-37), discussed in detail in the following paragraphs, regarding limestone dissolution in the site region and vicinity based on: review of material in the Turkey Point Units 6 and 7 COL FSAR, including referenced publications; RAI responses from the applicant; independent review of publications not previously included in the Turkey Point Units 6 and 7 COL FSAR; and questions arising from the site visits. In response, the applicant provided more detail in the Turkey Point Units 6 and 7 COL FSAR, completed additional field work at the site and submitted supplemental reports including Turkey Point Units 6 and 7 COL FSAR Appendix 2.5AA titled "Potential for Carbonate Dissolution and Karst Development at the Turkey Point Units 6 and 7 site" and Turkey Point Units 6 and 7 COL FSAR Enclosure 9 titled "Surficial Muck Deposits Field and Laboratory Investigation Data Report"

1. Sinkhole Types

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.1.1.1 provides a classification of Florida sinkhole types and ranking of collapse risk based on geographic distribution of known sinkholes (Sinclair and Stewart, 1985). The applicant indicated that for the Turkey Point Units 6

and 7 site, sinkholes are typically solution sinkholes. The staff independently reviewed Sinclair and Stewart (1985) and notes that solution sinkholes occur where limestone is exposed at the ground surface or is covered with only a thin veneer of unconsolidated material. Dissolution comes from rainfall that soaks into the ground and slowly dissolves the limestone, resulting in generally lowering the elevation of the landscape. In places, perhaps underlain by fractures or jointing, shallow, bowl-shaped depressions form that are typically filled with peat deposits and supporting vegetation distinct from surrounding sawgrass savannahs as shown on Figure 2.5.1-7. Photo compilation of vegetated surface depressions and discussed in Section 2.5.1.4.2 of this evaluation. The staff reviewed Sinclair and Stewart (1985) and notes that areas in central and northern Florida contain cover collapse and cover subsidence sinkholes (distinguished from solution sinkholes) formed from dissolution at the water table/vadose zone interface beneath more substantial, unconsolidated clastic/organic cover layers. The dissolving water is derived from local rainwater percolating through a relatively thick vadose zone, forming significant open cavities at or near the water table interface. Based on the material from the Turkey Point Units 6 and 7 COL FSAR and the staff's independent consideration of Sinclair and Stewart (1985) staff agrees with the applicant that this type of sinkhole is not found in the Turkey Point Units 6 and 7 vicinity with the possible exception of the features at Jewfish Creek and Key Largo.

2. Mixing Zones

The staff noted that there is a different mechanism or process of carbonate dissolution in coastal areas that is linked to mixing disequilibria at freshwater-brine interfaces (i.e., where the freshwater lens contacts saltwater in the Biscayne Bay aquifer). A zone of brackish water forms in the contact area that is under-saturated with respect to calcium carbonate. This was not discussed in the earlier versions of the Turkey Point Units 6 and 7 COL FSAR. Therefore, in RAI 41, Question 02.05.01-1, the staff asked the applicant to discuss any evidence for the potential of limestone dissolution associated with freshwater/saltwater interfaces in southern Florida, and to specifically consider the linking of open, water-filled passages in the subsurface to sub-sea springs in Biscayne Bay that may have formed from past freshwater/saltwater interfaces. The staff also asked the applicant to discuss how freshwater/saltwater mixing zones of dissolution would be expected to migrate in response to sea-level changes.

In an October 3, 2014, response to RAI 41, Question 02.05.01-1 (ADAMS Accession No. ML14282A073), the applicant explained that seawater saturated with calcium carbonate contains far less mass than fresh groundwater saturated with calcium carbonate, and the mixing waters become under-saturated with respect to calcium carbonate and thereby promote the dissolution of carbonate rock. The freshwater/saltwater interface within the Biscayne Aquifer is located approximately 9.6 km (6 mi) inland from the site (Turkey Point Units 6 and 7 COL FSAR Figure 2.4.12-207) and groundwater at the site is saline (Lanevin, 2001). Current groundwater withdrawals from constructed drainage canals and pumping from the freshwater aquifer for agriculture and urban population use has contributed to inland migration of the freshwater/saltwater interface. Furthermore, the

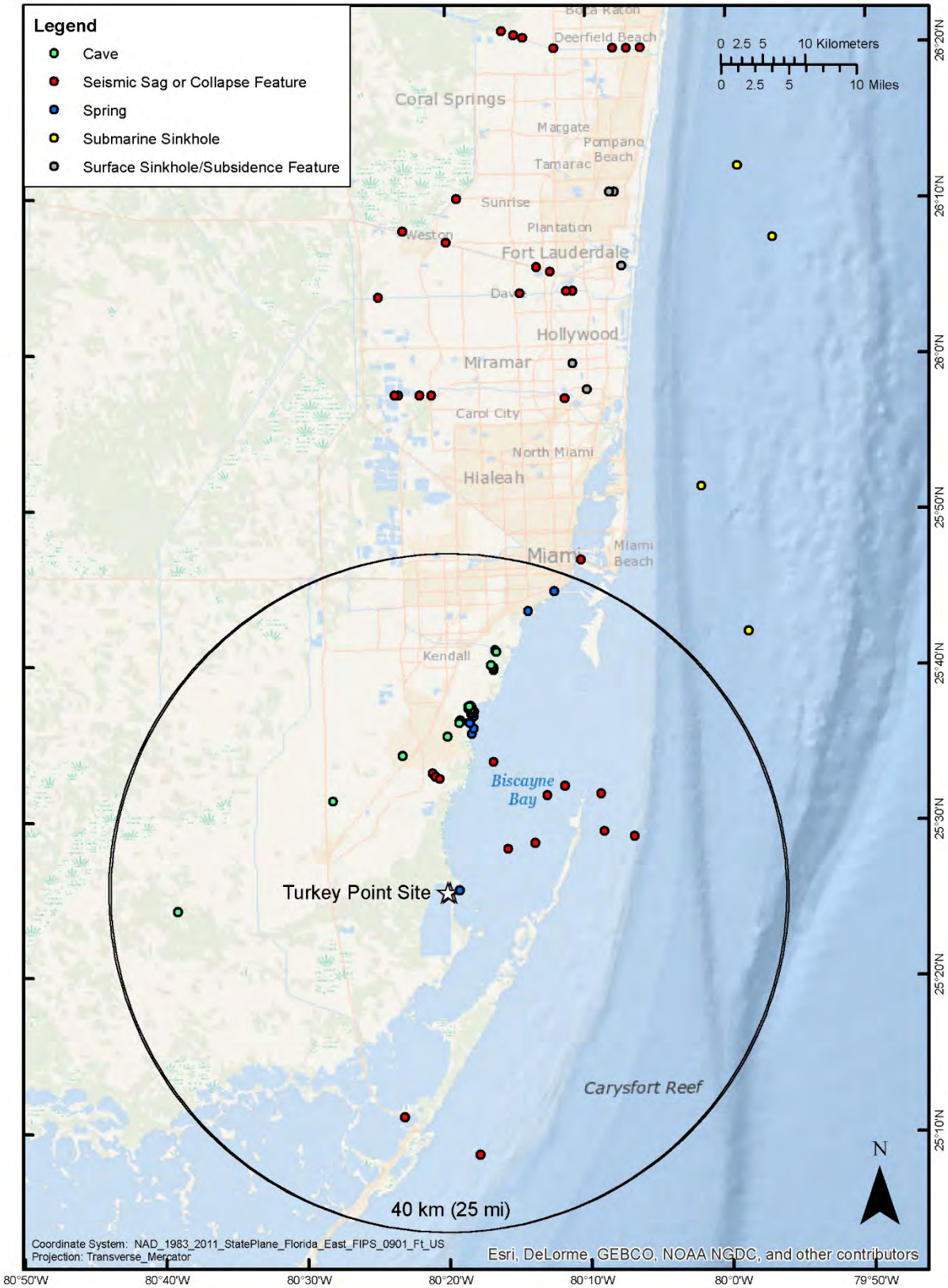


Figure 2.5.1-6. Map of karst features in the Turkey Point Units 6 and 7 site vicinity

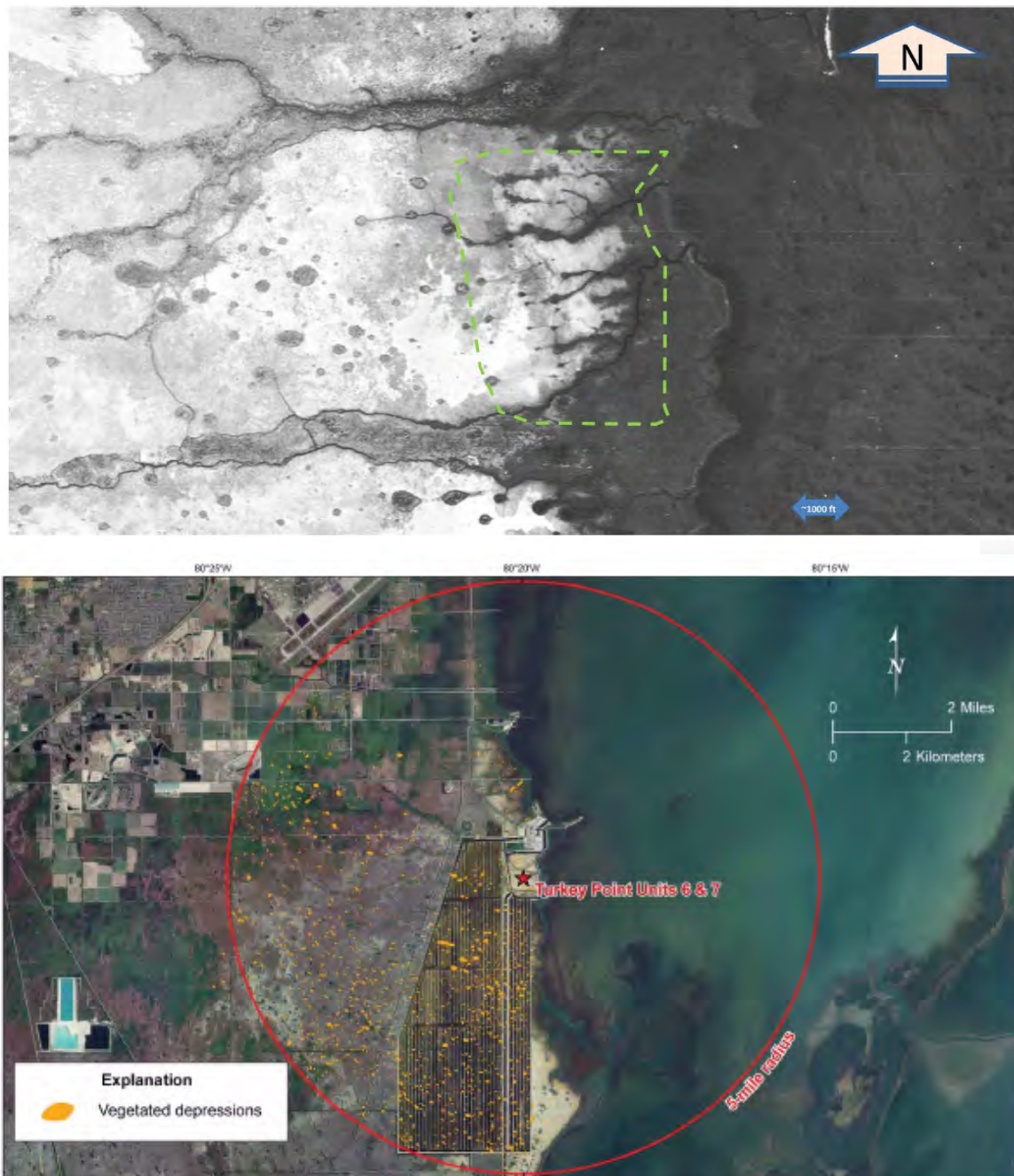


Figure 2.5.1-7. Photo of vegetated surface depressions in the site and site area.

long-term sea-level rise trend at Miami Beach, FL, currently estimated at 0.2 m (0.78 ft) per century, will increase the ocean hydrostatic head and move the freshwater/saltwater interface further inland and away from the site.

The applicant explained that dissolution features associated with mixing zones might occur at groundwater discharge sites and seafloor discharge zones. The applicant described freshwater springs on the floor of Biscayne Bay as a manifestation of a freshwater aquifer discharge zone driven by an inland hydraulic head. Dissolution of carbonate rock occurs along the aquifer flow path, where fresh and seawater mix. Before drainage canals were built and prior to substantial lowering of groundwater levels in southeast Florida, fresh groundwater discharged along the shoreline and offshore as submarine springs. The groundwater flow conduits still exist as dissolution features within the Biscayne Aquifer. However, due to current diminished aquifer flow and saline conditions, freshwater springs in the Bay are not active. The applicant also suggested that the 20 caves in Miami-Dade County along the flanks of the northeast trending Atlantic Coastal Ridge, located west of the Turkey Point Units 6 and 7 site (Cressler, 1983) are channels of past groundwater flow formed in a mixing zone along the paleo-shoreline of the coastal ridge.

The applicant concluded that there is no current fresh groundwater mixing with saltwater in the Biscayne Aquifer and, therefore, the mechanism necessary to form solution cavities does not appear to be active at or near the site.

The staff notes that the applicant, in response to RAI 41, Question 02.05.01-2 (ADAMS Accession No. ML14282A073) (discussed in more detail below), concluded that the zones of secondary porosity, found in the subsurface at Turkey Point Units 6 and 7 site, are the result of former mixing zone dissolution (now inactive). The staff also notes that groundwater discharge sites near the Turkey Point Units 6 and 7 site include freshwater drainage canals and outfalls, the closest of which are the Model Land Canal (C107) outfall, approximately 8 km (5.0 mi) south of the site, and the Florida City Canal outfall, approximately 1.9 km (1.2 mi) north of the site. The staff agrees with the applicant's characterization that there are mixing zone features in the site vicinity but these are derived from previous conditions and they are not actively forming now.

3. Zones of Secondary Porosity at the Turkey Point Units 6 and 7 Site

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.4 describes subsurface limestone dissolution features in the Key Largo Limestone and in the Fort Thompson Formation as zones of secondary porosity. These intervals have been identified via down-hole televiewer, caliper logs and rod drops. The upper zone at the contact between Miami and Key Largo Limestone will be removed during construction. The zone in the Fort Thompson Limestone is beneath the bearing layer for SCC buildings. In RAI 41, Question 02.05.01-2, the staff asked the applicant to discuss the origins of the subsurface secondary porosity.

In an October 3, 2014, response to RAI 41, Question 02.05.01-2, the applicant explained that two zones of secondary porosity are found beneath the site; near the contact of the Miami and Key Largo Limestones and in the Fort Thompson Formation. The zones of secondary porosity provide preferential conduits for groundwater flow. The applicant suggested that micro-karst formed by solution enlargement of primary sedimentary structures as fresh groundwater flowing from inland areas, mixed with sea water (mixing zone disequilibria), and dissolved carbonate rock as it flowed through the zones to the sea. The staff notes that groundwater within the

Biscayne aquifer, where both zones of secondary porosity are located, is currently saline and thus not conducive to further dissolution of the limestone host rock.

The applicant described two categories of secondary porosity: touching-vug porosity and moldic porosity. Touching-vug porosity occurs at the Turkey Point Units 6 and 7 site within the approximate depth interval of 6.1 to 10.7 m (20 to 35 ft) near the contact of the Miami and Key Largo Limestones as a result of solution enlargement of burrows, inter-burrow vugs, moldic fossils, root molds, and vugs between root casts. Drilling and coring during the site subsurface investigation show the zone of touching-vug porosity to be a laterally continuous zone of interconnected voids that are generally of centimeter scale with very few indications of larger voids such as those that could cause a rod drop (Figure 2.5.1-8). The staff notes that this zone will be completely removed during excavation of the nuclear island foundations.

Moldic porosity occurs at the Turkey Point Units 6 and 7 site in pockets within the approximate depth interval of 18.3 to 22.8 m or (60 to 75 ft), within the Fort Thompson Formation. Moldic porosity results from the dissolution of fossil shells and organic structures rather than the enveloping matrix rock. Void spaces of less than centimeter scale are located within shell molds. Drilling and coring during the site subsurface investigation within the zone of moldic porosity indicates that the zone is not laterally persistent, but exists in isolated sandy pockets with few indications of larger voids.

The staff notes that geologic features such as zones of secondary porosity, fractures, bedding planes and voids can provide potential pathways for water to flow. The staff notes that the applicant will construct a grouted zone for construction groundwater control and constraint of open voids, via grout injections into the rock mass between the bottom of the excavation at -10.7 m (-35 ft) and -33.5m (-110 ft) elevation in the Key Largo and Fort Thompson Formations. In Part 10 of the Turkey Point Units 6 and 7 COL FSAR Appendix B Table 3.8-6, the applicant provided a grouting ITAAC that establishes a set of actions and criteria for the grouting activity necessary to provide assurance that, when met, the stability of Category I structures are in conformance with the combined license (refer to SER Section 2.5.4.2.5).

The staff considered the characterization of mixing zone dissolution of limestone in the site vicinity provided by the applicant and concludes that the response adequately describes the dissolution process and the features likely associated with that process, namely the zones of secondary porosity in the subsurface units, the springs in Biscayne Bay and the caves along the coastal ridge. The staff agrees that there are mixing zone features in the site vicinity but these are derived from previous conditions and the features are not actively forming now. Accordingly and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Questions 02.05.01-1 and 02.05.01-2 resolved.

The applicant proposed a revision to the Turkey Point Units 6 and 7 COL FSAR to include portions of RAI 41, Questions 02.05.01-1 and -2 responses. The applicant's proposed revisions to the Turkey Point Units 6 and 7 COL FSAR are found in the response to RAI 41, Question 02.05.01-17 (not Questions 02.05.01-1 or -2). The staff finds the proposed revisions acceptable and has confirmed that these changes have been incorporated into the Turkey Point Units 6 and 7 COL FSAR.



Figure 2.5.1-8. Photograph of core boring from the Key Largo Formation taken during NRC site audit at the Turkey Point Units 6 and 7 site

4. Key Largo Paleo-sinkhole

The applicant described a large, offshore paleo-sinkhole in Key Largo Marine Sanctuary (Shinn et al., 1996) approximately 13 km (8 mi) south of the site. The sinkhole is sediment-filled, with little bathymetric expression, about 600 m (1,970 ft) in diameter and at a depth likely to exceed 100 m (328 ft). The oldest Radiocarbon age from the bottom sample at 54.5 m (179 ft) is 5,650 +/-90 years before present, and the youngest age (just below the overlying carbonate sand cap) is 3,260 +/-60 years before present. The staff notes that the sediment infilling of this sinkhole is geologically recent, within Holocene time. The applicant concluded that the Key Largo sinkhole was formed through shoreline flow under freshwater/saltwater mixing zone conditions, and since these mixing zone conditions no longer exist in this location, development of cavernous limestone is unlikely at this site. However, because of the large dimensions of this sinkhole, especially the depth, the staff concludes that this feature might be an expression of hypogenic dissolution.

5. Deep Pore Water Upwelling

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.1.1 introduces the concept of deep pore water upwelling as one type of submarine groundwater discharge where fresh groundwater

flows 'beyond the shoreline on the continental shelf through deeper confined permeable shelf sediments and rocks driven by buoyancy and pressure gradients'. The applicant provided two examples of this: submarine paleo-karst sinkholes beneath Biscayne Bay (approximately 13 km [8 mi] northeast of the site); and Crescent Beach Spring and Red Snapper Sink (approximately 320 km (200 mi) north of the site). The applicant also stated in the response to RAI 41, Question 02.05.01-1, that "deep pore water upwelling generally occurs well off shore, where the slope of the shelf is steeper and erosion of this thickness of confining sediments is more likely." The applicant concluded that carbonate dissolution associated with deep pore water upwelling from the Floridan Aquifer is not likely to pose a threat of surface collapse or sinkhole hazard at the site. The staff notes that there are 12 features in Biscayne Bay, described as seismic sags in Cunningham and Walker (2009) and Cunningham et al. (2012) that are interpreted as hypogenic dissolution. In addition, the staff notes that the seismic sags in Biscayne Bay are actually near-shore examples (not out on the shelf break) that likely represent a hypogenic karst mechanism (Klimchouk, 2009), rooted in the Floridan Aquifer that might affect the Turkey Point Units 6 and 7 site. This type of dissolution was not previously described in the Turkey Point Units 6 and 7 COL FSAR.

6. Hypogenic Dissolution

For the staff to have a complete understanding of all likely limestone dissolution processes that might impact the Turkey Point Units 6 and 7 site, the staff independently reviewed several southern Florida investigations that pertain to limestone dissolution in coastal areas that were not previously included in the Turkey Point Units 6 and 7 COL FSAR. The staff reviewed and considered the interpretations in Klimchouk (2009), who describes the process and features associated with hypogenic speleogenesis worldwide. Then the staff considered the correspondence of dissolution features identified in southern Florida within the site vicinity and the Keys as described by various researchers such as: Cunningham and Walker (2009), Cunningham et al. (2012), Land and Paull (2000), Land et al. (1995), and possibly a feature at Jewfish Creek (Technos, 2009). Klimchouk (2009) describes hypogenic speleogenesis, or cave formation, as occurring in confined to semi-confined groundwater conditions with recharge coming from deeper confined aquifers and moving vertically upward through aquifer and overlying confining units. The dissolving mechanisms including both physical and chemical conditions. This process forms vertically stacked or chimney-like voids; is active over large spans of geologic time and can reactivate.

The staff reviewed Land et al. (1995), which describes a Quaternary-aged, large, deep sinkhole offshore Key West on the edge of the Portales Terrace that formed under persistent submarine circumstances as hypogenic karst. Land and Paull (2000) located and investigated several more sinkhole-like features offshore along the entire stretch of the Florida Keys to Miami. The authors interpreted these features as hypogenic karst rooted in the Floridan aquifer, some likely active today. These features have diameters that range from about 350 to 960 m (1,148 to 3,150 ft) and vertical dimensions of about 31 to 260 m (101 to 853 ft). The staff notes that the applicant did not include these features in the FSAR discussion of deep porewater upwelling. More recently and close to the Turkey Point Units 6 and 7 site, Cunningham and Walker (2009) describe 12 seismic sags, capped by Miocene strata, in Biscayne Bay and the shelf margin, interpreted to be collapsed paleocaves or paleocave systems formed by hypogenic dissolution processes. These features range between 355 and 2,479 m (1,165 and 8,133 ft) in diameter and at least 730 m (2,395 ft) vertically. The staff also reviewed the Technos (2009), "Geophysical Survey for Karst Characterization at Proposed Units 6 and 7 Turkey Point Nuclear Power Plant," Appendix A, that describes a filled sinkhole at Jewfish Creek, within 16 km (10 mi) of the Turkey Point Units 6 and 7 site. This sinkhole is about 579 m (1,900 ft) across and

estimated to be more than 183 m (600 ft) deep, based upon seismic reflection and microgravity data. Borings and geophysical logging indicated open cavities within this paleocollapse feature up to 2.7 m (9 ft) in diameter. The staff notes that a 183 m (600 ft) deep sinkhole is far deeper than typical cover collapse sinkholes found in central and northern Florida and well below the -107 m (-350 ft) sea-level lowstand from Late Pleistocene glacial maxima.

Because of the staff's concern regarding the possibility of hypogenic dissolution in the Turkey Point Units 6 and 7 site vicinity and area, the on February 18, 2015 staff asked the applicant in RAI 81, Question 02.05.01-37 (ADAMS Accession No. ML15050A155), to (a) provide more details regarding the sinkhole at Jewfish Creek, (b) provide a discussion of hypogenic dissolution processes in southern Florida and include features in the site vicinity such as the seismic sags in Biscayne Bay, and (c) provide a map showing locations of all limestone dissolution features found in the Turkey Point Units 6 and 7 site vicinity.

In a May 18, 2015, response to RAI 81, Question 02.05.01-37, Part a, (ADAMS Accession No. ML15142A463) the applicant described the data available for characterizing the Jewfish Creek and adjacent shallow marine Lake Surprise karst features available in the five Technos reports issued from 1995 through 2009. The features are located 27 km (17 mi) south of the Turkey Point Units 6 and 7 site. Based on geotechnical borings with geophysical logs, seismic reflection surveys (high resolution as well as deep seismic reflection), microgravity surveys, and analysis of aerial imagery to support design work for the Jewfish Creek Bridge, Technos identified seven discrete collapse structures beneath Jewfish Creek and Lake Surprise, filled with sediments from overlying materials. The structures are associated with vertical, closely spaced, enlarged dissolution joints. Technos modeled the data, locating the collapse within the Arcadia Formation. Subsidence in overlying, dipping layers is interpreted as shallow as 21 m (70 ft), possibly into the Fort Thompson and Key Largo Formations. Technos concluded that the features were not actively forming features although no specific basis was provided for this conclusion. Since the bridge was completed in May 2008, no structural damage or differential settlement has been reported. The staff asked the applicant if the Jewfish Creek feature was an indication of hypogenic dissolution. Although Technos Inc. never suggested a formation mechanism, the applicant suggested two causative mechanisms for the collapse features: either epigenetic or eogenetic or a combination of both.

The staff notes that epigenetic dissolution occurs at or near the water table because of fresh rainwater dissolving limestone as it percolates through the vadose zone. Examples are the commonly known sinkholes of northern Florida. Eogenetic dissolution occurs along the freshwater/saltwater interface in a shallow coastal marine setting, typically in the water table aquifer, due to carbonate under-saturation in the mixed zone.

The applicant compared the Jewfish Creek feature with the collapse structures in Biscayne Bay and onshore Miami-Dade County. The applicant stated that the collapse structures at Jewfish Creek/Lake Surprise are not entirely inconsistent with the narrow seismic sag features described by Cunningham and Walker (2012); Reese and Cunningham (2014) and Cunningham (2013, 2014, and 2015). However, the seismic sag features are generally vertically stacked (multi-storied) and are not closely spaced or distributed horizontally as is the case at Jewfish Creek/Lake Surprise. Furthermore, the applicant stated that the Jewfish Creek/Lake Surprise feature and the nearby Key Largo submarine sinkhole (Shinn et al., 1996) appear to have formed in the Pleistocene, coincident with sea-level lowstands. The applicant concluded that given sea-level rise since that time, the Jewfish Creek/Lake Surprise structures are not relevant analogs for active surface collapse near the Turkey Point Units 6 and 7 site.

In response to RAI 81, Question 02.05.01-37, Part b, the applicant cited the description of hypogenic speleogenesis in Klimchouk (2007 and 2009) as dissolution-enlarged permeability (flow) structure development via ascending waters, driven by regional and/or more localized hydraulic potentials or other convective circulation mechanisms (e.g., thermal or density). The upward groundwater flow implies some hydrological confinement rather than surface recharge. Therefore, potential for hypogenic speleogenesis exists in the confined Floridan Aquifer system, which includes the Cedar Keys up to the lower Arcadia formations. The applicant cited Kohout (1967 and 1965), which stated that thermally induced convective circulation (and by inference hypogenic dissolution) was occurring in the Floridan Aquifer system in southern Florida. Meyer (1989) substantiated Kohout convection within the Floridan Aquifer, and suggested that inland flows associated with the circulation pattern were as high as 52 m (172 ft) per year in the early Holocene, but estimated modern Kohout circulation inland flows to be about 1.5 m (5 ft) per year.

The applicant stated that hypogene karst features are not typically seen at the surface because hypogenic dissolution is not associated with meteoric recharge. Therefore, direct (observational) evidence for hypogenic dissolution (i.e., from cave morphology) is not readily available for southeastern Florida, and very few studies from southeastern Florida explicitly address hypogenic dissolution processes as a cave or cavity/void forming mechanism.

The applicant cited Cunningham and Walker (2009) who propose two hypogenic mechanisms to explain structural sags in Biscayne Bay and the Atlantic Ocean: (1) upward groundwater flow via Kohout convection and subsequent carbonate dissolution by mixed fresh and saline waters, and (2) upward flow and dissolution from hydrogen-sulfide-rich groundwater, sourced from calcium sulfates in deeper Eocene (or Paleocene) age rocks. Cunningham and Walker (2009) also suggested that upward flow and dissolution via Kohout convection was responsible for the submarine sinkholes on the Portales and Miami terraces. However, the applicant stated that Cunningham and Walker (2009) did not present tangible evidence to support a hypogenic origin for these mechanisms. The applicant concluded that a hypogenic dissolution mechanism is not required to explain the collapse structures in Biscayne Bay and onshore Miami-Dade County or the Jewfish Creek/Lake Surprise collapse complex, but it cannot be ruled out as a formative mechanism.

The staff considered what the applicant concluded regarding the seismic sags and compared that to what others concluded (Cunningham, 2015; Reese and Cunningham, 2014; Cunningham et al., 2012; Cunningham and Walker, 2009). The staff acknowledges that both conclusions are possible alternatives, but considers that these features are likely hypogenic dissolution, in whole or in part, because: (1) the physical characteristics of the structural features compare favorably to Klimchouk's description of hypogenic dissolution systems, and (2) Cunningham et al. (2009) presents striking seismic reflection images of deep seated, vertically stacked, chaotic, truncated and broken reflectors within the Floridan Aquifer. Cunningham (2015) continues subsurface exploration (seismic reflection, drill hole and borehole tele-viewer data) to conclude that these karst collapse features are common structural features beneath southeastern Florida in the Floridan Aquifer, and that they range from about 122 m (400 ft) to 4.8 km (3 mi) in diameter (Figure 2.5.1-9).

In response to the staff's question about the timing and reactivation potential of hypogenic dissolution, the applicant stated that Cunningham and Walker (2009) suggested that Kohout circulation and hypogenic speleogenesis were likely initiated in the Eocene, and at least one structure indicates four cave formation and collapse cycles in middle Eocene to middle Miocene rocks. Deformation associated with the structural sags does not seem to extend beyond

(above) the Oligocene to Miocene age Arcadia Formation. The applicant identified one collapse feature extending upward into the Peace River and Tamiami formations located below the North New River and Hillsboro canals, located approximately 77 and 101 km (48 and 63 mi) from the site (Reese and Cunningham, 2014). It is possible then that cave formation and/or collapse deformed rock units as young as the Pliocene.

In reviewing these papers, the staff notes that the extent of collapse structures revealed in these data appears to be mostly limited to the upper Floridan Aquifer. Stratigraphically, these features appear to be capped by the upper contact of the Arcadia Formation with the overlying Peace River Formation (Miocene). This stratigraphic interval is positioned about 450 ft (137 m) below the surface at the Turkey Point Units 6 and 7 site. However, in Broward County, the staff observe one seismic sag that extends beyond the top of the Arcadia Formation into the Peace River Formation in a seismic reflection image (Reese and Cunningham, 2014).

The staff also notes that in response to RAI 82, Question 02.05.04-26 (ADAMS Accession No. ML14282A079), the applicant will develop a grouting program based on its test program for the subsurface beneath the nuclear island for dewatering and constraining open voids in the Key Largo and Fort Thompson Formations. The applicant will also perform analyses to confirm that this grouting will result with the condition that any remaining potential voids would not impact the safety of any Category I structure. The staff's evaluation of this plan and the associated ITAAC are in SER Section 2.5.4.4.4. In addition, for the depth of the subsurface explorations for safety related foundations, RG 1.132, "Site Investigations for Foundations of Nuclear Power Plants," Appendix D, "Spacing and Depth of Subsurface Explorations for Safety-Related Foundations," states that, "Where soils are very thick, the maximum required depth for engineering purposes, denoted d_{max} , may be taken as the depth at which the change in the vertical stress during or after construction for the combined foundation loadings is less than 10% of the effective in situ overburden stress." Staff further noted that in an October 3, 2014 response to RAI 6006, Question 02.05.04-19 (ADAMS Accession No. ML14283A312), the applicant provided a PLAXIS 3D finite element analysis that incorporates advance constitutive models (stress vs. strain relationship) that simulates the response of soils to external loading for construction sequence. The applicant used an analysis depth of El. -450 feet, which is greater than 2B (B is equal to the least dimension of the foundation), and assumed it to be adequate to meet the aforementioned RG 1.132 criterion. The applicant results indicated that the changes in effective vertical stresses are less than 10 percent of the effective in situ stress for each phase of the construction sequence, demonstrating that the model depth is appropriate and in compliance with RG 1.132 criterion. The staff's evaluation of this RAI response is in SER Section 2.5.4.4.10. As such, the staff accepts the applicant's conclusion for RAI 81, Question 02.05.01-37, Parts a and b.

In response to RAI 81, Question 02.05.01-37, Part c, the applicant provided two new figures to illustrate the various limestone dissolution features in the Turkey Point Units 6 and 7 site vicinity and beyond as discussed in the RAI responses. In a July 15, 2009 response to RAI 85, Question 02.05.01-39 (ADAMS Accession No. ML15198A060), the applicant provided a table of coordinates of all limestone dissolution features in the site vicinity and beyond to include the Florida Keys.

The staff accepts the applicant's response for RAI 81, Question 02.05.01-37, Parts a, b and c as indicated in preceding paragraphs. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 81, Questions 02.05.01-37 and -39, resolved. The applicant provided a proposed COL revision to include portions of the RAI 81, Question 02.05.01-37, response in a future revision of the Turkey Point Units 6 and 7 COL FSAR. The staff finds the

proposed revisions acceptable and has confirmed that these changes have been incorporated into the Turkey Point Units 6 and 7 COL FSAR.

Marine Terraces and Ridges in Florida

Turkey Point Units 6 and 7 COL FSAR Subsection 2.5.1.1.1.1.1 describes a statewide model and maps of marine terraces in the State of Florida (Turkey Point Units 6 and 7 COL FSAR Table 2.5.1-203). More recent studies refined the ages of previously mapped marine terraces in Florida, particularly the Pleistocene record of marine terrace development in southern Florida and the Florida Keys. Turkey Point Units 6 and 7 COL FSAR Table 2.5.1-203, "Florida's Marine Terraces, Elevations, and Probable Ages," characterizes nine marine terraces in Florida; however, the staff notes that the source of these data is 40 years old. In RAI 41, Question 02.05.01-4, the staff asked the applicant to provide more recent information regarding the age and elevations of southern Florida's marine terraces to characterize regional and local geomorphology and integrate these features with sea-level history through past interglacial periods.

In an October 3, 2014, response to RAI 41, Question 02.05.01-4 (ADAMS Accession No. ML14282A073), the applicant explained that the marine terraces of southern Florida, once thought to be the direct result of sea-level fluctuations through the last glacial cycles, are now understood to be a result of complex interactions between sea-level oscillation, sub-aerial exposure, precipitation karstification, and isostatic uplift. The Miami and Key Largo limestones, along with the coastal terraces and ridges, preserve the record of Pleistocene sea-level changes in southern Florida including periods of sub aerial exposure and isostatic uplift.

The applicant described a model (Adams et al., 2010) of two coastal terraces and one ridge along the Atlantic shoreline of northern Florida that were determined to be Pleistocene aged based on the ages of sea-level highstands, lithospheric uplift as a result of decrease in bulk crustal density due to precipitation karstification and the elevations of the terraces and ridge. The applicant described the ages of cores recovered from sites in the Florida Everglades that revealed at least ten separate sea-level highstands within the Pleistocene, one of which is the youngest Pleistocene sub aerial exposure in the Florida Keys and represents peak sea level of the last interglacial substage QE5 (Hickey et al., 2010) (Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-377).

Based on review of the applicant's response that included several new investigations, maps and correlation tables of sea-level oscillations and ages of morphostratigraphic units, the staff finds that the applicant sufficiently explained the ages of geomorphic features in southern Florida. Accordingly, in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-4 resolved.

The applicant proposed to include portions of the response to RAI 41, Question 02.05.01-4, in a future revision of the Turkey Point Units 6 and 7 COL FSAR. The staff finds the proposed revisions acceptable and has confirmed that these changes have been incorporated into the Turkey Point Units 6 and 7 COL FSAR.

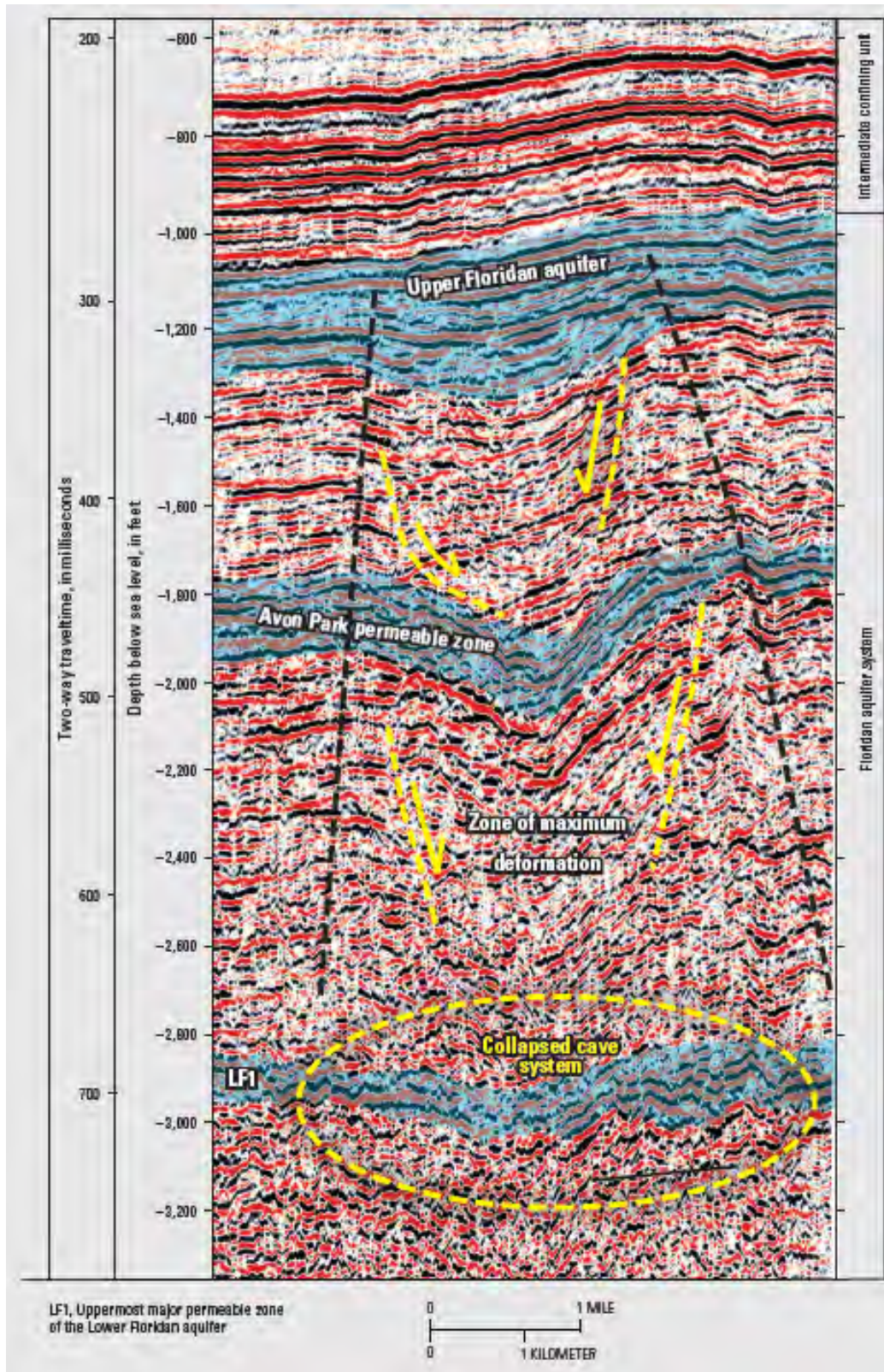


Figure 2.5.1-9. Cunningham (2015) Seismic Sag structure

Regional Stratigraphy

Turkey Point Units 6 and 7 CO FSAR Section 2.5.1.1.1.2 describes regional stratigraphy in the site region covering Florida, the Bahamas Platform, and Cuba. The staff focused the review on the Cenozoic stratigraphy of Florida, which includes the peninsula, the platform, and the offshore continental slope and shelf. The staff focused in particular on the Quaternary and Holocene stratigraphy.

Florida Stratigraphy

1. Quaternary Formations

The applicant described Quaternary formations in southern Florida including the Pliocene-Pleistocene Thompson Formation with the overlying Pleistocene Key Largo Limestone. The Key Largo Limestone is the highly porous, permeable, and part of the Biscayne surficial aquifer system. The Pleistocene Miami Limestone, which overlies the Key Largo Limestone, is the uppermost Quaternary unit in the Site area and is mostly marine limestone.

2. Holocene Sediments

The staff focused its review of Florida stratigraphy on the youngest units in the site region. Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.2.1.1 states that the Holocene sediments in Florida occur near the present coastline at elevations generally less than 1.5 m (5 ft) above sea level. Because of the scouring effect of hurricanes in southern Florida, Holocene sediment sequences are preserved only in protected depositional environments. The applicant described the Holocene record of southern Florida based on: deposits preserved in Blackwater Bay on the southwest Gulf coast of Florida; deposits preserved in Sarasota Bay and Little Sarasota Bay on the west-central Gulf coast of Florida; deposits preserved in Whitewater Bay near Cape Sable, on the southern tip of Florida; and the hurricane-disrupted deposits of Biscayne Bay, on the southeastern coast of Florida. In RAI 41, Question 02.05.01-7 (ADAMS Accession No. ML11293A202) dated October 20, 2011, the staff asked the applicant to provide a figure that illustrates the location of these deposits. In an October 3, 2014 response to RAI 41, Question 02.05.01-7 (ADAMS Accession No. ML14282A073), the applicant provided a map showing the distribution around the southern tip of Florida where these study sites are located with respect to the Turkey Point Units 6 and 7 site. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-7, resolved.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.2.1.1 indicates that the general history of sea-level transgression and regression during the Holocene is based on deposits preserved in Blackwater Bay on the southwest Gulf coast of Florida and that a significant sediment layer (Unit D) (1000–1090 years before present) is found in all these cores at the same elevation, and that this may be the result of a storm deposit or series of storm deposits. In RAI 41, Question 02.05.01-6 (ADAMS Accession No. ML11293A202) dated October 20, 2011, the staff asked the applicant to provide more detail to confirm that these deposits are storm deposits rather than a Holocene tsunami deposit.

In an October 3, 2014 response to RAI 41, Question 02.05.01-6 (ADAMS Accession No. ML14282A073), the applicant stated that there are no reliable sedimentological criteria for distinguishing paleo-tsunami and paleo-storm deposits in various environments, as both can generate identical depositional processes and related sedimentary features. Southern Florida

Holocene sediment sequences are preserved only in protected depositional environments (i.e., in areas that have a dense mangrove forest), and the Turkey Point site does not have that protected depositional environment, therefore, erosion (wave action) would have likely removed any “paleostorm” deposit(s). Studies by Tuttle et al. (2004), Morton et al. (2007), and Lowery (2002) in southwest Florida, in protected Blackwater Bay, identified a Unit D sediment layer. The applicant interpreted Unit D as a possible storm deposit or a series of storms that date 1,090 years before present. The radiometric age dates of the sediments correspond to the Medieval Warm Period. The interpretation is that the warm conditions are associated with increased hurricane activity or a higher frequency of major hurricanes in the tropical North Atlantic and Caribbean Sea.

The staff reviewed the response and notes the lack of dense mangrove forest and the conditions to preserve paleostorm deposits are not present in the Turkey Point Units 6 and 7 area. In regard to paleo-storm or -tsunami deposits in the Holocene deposits at the Turkey Point Units 6 and 7 site, the staff reviewed the Turkey Point Units 6 and 7 site exploration data provided in SER Section 2.5.1.4.2 and concurs that distinguishing paleo-storm from paleo-tsunami is difficult because similar sedimentary features can arise under both conditions. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-6, resolved.

Regional Tectonic Setting

The regional tectonic setting for the Turkey Point Units 6 and 7 site and beyond includes the long standing, stable carbonate/siliciclastic continental margin (Florida Peninsula and Platform and the Bahamas Platform); the complex orogenic terranes of Cuba; the intervening Straits of Florida and Santaren channel; and the complex and distant Caribbean plate boundary. The staff focused its review on the tectonic structures that are within the 320 km (200 mi) radius of the site region, the structures that are the most relevant to the hazard assessment, and the tectonic structures that are potentially Quaternary-aged (Figure 2.5.1-4).

As stated previously, the applicant used the EPRI-SOG model for the PSHA, and developed a unique seismic source model for Turkey Point Units 6 and 7 to include the North American-Caribbean plate boundary and the island of Cuba as an areal source. The northern flank of Cuba is the site of a relict plate boundary from the Eocene and has small to moderate size earthquakes. Cuba also has many mapped faults of various age, some of which might be Quaternary. The staff conducted its own independent literature review of the geology and tectonics of Cuba. This information led the staff to develop several RAIs regarding tectonic setting in Cuba and nearby offshore regions.

Contemporary Stress Regime in Region

The Turkey Point Units 6 and 7 COL FSAR describes the two contemporary stress provinces within the site region: the mid-plate province and the Gulf Coast Province. Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.4 states that the boundary between the mid-plate and Gulf Coast stress provinces terminates in the northern Florida Peninsula, and there is a lack of stress data from areas near the Florida Peninsula and most of Cuba. Because the southern Florida Peninsula does not reveal the salt-rooted normal growth faults associated with the north and northwest portions of the Gulf Coast, the site region is generally interpreted to be part of the mid-plate stress province.

In RAI 41, Question 02.05.01-20, the staff asked the applicant to address questions about boundaries of contemporary stress within the site region between the mid-plate, Gulf Coast stress provinces and the area of Cuba. Specifically, the staff asked the applicant to: (a) address the focal mechanism for the September 2006 Gulf of Mexico earthquake with respect to the Gulf Coast stress province, (b) indicate the boundary between the Gulf Coast and mid-plate stress provinces as currently interpreted, and (c) indicate on a map how the Gulf Coast and mid-plate stress provinces resolve in the vicinity of northern Cuba.

In an October 3, 2014, response to RAI 41, Question 02.05.01-20, Part a, the applicant explained that the Gulf Coast stress province is characterized by northeast-southwest to north-northeast to south-southwest horizontal tension, driven by sediment loading and subsidence of the gulf. The resulting “typical” faults in this regime are down-to-the-gulf growth faults in Cenozoic cover sediments that glide over a weak salt layer, the Louann formation (e.g., Wu et al., 1990). The focal mechanism for the September 10, 2006, Gulf of Mexico earthquake is representative of a thrust fault along a steep northwest-striking fault plane, with a compression principal stress direction oriented at 214° , plunging 19° . The staff notes that this is consistent with the mid-plate stress province of the CEUS, characterized by northeast-southwest compression driven by forces originating at the mid-Atlantic Ridge, rather than the Gulf Coast stress province. The applicant stated that the September 10, 2006, earthquake was produced by basement faulting beneath the Louann salt formation (Angell and Hitchcock, 2007). The earthquake epicenter is at 22 to 31 km (13.6 to 19.2 mi), beneath the 5 to 14 km (3.1 to 8.7 mi) of sedimentary cover in the gulf (with its associated stresses). Therefore, stress orientation on basement faults in the Gulf of Mexico would align with the rest of the CEUS. The original EPRI-SOG seismic source zones within the site region were updated to account for the September 10, 2006, Emb 5.90 Gulf of Mexico earthquake.

In response to part b, the applicant replied that there is little stress data available near the Florida peninsula and Cuba to determine a stress province boundary, and the Florida Peninsula and platform lack the growth fault features characteristic of the Gulf Coast stress province. The applicant stated that the Gulf Coast stress province does not extend to the Turkey Point Units 6 and 7 site region. The staff notes that given the lack of stress orientation data, and Florida and bathymetric features that do not indicate growth fault systems, the extension of Zoback and Zoback’s (1991) Gulf Coast boundary into the Florida Peninsula is not justified and thus agrees with the applicant that there is insufficient evidence to determine the boundary of the stress province.

In response to part c, the applicant stated that based on the absence of growth fault systems they would not interpret the Gulf Coast stress province to extend further south toward Cuba. The applicant also stated that focal mechanisms associated with north Cuba seismicity are lacking, therefore, the applicant concluded that the stress orientation data are inadequate in the site region to reliably determine if stress differences exist between Cuba and the Florida platforms.

The staff concludes that there is insufficient stress orientation data within the Turkey Point Units 6 and 7 site region to justify drawing a distinct boundary between the Gulf Coast and the Mid-plate stress provinces as well as a boundary between Florida and Cuba. In addition, based on the bathymetric character of the Florida platform (no growth fault systems), there is no justification to extend the Gulf coast stress province into the Turkey Point Units 6 and 7 site region. Accordingly and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-20, resolved.

Principal Regional Tectonic Structures

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2 originally stated that the site region has generally recorded only sedimentary processes since Mesozoic rifting, with exception of tectonic activity associated with the collision of the Greater Antilles Arc with the Bahamas Platform during Cretaceous to Eocene (~34 Ma) time. The staff notes that the Walkers Cay fault, the Santaren Anticline, and the Straits of Florida normal faults all occur within the site region and show evidence for post-Eocene tectonic activity. Therefore, the staff asked the applicant in RAI 41, Question 02.05.01-11, to update the discussion to clarify the timing and location of all tectonic features in the site region and place them into the regional tectonic setting. In response to RAI 41, Question 02.05.01-11 (ADAMS Accession No. ML14282A074), the applicant replied with a brief description of each feature and referred to further details in additional RAI responses that are specific to each feature (Questions 02.05.01-14, -15, -16, -34, and -36). The staff provides its evaluation of these structures and features in the following paragraphs.

1. Structures in southern Florida Peninsula

The staff independently sought out and reviewed many publications pertaining to the Turkey Point Units 6 and 7 COL FSAR review and found a recent short paper (Cunningham et al., 2012) that reveals normal and reverse faults in Biscayne Bay and the shelf margin, within 11.3 km (7 mi) of the site, based on approximately 210 km (130 mi) of high-resolution marine seismic data. One of these faults is identified on 5 seismic lines and extends about 16 km (10 mi), striking N, NE (Figure 2.5.1-10). The authors interpret this fault as a vertical normal fault offsetting the top of the Arcadia Formation. The staff notes that the fault projects directly toward the Turkey Point Units 6 and 7 site. Because the fault appears to offset the top of the Arcadia Formation, the age of movement might be as young as early Pliocene (5.3 Ma). The staff also notes that this tectonic structure is not included in the Turkey Point Units 6 and 7 COL FSAR. In RAI 81, Question 02.05.01-36, the staff asked the applicant to discuss this tectonic feature with respect to the Turkey Point Units 6 and 7 site, and integrate the information into the regional tectonic setting. The staff also asked the applicant to address the possibility that the fault is strike-slip and finally to address the possibility that this fault underlies the Turkey Point Units 6 and 7 site, and what impact if any does this have on potential surface deformation.

In a May 19, 2015, response to RAI 81, Question 02.05.01-36 (ADAMS Accession No. ML15156A616), the applicant cited a recent USGS Scientific Investigations Report (Cunningham, 2015) that includes additional information about the fault identified in Biscayne Bay. Cunningham (2015) extends the fault, as uncertain, an additional 30 km (20 mi) northward through a data gap to connect with a possible offset identified in seismic profiles at the Miami-Dade North District Boulder Zone Water Field. Cunningham (2015) now interprets this fault as strike-slip with a characteristic normal, dip-slip component (up to the east), with typically about 12 m (40 ft) of vertical separation. The youngest faulted strata are the Arcadia Formation (Miocene age). The author interprets the top of Peace River and Tamiami formation (Pliocene) strata as unfaulted. Movement on the fault is thus interpreted to be within mid Miocene to early Pliocene, meaning no movement in the last 3.6 Ma.

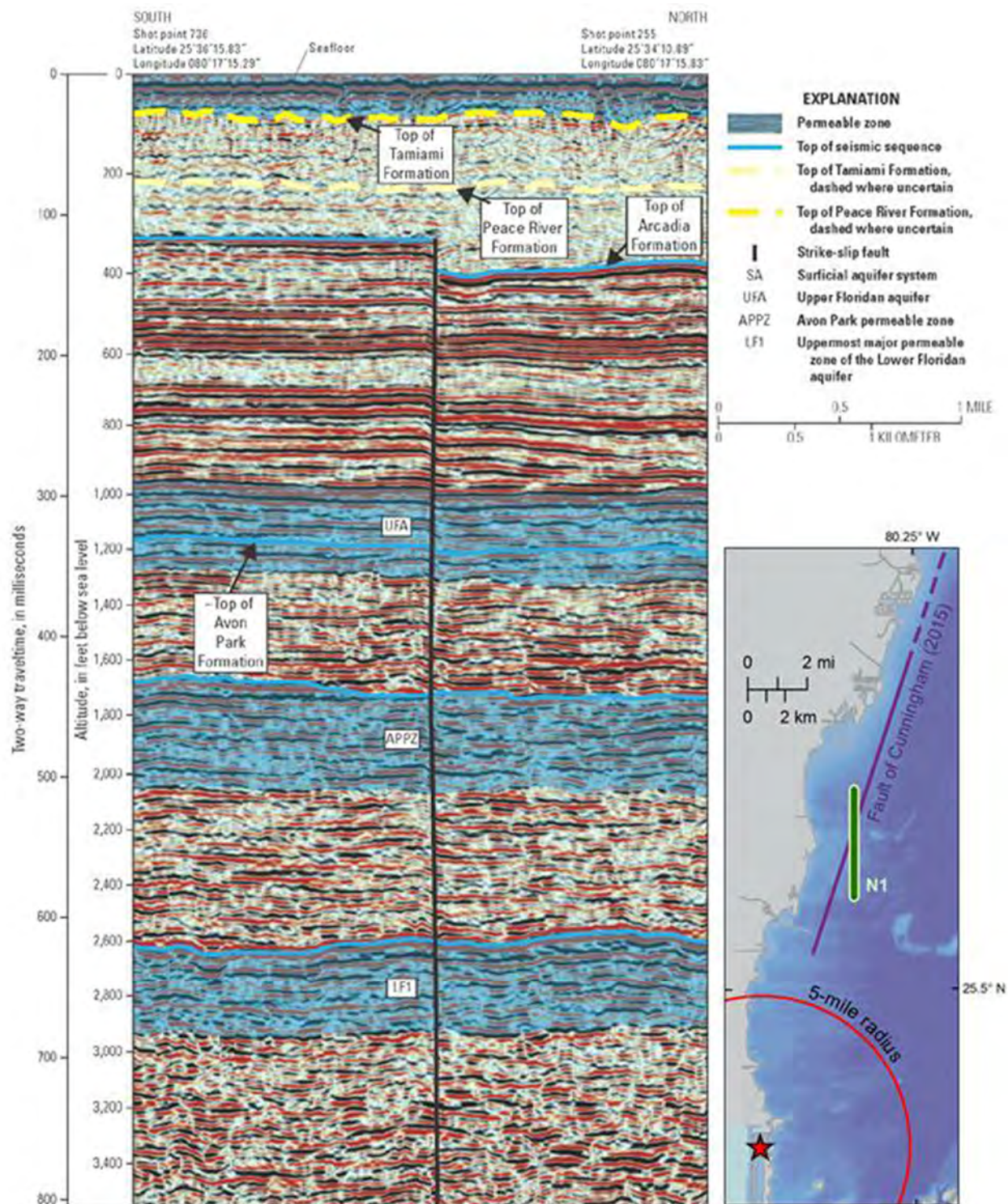


Figure 2.5.1-10. Strike-slip fault (unnamed) in Biscayne Bay (Source: Turkey Point Units 6 and 7 FSAR Figure 2.5.1-393, Cunningham et al., 2012 and Cunningham, 2015).

The applicant acknowledged that insufficient information exists to definitively exclude the possibility that this fault underlies the Turkey Point Units 6 and 7 site. The applicant stated that

Cunningham (2015) indicates the fault does not cut post-Arcadia strata, indicating no movement in the last 3.6 Ma. The applicant also stated that there are no earthquakes associated with the fault trace and no nearby potential Quaternary tectonic structures or capable faults. The applicant concluded that even if the fault underlies the Turkey Point Units 6 and 7 site, it is not a capable tectonic source and does not pose a surface rupture hazard at the site.

The staff notes that pure strike-slip faults will not show offset strata in cross-section, which might be a challenge with determining the final age of movement. However, in the case of this fault, there is a persistent characteristic of a slip component of normal offset in the seismic reflection images. The staff considers that fault movement more recent than 3.6 Ma would also likely reveal some dip-slip offset in younger strata, therefore, the staff concurs with the applicant that fault movement is no younger than about 3.6 Ma.

The staff consider tectonic structures younger than the Quaternary boundary (greater than 2.6 Ma) to be more likely to move or deform in the future than older tectonic structures (SRP 2.5.1), therefore, the staff focus on the technical bases for any conclusion regarding Quaternary tectonic features. This consideration is also rooted in the capable tectonic source definition in RG 1.206 where a structure known to be at least pre-Quaternary, in the absence of other conflicting evidence, can be taken as not a capable tectonic source. The staff notes that Cunningham's seismic reflection images consistently show a fault that does not disturb or deform sediments younger than the Peace River and Tamiami Formations. The staff also notes that the offset on the top of the Arcadia Formation would be positioned about 137 m (450 ft) below the surface of the Turkey Point Units 6 and 7 site. Therefore, the staff concludes that the fault is likely older than Quaternary and is not a surface deformation hazard to the Turkey Point Units 6 and 7 site, a finding in SER Section 2.5.3. The staff examined the earthquake catalog and agrees there is no seismic activity associated with the fault in Biscayne Bay. Therefore, in accordance with 10 CFR 100.23 and 10 CFR 52.79, RAI 81, Question 02.05.01-36, is resolved.

2. Miami Terrace anticline and reverse faults

The staff independently reviewed Cunningham (2015) and observed a tectonic anticline, located east of Miami, on the Miami Terrace, about 48.2 km (30 mi) from the Turkey Point Units 6 and 7 site that has not been previously discussed in the Turkey Point Units 6 and 7 COL FSAR. Cunningham (2015) clearly shows a tectonic anticline with uplifted truncated seismic reflections assigned to the top of the lower Arcadia Formation (Figure 2.5.1-11). Horizontal, buried wave-cut terraces on the flank of the anticline indicate uplift and erosion of the lower Arcadia Formation followed by deposition of late Pliocene or early Pleistocene-age sediments. The author suggests that this compression event is consistent with the timing of tectonic movement of the Santaren anticline, also considered a potential Quaternary structure. The staff also notes that this young tectonic structure is close to the Turkey Point Units 6 and 7 site and has not been previously characterized in the Turkey Point Units 6 and 7 COL FSAR. Therefore, in RAI 85, Question 02.05.01-38, the staff asked the applicant to discuss this tectonic feature with respect to the Turkey Point Units 6 and 7 site, to integrate the feature into the regional tectonic setting for the Turkey Point Units 6 and 7 site COLA, and, finally, to discuss how this feature might affect the PSHA at the Turkey Point Units 6 and 7 site in light of sensitivity analyses completed for the Santaren Anticline and the Walker's Cay fault, 274 and 320 km (170 and 200 mi) from the Turkey Point Units 6 and 7 site, respectively.

In a July 15, 2015, response to RAI 85, Question 02.05.01-38, the applicant replied that Cunningham et al. (2012) and Cunningham (2015) report a group of five reverse faults and an anticline interpreted in seismic-reflection data on the offshore Miami Terrace, north-northeast of

the Turkey Point Units 6 and 7 site. The anticline is 43 km (27 mi) north-northeast of the Turkey Point Units 6 and 7 site and deforms strata through the Oligocene or early Miocene lower Arcadia Formation. The fold introduces approximately 152 m (500 ft) of relief on the top of the Avon Park Formation over a distance of approximately 2.4 km (1.5 mi) along one seismic profile. It is only imaged on one seismic line, therefore, the strike and extent are not determined. The reverse faults are 47 km (29 mi) northeast of the site, two of which offset seismic reflections in middle Eocene-age strata. Cunningham (2015) indicates that the reverse-fault movement occurred sometime within the Oligocene to early Pleistocene. Because the reverse faults were only imaged at one location, the strike and extent of these faults is undetermined.

The staff independently reviewed Cunningham (2015) and notes that he interprets late Pliocene- or early Pleistocene-age overlying sediments that downlap onto and overstep horizontal wave-cut terraces on the top of the lower Arcadia unconformity. He concludes that the contractional uplift and reverse faulting occurred sometime during the Oligocene to early Pleistocene. The staff notes that this indicates the possible age of deformation to be within the Quaternary Period (2.6 Ma to present). The staff also notes that Cunningham (2015) links these structures to the regional tectonic setting in that the timing of uplift and reverse faulting in southeastern Florida postdates intense northerly directed thrust movement during the Cuba orogeny, but may coincide with later possible contractional deformation episodes recorded in the Bahamian foreland of the Cuban Fold and Thrust Belt. Furthermore, Missimer and Maliva (2004) report tectonic folding deformation in southern Florida and attribute that to episodic interactions between the Caribbean and North American plates southeast of the Florida Platform during the late Miocene and early Pliocene. The staff notes that the timing of reverse-fault movement into early Pleistocene is also compatible with the timing of the majority of fold uplift of the Santaren Anticline (Masaferro et al., 1999 and 2002), which is considered by some investigators as part of the Cuban Fold and Thrust Belt and is discussed in the staff's evaluation of RAI 41, Question 02.05.01-15 (Santaren Anticline).

In addressing the staff's question regarding the Miami Terrace structures' effect on the Turkey Point Units 6 and 7 site's PSHA (RAI 85, Question 02.05.01-38), the applicant cited Appendix A to RG 1.208 definition of a capable tectonic source and stated that because the uppermost deformed strata observed in the anticline and reverse faults is the Oligocene to Miocene Arcadia Formation, the structures are not considered to be capable tectonic features. The applicant pointed out that there is only one Emb 2.70 earthquake in the project Phase 1 earthquake catalog, including dependent events, located approximately 10 km away from the Miami terrace structures. Thus, there does not appear to be an association of seismicity with these structures. Therefore, the applicant stated that the reverse faults and fold reported by Cunningham et al. (2012) and Cunningham (2015) are not capable tectonic sources and would not affect, and should not be included in, the PSHA for the Turkey Point Units 6 and 7 site.

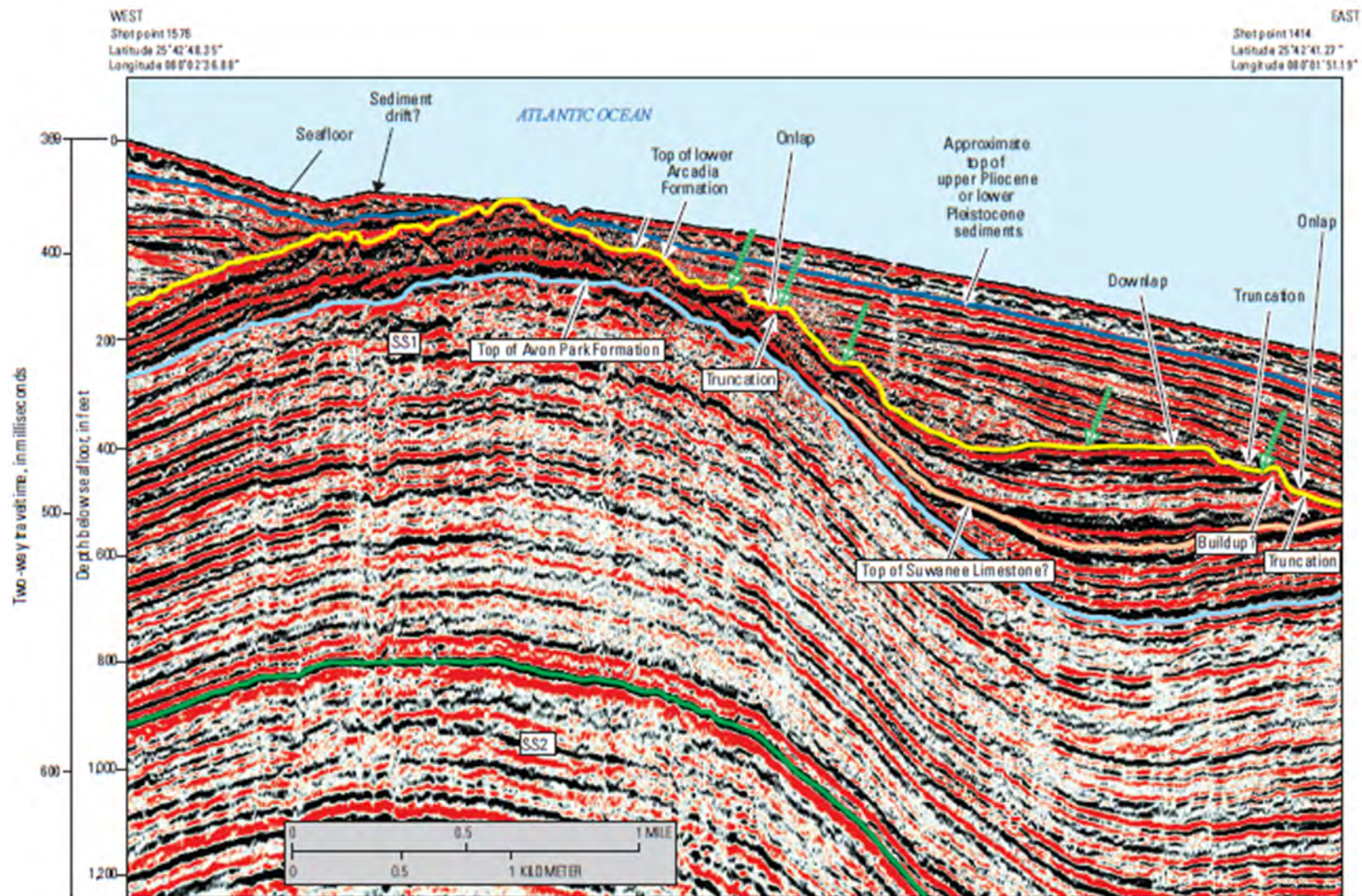


Figure 2.5.1-11. Miami Terrace anticline from Cunningham, 2015 (Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-395)

The staff points out that Cunningham concluded that the structures were formed sometime during the Oligocene to early Pleistocene. The Pleistocene Epoch (2.6 Ma to 10,000 years before present) is part of the Quaternary Period (2.6 Ma to the present). Cunningham associates this deformation event with other Oligocene through Pliocene, and into Quaternary-age, deformation in the region that researchers have suggested for structures such as: the Santaren Anticline and associated structures; the Bahamian contraction and tilting (Masafero et al., 1999; Mulder et al., 2015; Austin et al., 1988; Bergman, 2005), and Miocene through Pliocene folding deformation in scattered locations in southern Florida (Missimer and Maliva, 2004). Missimer and Maliva report fold relief on the order of 70 m. The staff notes that this group of geologically young structures within the Turkey Point Units 6 and 7 site region should also include Walkers Cay fault off of Little Bahama Bank (discussed in the staff's evaluation of RAI 41, Question 02.05.01-14). Thus the staff notes that there are several tectonic structures within the Turkey Point Units 6 and 7 site region that indicate Oligo-Pleistocene tectonism that is not directly related to the current North American-Caribbean plate boundary.

Based on Cunningham's (2015) conclusion of Plio-Pleistocene deformation, the staff does not agree with the applicant's determination that the structures on Miami Terrace are definitively "not capable tectonic sources." To assess the potential significance of the Miami Terrace anticline for the site-specific seismic hazard, the staff conducted a PSHA sensitivity analysis using the NRC-endorsed ground motion models (EPRI, 2013). The details of this sensitivity analysis are provided in SER Section 2.5.2.4.4. The staff developed hazard curves using a wide range of alternative slip rates that could be considered small-to-large for this tectonic region (e.g., 0.01, 0.05, 0.1, 1.0, 10.0 mm/yr). A slip rate of 10 mm/yr would be expected along a plate boundary, such as the North American-Caribbean plate boundary and is not a realistic slip rate for this region. An uplift rate of 0.05 mm/yr was determined for the Santaren Anticline (Masafero et al., 2002), and the applicant translated this to a slip rate of 0.071 mm/yr (assuming a fault dip angle of 45 °) for its sensitivity analysis of the Santaren anticline. For the Miami Terrace anticline, assuming it is cored by a vertical fault, with 152 m (500 ft) of vertical uplift in 1 Ma, the rate might be about 0.15 mm/yr, and for a 2 Ma time period the slip rate would be about 0.07 mm/yr (or 0.1 mm/yr on a 45-degree dipping fault). A fault length of 15 km (9.3 mi) is based the thickness of the seismogenic crust, and the closest distance to Turkey Point Units 6 and 7 site is 43 km (27 mi). The calculated seismic hazard from these slip rates was compared to the seismic hazard for the Turkey Point Units 6 and 7 site over a range of frequencies (0.5 to 100 Hz). Based on these assumed slip rates and geometries, the fault cored anticline would not affect the Turkey Point seismic hazard significantly (greater than 1 percent of total hazard) unless slip rates on this fault far exceed 1 mm/yr. Estimated slip rates on nearby tectonic structures appear to be much less than 1 mm/yr, which is consistent with the staff's understanding of the tectonic setting of this region. Based on the results of the sensitivity analysis, the staff concludes that the Miami Terrace anticline and associated reverse faults are not a contributor to site hazard. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 85, Question 02.05.01-38, resolved.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2.1 originally stated that variations in pre-Miocene stratigraphy, as recorded in boreholes, is due to erosion-based paleotopography or karst rather than possible faulting (e.g., the queried fault in Cunningham et al. (1998)). The staff notes that the fault, on the southern tip of the Florida peninsula, strikes essentially east to west, toward the Turkey Point Units 6 and 7 site. Cunningham et al. (1998) indicates that the Long Key Formation is offset against the Arcadia Formation, and the Arcadia Formation is offset against the Avon Park Formation. A structural contour map of the top of the Arcadia formation and a map of net thickness of Miocene-to-Pliocene siliciclastic sand appears to be consistent

with faulting. In RAI 41, Question 02.05.01-12, the staff asked the applicant to substantiate its interpretation with specific evidence that the stratigraphic relations across the queried fault shown by Cunningham et al. (1998) are a result of paleo-topographic or karst processes, rather than tectonic offset.

In an October 3, 2014, response to RAI 41, Question 02.05.01-12 (ADAMS Accession No. ML14282A074), the applicant replied that although Cunningham et al. (1998) shows a possible fault in a borehole-based cross section, a structure contour map on top of the Arcadia Formation, and an isopach map, there is no specific discussion of the fault in the text. Of the two wells on either side of the fault that show about 100 m (328 ft) of offset on top of the Arcadia Formation, one well has critical data gaps in intervals including the Arcadia Formation. Furthermore, the top of the Arcadia Formation is a known regional unconformity with geologic formation thickness and relief variations of 200 m (656 ft) and 90 m (295 ft), respectively (Warzeski et al., 1996; Missimer, 2001). The influence of the Arcadia Formation paleotopography on subsequent carbonate and clastic deposition in southernmost Florida is recognized in McNeil et al. (2004) and Hine et al. (2009). Hine et al. (2009) attributes as much as 100 m (328 ft) of relief over distances of kilometers to tens of kilometers on the top of the Arcadia Formation in west-central Florida to a mid to late Miocene sea-level lowstand that caused dissolution in the deeper carbonates, such as the Arcadia Formation, and formed paleotopographic depressions and non-tectonic deformation in the Arcadia Formation. The applicant concluded that while the fault in Cunningham et al. (1998) is a potential explanation of the cause of thickness variations, paleotopography is a possible alternate explanation.

The staff independently reviewed Cunningham et al. (1998), the applicant's assessment of it and more recent publications. Because the fault was not discussed within the text as an investigated structure, the staff concludes that the fault was not presented as a confirmed, newly identified fault in southern Florida. Furthermore, the staff acknowledges that regional unconformities, such as the top of the Arcadia Formation, indicate subaerial erosion that can modify the original depositional surfaces and result in significant thickness variation and topographical relief along the contact surface. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-12, resolved.

The applicant provided a proposed revision to the Turkey Point Units 6 and 7 COL FSAR to include portions of the RAI 41, Question 02.05.01-12 response. The staff finds the proposed revisions acceptable and has confirmed that these changes have been incorporated into the Turkey Point Units 6 and 7 COL FSAR.

3. Structures in the Straits of Florida, the Santaren Channel and the Bahamas Platform

Offshore southern Florida, within the 320 km (200 mi) radius of the site, includes the regional features of the Straits of Florida and the Florida peninsula submarine terraces, the Bahamas Bank, the drowned Cay Sal Bank, and the Santaren Channel, which is located between the Bahamas and Cal Sal banks.

A. Walkers Cay Fault

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2.2 originally stated that Walkers Cay Fault is interpreted in seismic sections as both faulted and unfaulted above the Oligocene horizon, yet the Walkers Cay fault has minimal effect on middle Miocene and younger strata. The applicant concluded that because of the minor deformation of Miocene and younger strata, the Walkers Cay fault is a Tertiary structure, and consequently, not a capable tectonic structure.

In RAI 41, Question 02.05.01-14, the staff asked the applicant to provide further details for its conclusions, discuss fault offset up to the sea floor in light of the Austin et al. (1988a, 1988b) papers and discuss the seismic reflection profiles interpreted to be displacing the seafloor.

In response to RAI 41, Question 02.05.01-14 dated October 3, 2014 (ADAMS Accession No. ML14282A074), the applicant replied that there are five seismic reflection lines published in various papers that show the Walkers Cay fault or fault zone, located 320 km (200 mi) northeast of the Turkey Point Units 6 and 7 site: Van Buren and Mullins (1983), Harwood and Towers (1988), and Austin et al. (1988a, 1988b). In general, the fault strikes north to northeast and in some interpretations extends about 33 km (20 mi) and appears to be a normal fault. Van Buren and Mullins (1983) describe the fault as vertically displacing the Oligocene reflector by about 75 to 100 m (246 to 328 ft). The applicant stated that the fault does not appear to extend upwards to the seafloor. The data resolution near the surface, however does not allow for a definitive assessment of the fault tips. Harwood and Towers (1988) interpret the Walkers Cay fault on all five seismic reflection profiles. One seismic reflection line shows the Walkers Cay fault reaching the seafloor, but the majority of seismic lines appear to show fault deformation terminating at 1.3 to 1.5s (two-way travel time) just below the seafloor. Harwood and Towers (1988) indicate that the resolution of the data is 10 m (33 ft). Austin et al. (1988a) interprets brittle faulting in Profile LBB-17, within sequence G, and deformation continuing upwards as monoclinical folding into the upper stratigraphy, which they attribute to “synsedimentary movement.” They interpret the monocline to be the result of tectonic deformation that extends activity at least into the late Paleocene-early Eocene. In Profile LBB-18, a normal fault extends from above the carbonate platform top to the seafloor. This is the only profile that interprets faulting to the seafloor. The applicant noted that Austin et al. (1988a) does not discuss the amounts of offset in Quaternary strata.

Borehole data in the vicinity of these seismic profiles indicate that the Quaternary section is limited to a thin veneer. Pleistocene sediments are limited to approximately the uppermost 15.5 m, 3.6 m, and 18.2 m (51 ft, 12 ft, and 60 ft) (Austin et al., 1986a, 1986b, and 1986c, respectively). Thus, to definitively determine if the Walkers Cay fault is a Quaternary structure, seismic data would need to resolve displacement within approximately the uppermost 20 m (66 ft) of seafloor sediments.

The staff notes that the thickness of the Quaternary section, as measured in three Ocean Drilling Project (ODP) borings, ranges from 3.6 to 18.2 m (12 to 60 ft), and in conjunction with seismic reflection data resolution of about 10 m (33 ft), makes it difficult to accurately assess the presence or absence of Quaternary deformation on the Walkers Cay fault in those data.

The applicant concluded that considering all the data published to date, the possibility of Quaternary slip on the Walkers Cay fault cannot be precluded by the available data. For this reason, the applicant performed a hazard sensitivity calculation to assess the potential effect of a Walkers Cay fault source on the PSHA for the Turkey Point site.

As input parameters to the hazard sensitivity calculation, the applicant used a probability of activity of 1.0, a length of 33 km (20.5 mi), vertical dip angle and a rupture depth from 0 to 15 km (0 to 9 mi), maximum magnitude of Mw 6.8 with 0.2 uncertainty, and an upper, median, and lower bound slip rate distribution of 0.05 mm/yr, 0.01 mm/yr and 0.001 mm/yr, respectively. The largest weight in this slip rate distribution is accorded to a slip rate of 0.01 mm/yr, which appears to represent a limiting rate beyond which there would be a significant likelihood that vertical separations of Quaternary and Pliocene deposits would be sufficiently large to be observable within the presently available data.

The applicant stated that the results show that adding the Walkers Cay fault to the total hazard results in 10^{-4} mean annual frequency of exceedance (MAFE) amplitudes that are 0.3 percent higher at 1 Hz and 0.5 percent higher at 10 Hz, and annual frequencies of exceedance, at the Turkey Point Units 6 and 7 COL FSAR 10^{-4} MAFE amplitudes, that are 0.7 percent higher at 1 Hz and 1.0 percent higher at 10 Hz. The applicant concluded that the results of the hazard sensitivity calculation, based on the conservative seismic source characterization of the Walkers Cay fault, indicate that further consideration of the Walkers Cay fault for the Turkey Point site hazard is unwarranted due to its insignificant contribution to site seismic hazard, discussed in more detail in Section 2.5.2 of this SER.

The staff notes the research that reveals the Walkers Cay fault does not provide clear evidence of age of last movement on the fault. Although some authors indicate faulting to the sea floor, which would suggest Quaternary age for the fault, the resolution of the data and the continuity of seismic reflectors do not allow for a determination of the age of the last strata that the tip of the fault deforms in most seismic lines. In addition, the fault is about 320 km (200 mi) from the Turkey Point Units 6 and 7 site. The staff considers the results of the sensitivity analysis completed by the applicant to be a sufficient indication that the Walkers Cay fault is not a significant contributor to site seismic hazard. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-14, resolved.

The applicant proposed a revision to the Turkey Point Units 6 and 7 COL FSAR to include portions of the RAI 41, Question 02.05.01-14 response. The staff finds the proposed revisions acceptable and has confirmed that these changes have been incorporated into the Turkey Point Units 6 and 7 COL FSAR.

B. Straits of Florida faults

The deep Straits of Florida, which also include the distinctive submarine Miami, Portales, and Mitchel terraces on the Florida side of the strait, separate Florida from Cuba. Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2.2 originally stated that a series of short, steep normal faults exist in the western Straits of Florida southwest of the Turkey Point Units 6 and 7 site, and that middle to late Eocene to early middle Miocene strata were deposited uniformly over most of the southern Straits of Florida and also the edges of the Florida and Bahamas Platforms along the Straits of Florida. In RAI 41, Question 02.05.01-16, the staff asked the applicant to provide more details with respect to the timing and location of the faults located in the Straits of Florida.

In response to RAI 41, Question 02.05.01-16 (ADAMS Accession No. ML15065A070), the applicant provided a map of the Straits of Florida with the faults and the locations of seismic lines, and replied that deformation within the Straits of Florida is characterized by a series of short, steep, normal faults buried by Eocene sediments. Malloy and Hurley (1970) hypothesized faulting along some of the geomorphic escarpments in the central Straits of Florida, particularly the Pourtales escarpment and the Mitchell escarpment.

The applicant explained that more recent, higher resolution seismic imaging reveals the Pourtales escarpment and similar steep-sided escarpments throughout the Straits of Florida and Bahamas to be relict carbonate platform margins, sometimes modified by erosion, and associated with younger sediment drift, resting adjacent to the scarp. Along the base of the Pourtales escarpment, large drifts of sediment overlie the toe margin and have been prograding along the Straits of Florida since the Miocene. Where these drift deposits rest against the paleo-reef face, discordant dips are observed that were previously interpreted as potentially

fault-related. Two seismic lines that obliquely cross the Mitchell escarpment also display similar stratigraphic characteristics near the toe of the escarpment, with drifts resting against each other in the shallow stratigraphy and erosional truncations in the seismic reflectors that do not extend to depth. The applicant stated that little detail is available with respect to the hypothesized Las Villas and Sierra de Jatibonico structures offshore in Northern Cuba drawn by Malloy and Hurley on the basis of bathymetric data. More recent compilations generally do not depict offshore interpretations of these faults.

The applicant concluded that the Straits of Florida normal faulting is likely syntectonic deformation of the Cuban foreland basin during its Eocene collision with the Florida-Bahama Platform, and the undeformed Miocene and younger strata overlying these faults constrain deformation to Eocene. The staff notes that throughout the seismic reflection profiles provided by the applicant, the youngest faulting is constrained below a middle Miocene unconformity. Furthermore, the staff notes that Miocene and younger drift deposits are clearly expressed in the seismic reflection data as both geomorphological elements as well as discordant layering against the base of escarpments, but are not faulted contacts. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-16, resolved.

C. Santaren Anticline

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2.2 originally stated that the Santaren Anticline is Tertiary in age, predominantly active during the Eocene, with diminishing activity throughout the Miocene. The staff notes that Masaferro (1997), Masaferro et al. (2002), and Ball et al. (1985) present evidence that the Santaren Anticline, within the 320 km (200 mi) radius of the site, is cored by a thrust fault, and is potentially undergoing present-day shortening. The authors used stratigraphic analysis to infer Pliocene or potential Quaternary activity on the structure.

In RAI 41, Question 02.05.01-15, the staff asked the applicant to address evidence for possible ongoing deformation, to discuss rates of shortening calculated across the anticline (Masaferro et al., 1999), to examine regional seismicity on a close-up view of the Santaren Anticline, and to comment on whether the Santaren Anticline is a capable tectonic structure.

In response to RAI 41, Question 02.05.01-15 (ADAMS Accession No. ML15169A845), the applicant summarized the data and interpretations presented in the literature for ongoing deformation; rates of shortening; and the possible existence of a thrust fault that cores the Santaren anticline. The applicant cited Ball et al. (1985), which identifies the Santaren anticline as an approximately 10 km (6 mi) wide, 70 km (43 mi) long, northwest-trending structure and concludes that the structure was initiated during the Late Cretaceous and that maximum topographic relief occurred in the early Cenozoic. The authors further speculate that the Santaren Anticline is a hanging-wall anticline on the northern limit of thrusting in the Cuban arc, based on age, location, and asymmetry of the anticline, and the interpretation of a fault below 4 km (2.5 mi) depth.

Masaferro et al. (1999) uses seismic reflection data with well logs acquired during the ODP to provide a more detailed stratigraphic and structural analysis of the Santaren anticline, and conclude the Santaren anticline experienced fold growth from the Mid-Eocene to Pliocene and perhaps to the present day, although the youngest beds might be post-tectonic.

Masaferro et al. (2002) interprets the Santaren anticline to have had episodic tectonic growth and sedimentation since at least Oligocene time, with the most recent episode of tectonic uplift interpreted to have occurred in the early Quaternary (between deposition of beds M2 and M3, with a fold uplift rate of 0.05 mm/yr). The same study recognizes previous interpretations of the Santaren anticline as a fault-related fold or a detachment fold but do not provide any additional discussion or interpretation of fold-growth models for the Santaren anticline.

The applicant provided a close-up map view of the Santaren anticline and three unnamed fold axes directly to its southwest (Masaferro et al., 1999) along with earthquake epicenters from the Phase 2 earthquake catalog. Only two small earthquakes (Mw 3.26 and 3.1) with three dependent events (aftershocks) are indicated on the seismicity map, and there does not appear to be a spatial association with the Santaren anticline or the unnamed fold axes directly to the southwest. The applicant stated that Masaferro et al. (2002) shows no uplift on the structure in the last 1 million years and that, in conjunction with the sparse seismicity, would suggest that the Santaren Anticline does not represent a capable tectonic structure.

The staff notes that earthquake activity is sparse within about a 50 km (31 mi) radius of the Santaren anticline, and different structural frameworks to explain the Santaren anticline are found in the publications cited by the applicant. Masaferro et al. (2002) notes that Ball et al. (1985) suggests the Santaren anticline may be cored by a steeply dipping thrust fault, whereas Masaferro et al. (1999) interprets the Santaren anticline as a detachment fold but provide no further discussion of any postulated fault. However, the staff reviewed Bergman (2005) and finds that new data and interpretations regarding the Santaren anticline show thrust faulting in the core of the anticline as interpreted in the new seismic reflection data. Therefore, in RAI 81, Question 02.05.01-34, the staff asked the applicant to update and include the interpretation of the Santaren Anticline based on Bergman (2005).

In a July 15, 2015, response to RAI 81, Question 02.05.01-34 (ADAMS Accession No. ML15198A059), the applicant provided additional information on the Santaren anticline and other structural features in the Santarn channel based on recent publications, and conducted a sensitivity analysis of the Santaren anticline on the PSHA.

Masaferro (1997) and Masaferro et al. (1999 and 2002) quantified the fold geometry, growth strata, uplift history, and timing of deformation, suggesting that the Santaren anticline has been active at least since Mid-Eocene time to possibly Pliocene/present day. They indicate that the Santaren anticline is not an isolated structure, as a second anticline located to the south of the Santaren anticline has also folded much of the same sedimentary section. Echevarria-Rodriguez et al. (1991) interpreted a similar type of anticline to be an extension of the Santaren anticline.

The applicant assessed Bergman's dissertation work (Bergman, 2005), which describes the Santaren anticline as a detachment growth fold that "is underlain by a detachment horizon over which reflections are folded." Bergman interprets two imbricated thrust blocks located directly northwest of the Santaren anticline. Further to the northwest, at the northern margin of Cay Sal Bank, Bergman (2005) interprets steep normal faults bounding the drowned carbonate bank margins and a large, northeast trending, broad fold underlying the Cay Sal Bank region. Bergman (2005) concludes that loading of the North American plate migrated northward away from the Cuba collision zone and caused differential subsidence along the margins of the Santaren Channel. Later, Bergman (2015) concludes that thrust faulting and other compressional features associated with the late stage Cuba collision propagated as far north as the central Santaren Channel, which is farther north than previously estimated. These

compressional features of the Cuba-Bahama thrust belt were long-lived and one structure appears to be active into the late Miocene and possibly Pliocene.

The applicant stated that while a fault has yet to be imaged in the core of the relatively symmetrical Santaren anticline, this structure is a candidate for a potential seismic source because fold deformation appears to be Quaternary in age (Jo, 2013; Jo et al., 2015) and a fold uplift rate was determined for this structure (Masaferro et al., 2002). New high-resolution seismic data and subbottom profiles illustrate Quaternary growth strata and steeply dipping secondary faults associated with the Santaren anticline, further suggesting ongoing deformation of the anticline (Jo et al., 2015) (Figure 2.5.1- 12).

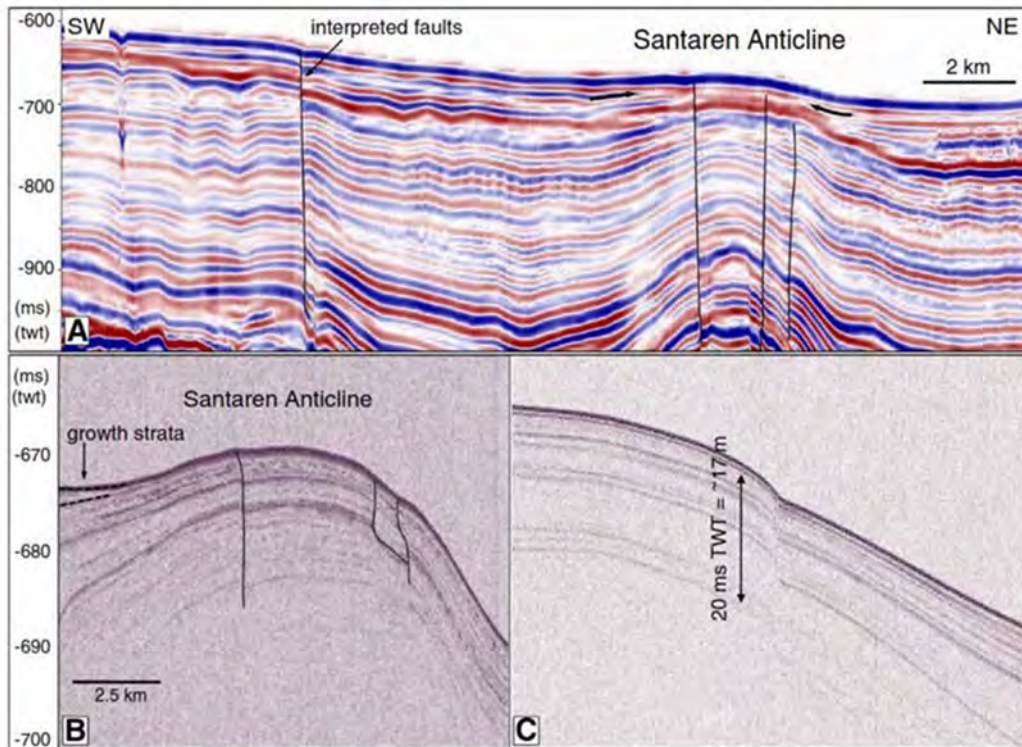


Figure 2.5.1-12. Santaren anticline and faults from Jo et al., 2015.

D. Santaren Anticline Fault Source Sensitivity Analysis

The applicant conducted a sensitivity analysis to assess the effect to the PSHA results from a Santaren anticline fault source. Details of the calculation are evaluated in SER Section 2.5.2. For the sensitivity analysis, the applicant conservatively assumed that the anticline is cored by a seismogenic fault and the fault source follows the northernmost surface trace of the Santaren anticline, as depicted in Masaferro et al. (1999).

The results of the sensitivity analysis consist of quantification of the increase in hazard and ground motion amplitude at annual frequencies of exceedance (AFE) of 10^{-4} and 10^{-5} , for frequencies of 1 Hz and 10 Hz. The applicant used the Hicacos fault source in Cuba as a proxy for magnitude and distance to assess the sensitivity of the Turkey Point Units 6 and 7 COL FSAR PSHA to a Santaren anticline seismic source. The applicant's assessment determined a slip rate of 0.037 mm/yr for the Hicacos fault source and a 0.071 mm/yr for the Santaren

anticline fault source. The applicant found that the ground motion amplitudes at AFEs of 10^{-4} and 10^{-5} increase by 0.8 to 3.5 percent, with increases in ground motion amplitudes ranging from approximately 0.0006 to 0.003 g for AFEs of 10^{-4} and 10^{-5} . The staff concludes that based on this limited effect on the Turkey Point Units 6 and 7 PSHA total hazard, the Santaren Anticline is not a seismic hazard to Turkey Point Units 6 and 7 site.

E. Possible Quaternary faults off Cay Sal Bank

The staff reviewed Kula (2014) and notes that the author includes interpretations regarding possible Quaternary tectonic faults along the western bank of the northern Santaren Channel (northeast of the Cay Sal Bank). High resolution seismic reflection, multibeam bathymetry and sub-bottom parasound profiles reveal Quaternary-aged tectonic structures in the Santaren Channel and the Straits of Florida within about 50 mi of the Turkey Point Units 6 and 7 site (Figure 2.5.1-13). Although there is no seismicity in the area beneath Cay Sal Bank and the Santaren Channel, distinct seafloor scarps suggest recent and significant displacement on faults imaged on seismic reflection. In RAI 81, Question 02.05.01-34, the staff asked the applicant to discuss and integrate these tectonic features into the regional tectonic setting for the Turkey Point Units 6 and 7 site. The staff asked the applicant to provide an analysis of how a northward extension of the Cuban Fold and Thrust Belt terrane with associated Quaternary fault displacement and seafloor scarps on at least two faults impacts the site seismic hazard assessment and seismotectonic boundaries. The staff also asked the applicant to update interpretations of the Santaren Anticline

In a July 15, 2015, response to RAI 81, Question 02.05.01-34 (ADAMS Accession No. ML15198A059), the applicant (1) reviewed Kula (2014), including interpretations and data (high resolution shallow seismic reflection and bathymetry) data, (2) obtained and interpreted six deep seismic reflection lines in the same area as Kula's interpretation, (3) completed a solicitation of expert opinion through a Senior Seismic Hazard Analysis Committee (SSHAC) level II study regarding a Quaternary tectonic fault off the northern Cay Sal Bank, and (4) discussed the Cuban areal source term for the Turkey Point Units 6 and 7 site in conjunction with different concepts of the Cuba Fold and Thrust Belt. The applicant specifically contacted Dr. Gregor Eberli, from University of Miami (Florida) who is an expert in carbonate bank research and is also D. Kula's thesis advisor. The applicant concluded that (1) Kula's interpretations are not technically defensible, (2) the deep seismic reflection lines show unfaulted seismic reflectors where Kula interpreted faults in the shallow section, and (3) that Dr. Eberli concurs with its position that there are no seismogenic faults in this area.

Based upon all the material that the staff reviewed related to this question, the staff decided to conduct its own seismic hazard sensitivity analysis. The applicant provided a synopsis of Kula's (2014) interpretation of four tectonic faults along the eastern margin of Cay Sal Bank, and her interpretation that these faults represent an extension of the Cuba Fold and Thrust Belt a few hundred kilometers farther north and east than previously mapped by others. Kula suggests neotectonic activity on two of these faults (Fault A and B) along the eastern margin of Cay Sal Bank and north to the Straits of Florida. Kula (2014) interprets that the faults extend in length

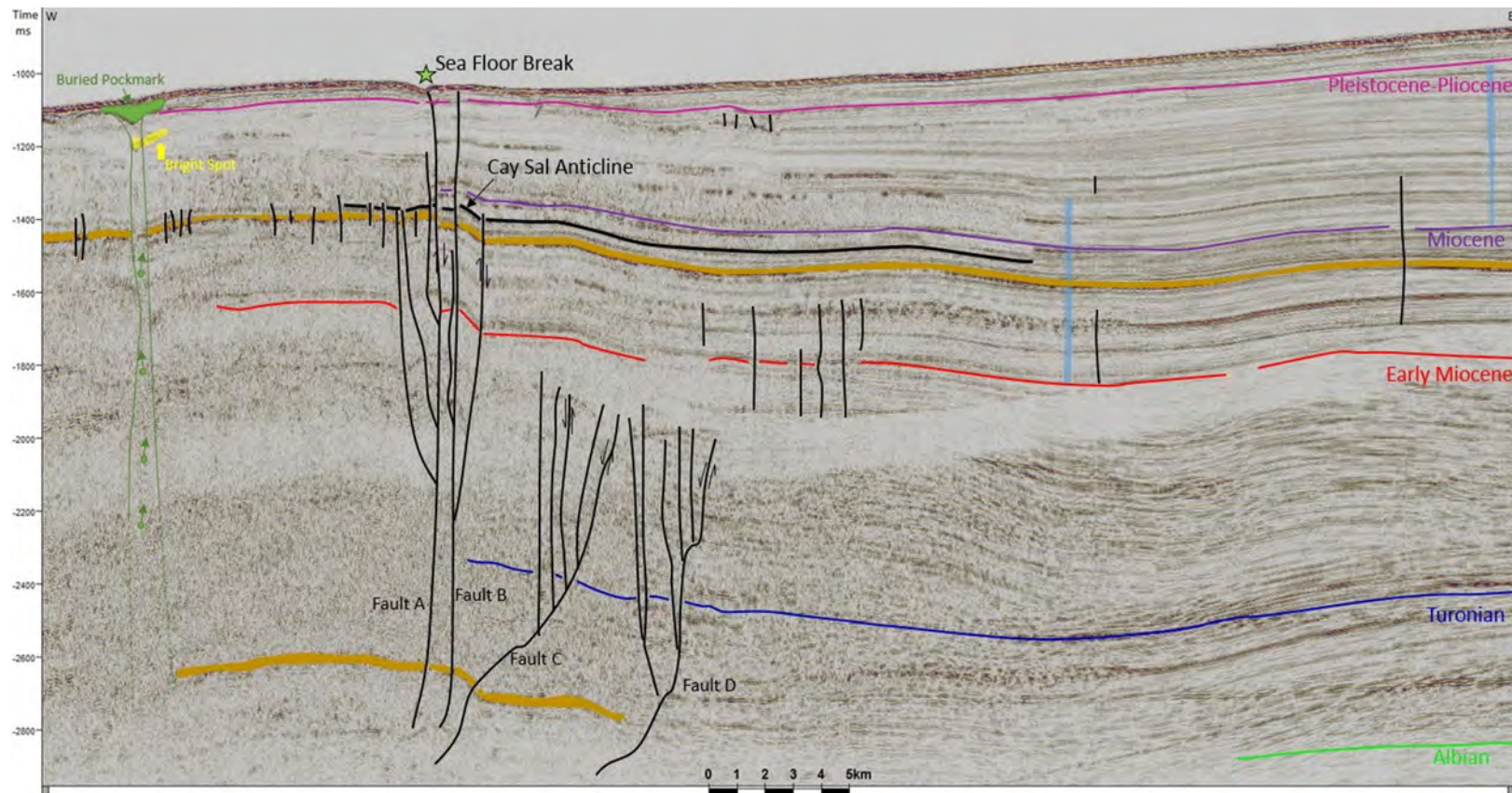


Figure 2.5.1-13. Profile 20 as interpreted from Kula, 2014.

from 41 km (25 mi) (Fault A) to 115 km (71 mi) (Fault B). Kula (2014) cites seafloor breaks in seismic profiles (profile 20, 22 and 24) and breaks in multibeam bathymetry data as evidence for neotectonic activity.

In addition, the applicant obtained and reviewed six high-energy, deep-penetration 2D industry seismic lines acquired from USGS National Archive of Marine Seismic Surveys that are located close to the high resolution lines used by Kula. These public domain data, collected during commercial survey cruises in 1981 and 1982, have somewhat lower resolution, in comparison to the new high resolution shallow 2013 data, but provide a much deeper view (up to 10 km (6.2 mi)) of potential fault structure. Images of some of these data are interpreted in prior publications in the region (e.g., Ball et al., 1985; Masaferrro, 1997; Masaferrro et al., 1999 and 2002; Bergman, 2005). The staff notes that vertical resolution is about 15 to 30 m (50 to 100 ft) in these seismic data.

The applicant completed a SSHAC Level II study of the potential Quaternary faults proposed by Kula as part of the response to Question 02.05.01-34b. As part of the SSHAC study, the Technical Integration (TI) team attempted to engage more than 20 researchers with potential knowledge of the new offshore data in the region. The TI team formed as part of the SSHAC Level II study examined the deep seismic lines from USGS and concluded that these data do not support Quaternary active faults along the eastern margin of Cay Sal Bank because continuous, unfaulted seismic reflections across the Santaren Channel and along the eastern flank of Cay Sal Bank are clearly apparent on seismic profiles that cross the faults mapped by Kula. The TI team further concluded that minor faults along the axis of the Cay Sal anticline (Bergman, 2005) do not penetrate below the top of the Miocene, which is less than 1 km below the seafloor (not seismogenic depth).

The staff audited the SSHAC material that the applicant provided in a reading room (April through July, 2015) (ADAMS Accession Nos. ML15321A134 and ML15243A420) and carefully considered remarks provided by Dr. Eberli in response to the TI team's expert solicitation, examined the extra seismic reflection lines provided by Dr. Eberli, and also examined USGS 1980 public domain seismic reflection lines evaluated by the applicant. The staff notes that Dr. Eberli was the only researcher who responded to the TI Team with detailed written statements and a report. The staff also independently reviewed several relevant publications including Kula (2014); Bergman (2005); Masaferrro et al. (2002 and 1999); Jo et al. (2015); Mulder et al. (2013); Tourndour et al. (2015); and Missimer and Maliva (2004).

Dr. Eberli provided a written review of the preliminary TI Team interpretations of USGS deep seismic reflection profiles; answered the TI Team questionnaire; and provided additional, zoomed-in, high-resolution seismic profiles not presented in Kula's thesis. As part of his review of the TI team's interpretation of the deep seismic reflection from USGS, Dr. Eberli pointed out various small faults and anticlines in those data, not breaking the seafloor and not necessarily lining up with Kula's interpreted faults. Dr. Eberli stated that Kula's structural and neotectonic interpretations allow for some reinterpretations and provided comments on Kula's profile lines 20, 22 and 24.

Dr. Eberli re-interprets seafloor breaks interpreted as fault scarps by Kula on Profile 24 as the headscarp of a mass transport complex (MTC). The staff notes that Dr. Eberli made no specific re-interpretation of the vertical fault-like feature immediately to the west of the MTC. While the TI Team asserted that subsurface reflections are continuous and unbroken beneath the seafloor break, indicating the absence of a fault at that location, the staff observes broken reflectors and

tightly folded strata from the surface to the bottom of the profile, based on the additional seismic profiles that Dr. Eberli provided as part of his written statement (ADAMS Accession Nos. ML15321A134, and ML15243A420).

Dr. Eberli supports the fault interpretation for seismic profile 20. The TI team acknowledged that this fault zone of small displacement faults extends to the seafloor but stated that there is little apparent vertical separation of the Plio-Pleistocene horizon and concluded the feature in seismic Profile 20 is non-tectonic, and non seismogenic. However, the staff notes that strike-slip fault zones are not likely to show a lot of vertical separation in the strata.

The staff notes that Dr. Eberli stated in his written report to the TI team that: "The high resolution seismic lines shot in 2013 display reflection offsets that are indicative of Quaternary folding and faulting. Three lines (15, 20, and 22) image an asymmetrical anticlinal feature (Cay Sal anticline) that partly grows in the Quaternary strata. In conjunction with this anticline, faults extend into younger strata and at least in one location break the sea floor."

The staff also notes that Dr. Eberli concluded that Fault A on Line 20 is a wrench fault (strike-slip) with some dip slip motion that cuts to the seafloor and he considers this fault active. Dr. Eberli interprets the fault-cored fold of the Cay Sal anticline apparent on Profile 20 as part of a wrench fault system with components of both local compression and strike slip motion, and suggests it may be the far field expression of a lateral stress component along the American-Caribbean plate boundary. Dr. Eberli also noted that three seismic lines show anticlines within the Quaternary section thus indicating deformation in the Quaternary. Finally, Dr. Eberli stated that due to low resolution, USGS deep seismic reflection is not able to resolve faults with small offsets and, therefore, does not allow for precise interpretation of reflection offsets.

Based on its review, the staff cannot rule out the possibility that some of the features identified in Kula (2014) are tectonic in origin and Quaternary-age, particularly Fault A. To assess the potential significance of Fault A and the Cay Sal anticline for the site-specific seismic hazard, the staff conducted a PSHA sensitivity analysis using the most recent NRC-endorsed ground motion models (EPRI, 2013). The details of this sensitivity analysis are provided in SER Section 2.5.2.4.4. The staff developed hazard curves using a wide range of alternative slip rates along these faults (0.01, 0.05, 0.1, 1.0, 10.0 mm/yr). However, regional examples of slip rates of 10 mm/yr would only be expected along active plate boundaries, such as the Caribbean and North American plate boundary. A slip rate of 0.071 mm/yr is used by the applicant for the nearby Santaren anticline. The staff estimated a range of 0.15, 0.1, or 0.07 mm/yr for the Miami Terrace anticline.

For Kula's Fault A, the staff considered a vertical fault with 150 m (492 ft) of dip slip offset over a 2.6 Ma period resulting in an estimated slip rate of 0.057 mm/yr. In its sensitivity analysis, the staff used a fault length of 40 km (24.8 mi) and assumed the thickness of the seismogenic crust to be 15 km (9.3 mi). The closest distance of this fault to the Turkey Point Units 6 and 7 site is 77 km (48 mi). The staff then calculated the hazard contribution from this source using alternative slip rates and compared the calculated seismic hazard from the range of slip rates to the seismic hazard for the Turkey Point Units 6 and 7 site over a range of frequencies (0.5 to 100 Hz) and found that Fault A would not significantly affect the Turkey Point seismic hazard (greater than 1 percent of total hazard) unless slip rates on this fault far exceed 1 mm/yr. Since estimated slip rates on nearby Santaren anticline also appear to be less than 1 mm/yr, the staff considers the results of the sensitivity analysis to be a sufficient indication that the features as interpreted by Kula (2014) are not a contributor to site seismic hazard.

4. Cuba Fold and Thrust Belt and the Cuban Areal source term

In response to RAI 81, Question 02.05.01-34 (ADAMS Accession No. ML15198A059), specifically in regard to the boundary of the Cuba Fold and Thrust Belt, the applicant indicated that there does not appear to be a strict definition or boundary to the Cuba Fold and Thrust Belt in the literature, in terms of style, intensity, and magnitude of deformation. Two general views suggest the Cuba Fold and Thrust Belt as either an arcuate belt largely restricted to the island of Cuba or a broader interpretation that extends the margin eastward to the southern Santaren Channel to include the Santaren anticline. Bergman (2005 and 2015) extended this boundary northward in the Santaren Channel and Kula (2014) proposes that the boundary be expanded further to include the Cay Sal Bank.

The applicant stated that tectonic terranes and areas of similar geologic histories can assist in subdividing the crust into regional seismic source zones; however, the criteria for defining areal source zones are primarily the size, rate, and characteristics of future earthquake production. The Cuba areal source zone was defined to capture the higher rate of seismicity in Cuba and distinguish it from the very low rates of seismicity in the surrounding offshore regions of the site region covering the Bahamas and Straits of Florida (and the Cay Sal Bank), which are included in separate supplemental background zones. Therefore, the applicant concluded that there is no justification for expanding the Cuba areal source to include either the northern Santaren Channel or the Cay Sal Bank.

Based on the staff's hazard sensitivity on Kula's interpreted fault and the applicant's hazard sensitivity of the Santaren Anticline, the staff finds that there is sufficient indication that these features are not contributors to the site seismic hazard. With respect to the Cuba Fold and Thrust Belt, the staff notes that the specific boundary of the Cuba Fold and Thrust Belt would not necessarily define the Cuban areal source zone for the Turkey Point Units 6 and 7 site's PSHA. Based on distinct differences in seismicity rates, the staff agrees with the applicant that there is no justification for expanding the Cuba areal source to include the northern Santaren Channel and Cay Sal Bank. Accordingly and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 81, Question 02.05.01-34, resolved.

5. Tectonic Structures in Cuba

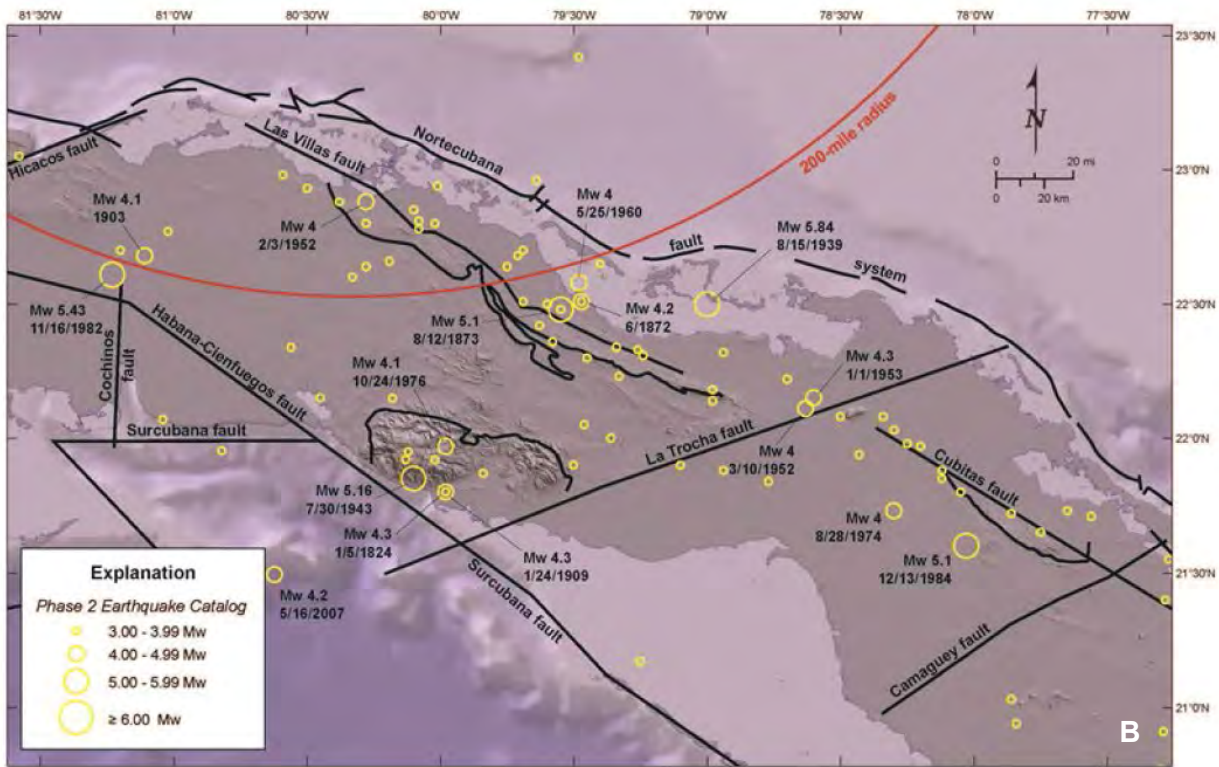
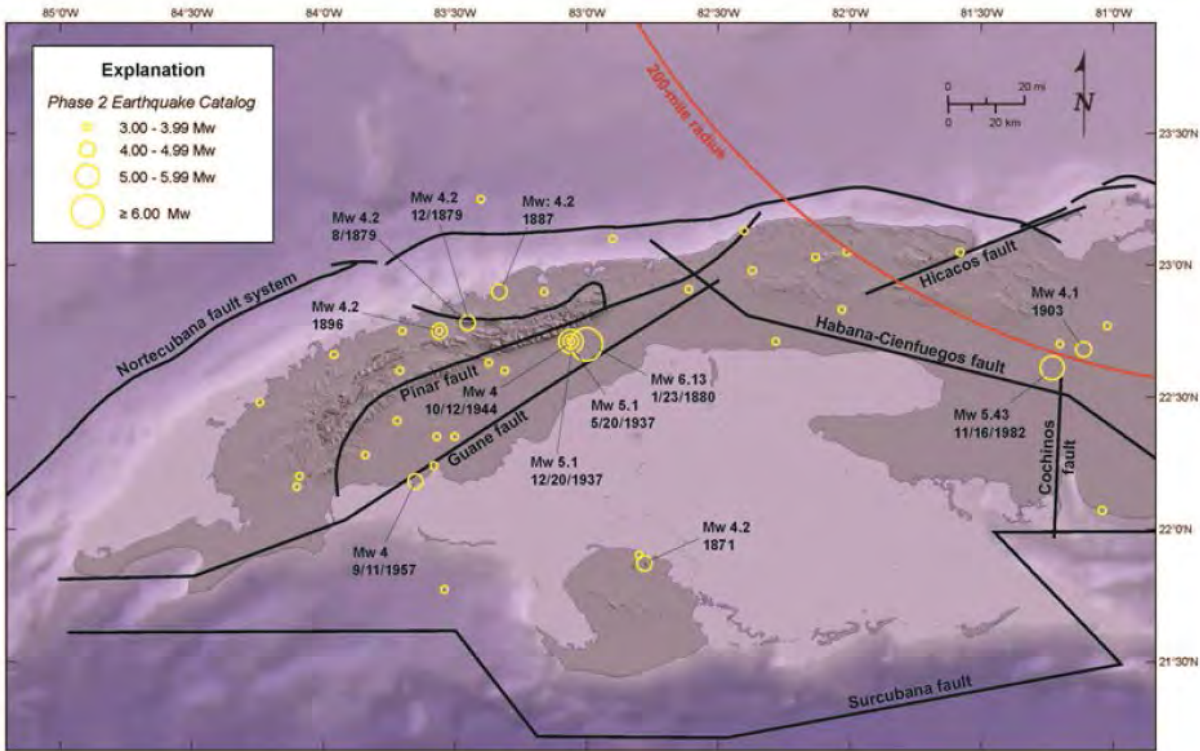
Within the 320 km (200 mi) radius of the site there are many mapped, potentially active faults on the island of Cuba and immediately offshore to the north as identified and discussed in various publications. There are also many small to moderate magnitude earthquakes that reveal a persistent history of recorded seismicity along the northern portion of Cuba separate from the modern plate boundary further south. However, the staff notes that the northern boundary of Cuba is the location of a Miocene age relict plate boundary. In addition to reviewing the references provided in the Turkey Point Units 6 and 7 COL FSAR, the staff independently reviewed other publications pertaining to tectonic features in Cuba that were not initially in the Turkey Point Units 6 and 7 COL FSAR and that became the basis of several RAIs.

In response to several RAIs regarding Cuba faults and seismicity (RAI 41, Questions 02.05.01-21, -24 through 30) (ADAMS Accession Nos. ML14282A078, ML14282A079, and ML14282A079) dated October 3, 2014, the applicant made a general statement that the lack of permanent seismic recording stations in Cuba, especially for lower-magnitude earthquakes, limits the accuracy of earthquake locations; that earthquakes in Cuba do not appear to correlate strongly with faults; and the Phase 2 earthquake catalog was used to consider the possibility of seismicity associated with a specified fault (Figure 2.5.1-14). The staff notes that the Phase 2

catalog is declustered and includes earthquakes of Mw 3 and above. The staff also notes that aftershocks of an earthquake can be used to determine an image of a fault's subsurface rupture plane and subsequently used to identify the acting fault for the event. In RAI 81, Question 02.05.01-35, the staff asked the applicant to describe the rationale to use a declustered Phase 2 earthquake catalog to determine seismic activity associated with any Cuban faults, rather than the complete catalog.

In a June 8, 2015 response to RAI 81, Question 02.05.01-35 (ADAMS Accession No. ML15160A574) the applicant responded that a declustered or mainshock Phase 2 earthquake catalog was used to compute recurrence parameters for the Cuba seismic source characterization. The applicant agrees with the staff that in the Cuba region that mapping seismicity before the declustering earthquake process could be used in identifying potentially active, previously unidentified structures, if the earthquake association were unambiguous. Therefore, the applicant revised FSAR Figure 2.5.1-368 (Sheets 1 through 3) to include mainshock events of Mw and above 3.0, and foreshocks, aftershocks, and cluster events of Mw and above 3.0, and all small events mainshock and dependent events of Mw less than 3.0. The applicant also stated that the relevant text in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1 will be revised accordingly. The applicant also stated that while the majority of the small-magnitude (Mw less than 3) seismicity is scattered and diffuse, seismicity patterns do show several clusters that are not part of the Phase 2 mainshock earthquake catalog Mw of 3 and above. Some of these earthquakes are not of sufficient size and definition to merit their consideration as fault sources. Other earthquake clusters are near faults that were included in a PSHA sensitivity study of the modeling of Cuba as a seismic source. The applicant concluded that when specific faults were considered as alternatives to the Cuba seismic source, they produced negligible impact on the total seismic hazard at the Turkey Point Units 6 and 7 site, as compared to the modeling of Cuba as a single areal seismic source zone (see FSAR Section 2.5.2.4.4.3.4.2.1). The staff evaluates the sensitivity analysis for the Cuba seismic source in RAI 41, Question 02.05.01-21 and RAI 5896, Question 02.05.02-4. Staff considers the revised Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-368 showing the total earthquake catalog of independent and dependent earthquakes sufficient response to this question and thus considers RAI 81, Question 02.05.01-35 resolved.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.4.4.3.2 states that an area source model is used for Cuba because of the lack of knowledge on fault behavior and slip rates for Cuban faults with which to support assessment of fault-specific sources. To evaluate the possibility of capable tectonic sources within the site region, in RAI 41, Question 02.05.01-21, the staff asked the applicant to provide a detailed geologic discussion of tectonic features of Cuba and their potential impact on the PSHA. In an October 3, 2014 response to RAI 41, Question 02.05.01-21 (ADAMS Accession No. ML14282A078), the applicant discussed the uncertainty and alternate interpretations of faults and tectonic features of Cuba, presented information on faults located within intraplate Cuba, and provided a hazard sensitivity calculation using Cuba faults as sources. The applicant also characterized the faults in intraplate Cuba including: Baconao fault, Camaguey fault, Cochinos fault, Cubitas fault, Guane fault, Habana-Cienfuegos fault, Hicacos fault, La Trocha fault, Las Villas fault, Nipe fault, Nortecubana fault, Pinar fault and Surcubana Fault.



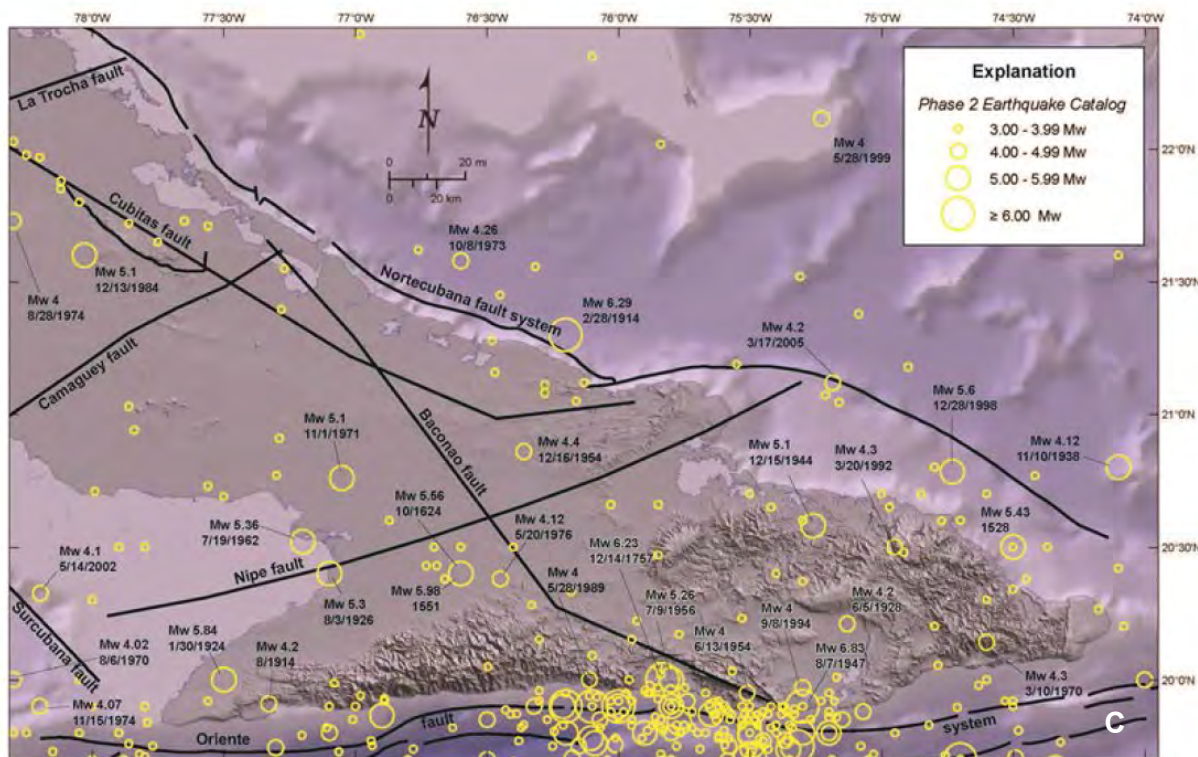


Figure 14. Fault Maps of Cuba Showing Earthquakes from the Project Phase 2 Earthquake Catalog (Sheet 1 of 3) (Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-368). Multiple sources used to compile this map, including Turkey Point Units 6 and 7 COL FSAR Refs. 439, 448, 492, and 494.

Finally, the applicant described the SSHAC Level II study completed to address the tectonic features in Cuba and the development of input parameters for the hazard sensitivity calculation and thus the potential impact of Cuba faults on the Turkey Point Units 6 and 7 site's PSHA.

The applicant modeled intraplate Cuba as a single areal source, as opposed to multiple fault sources or a combination of fault and areal sources, because of the coarse scale of geologic mapping; the poor location of earthquakes and uncertain estimates of magnitude; and the lack of fault-specific paleoseismic studies. The applicant indicated that the large scale maps that are available are developed for geologic rather than neotectonic purposes. The staff independently reviewed geologic maps of Cuba held at USGS library in Reston, VA, and notes that most maps are small scale, ranging from 1:250,000 to 1: 2,250,000.

The applicant stated that the accuracy of the instrument-derived earthquake locations is limited by lack of permanent recording stations in Cuba and the accuracy of intensity-based locations is a function of the number and reliability of felt reports, the population density and distribution and other factors. There are no known historical observations of surface rupturing earthquakes in Cuba and no fault-specific neotectonic studies that would theoretically provide recurrence interval and slip rate. The staff notes that the number of stations in the Cuban network started increasing after 1998 when broadband seismometers were installed along the island of Cuba (Moreno Toiran, 2002). According to recent news from Cuban newspaper, Cubasi (2015), the Cuban government plans to expand its seismic network with new seismometers in the central region. This is not only to improve the monitoring of the regional seismicity but to share the data

of their stations with the international community. The staff concludes that, in the near future, it may be possible to use seismic data from Cuba as a reliable constraint for the seismotectonic interpretations in the region.

The applicant indicated that several faults are identified in intraplate Cuba and after a detailed review of literature and geologic maps, concluded that no late Quaternary activity was revealed for many of the intraplate Cuba faults. However, some authors, such as Cotilla-Rodriguez et al. (2007), assert Quaternary activity. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-368 (Sheets 1 through 3) shows the fault map locations and earthquakes in Cuba from the Phase 2 earthquake catalog. According to these figures, the faults in Cuba that are within the 320 km (200 mi) radius of the Turkey Point Units 6 and 7 site and described in the response to RAI 41, Question 02.05.01-21 (ADAMS Accession No. ML14282A078), are the Hicacos fault, Nortecubana fault, Las Villas fault, and Domingo fault. Although the applicant stated that earthquakes in Cuba do not appear to correlate strongly with faults, the staff notes that Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-368 shows a spatial association between some faults and seismic activity in Cuba. In addition, the staff looked at additional literature and current research not cited by the applicant to evaluate these features.

Hicacos Fault

In response to RAI 41, Question 02.05.01-21, the applicant characterized the Hicacos fault also known as Matanzas fault (Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-247). This fault is also discussed in response to RAI 41, Question 02.05.01-29. The applicant described the Hicacos fault as the closest fault to the Turkey Point Units 6 and 7 site that is identified as active by Cotilla-Rodríguez et al., (2007), based on associated seismicity. Based on the Phase 2 earthquake catalog, seismicity in the vicinity of the Hicacos fault is sparse and. Cotilla-Rodriguez et al. (2007) indicated that there are no earthquake focal mechanisms associated with the Hicacos fault. The applicant concluded that the association of these earthquakes with the Hicacos fault or another mapped or unmapped fault is problematic due to the uncertainties associated with the accurate locations of both faults and earthquakes in Cuba and the paucity of available focal plane solutions.

The staff notes that the number of stations in the Cuban network started increasing after 1998 when broadband seismometers were installed along the island of Cuba (Moreno Toiran, 2002). According to recent news from Cuban newspaper, Cubasi (2015), the Cuban government plans to expand its seismic network with new seismometers in the central region. This is not only to improve the monitoring of the regional seismicity but to share the data of its stations with the international community. The staff concludes that, in the near future, it may be possible to use seismic data from Cuba as a reliable constraint for the seismotectonic interpretations in the region.

Nortecubana Fault Zone and Domingo Fault

In response to RAI 41, Question 02.05.01-21, the applicant also described the Nortecubana fault zone (Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-247), located approximately 240 km (150 mi) of the Turkey Point Units 6 and 7 site, is the main structure within the Cuban Fold and Thrust belt, which falls offshore of, and nearshore to, northern Cuba dipping south with a various dip angle along the strike.

In RAI 41, Question 02.05.01-24 the staff asked the applicant to explain how the Nortecubana fault is expressed in the offshore bathymetry. In response to RAI 41, Question 02.05.01-24

dated October 3, 2014 (ADAMS Accession No. ML14282A079), the applicant indicated that Cotilla-Rodríguez et al. (2007) as well as other researchers, suggests the possibility that the Nortecubana is expressed in the bathymetry; however, none of these studies provide sufficient information to determine the nature of the bathymetric expression of the fault. Cotilla-Rodríguez et al.'s (2007) description of the Nortecubana fault as expressed "in the sea" is their indication that this fault is located offshore, as opposed to onshore, not that there is a geomorphic expression on the seafloor. Along much of its length, the surface projection of the Nortecubana fault is roughly associated with the continental slope off northern Cuba and, as such, is approximately spatially associated with this gross feature in the bathymetry. A continental slope is a bathymetric feature common to many nearshore areas and is not typically produced by faulting. Based on independent review of literature, the staff agrees with the applicant's conclusion that studies of the Nortecubana fault do not provide in depth description of the bathymetric expression of this fault.

In an October 3, 2014 response to RAI 41, Question 02.05.01-21 (ADAMS Accession No. ML14282A078), the applicant described the Domingo fault. The applicant indicated that the Domingo fault is considered the former suture between North American and Caribbean plates and is Late Eocene in age. The staff reviewed the information provided on the Domingo fault and based on several experts and maps from Cuba, the staff agrees with the applicant's conclusion that because the fault does not cut the uppermost Eocene and younger sedimentary units, it is not considered of Quaternary age.

Las Villas Fault

The Las Villas fault is located approximately 250 km (155 mi) south of the Turkey Point Units 6 and 7 site. In an October 3, 2014 response to RAI 41, Question 02.05.01-21 (ADAMS Accession No. ML14282A079), the applicant characterized the Las Villas fault as either middle Eocene age (Pardo, 2009) or Pliocene-Quaternary age outlined by young eroded scarps (Cotilla-Rodríguez et al., 2007). The applicant indicated that the Phase 2 earthquake catalog shows a total of 33 earthquakes located about 10 km (6 mi) from Las Villas fault, the largest being a MW 5.1 in 1873. Cotilla-Rodríguez et al. (2007) indicates that it is difficult to determine if these epicenters occurred on the Las Villas fault or another fault as there are no focal mechanisms available.

In RAI 41, Question 02.05.01-27 dated October 20, 2011 (ADAMS Accession No. ML11293A202), the staff asked the applicant to evaluate Cotilla-Rodríguez et al. (2007) statement about young eroded scarps of Pliocene-Quaternary age associated with the Las Villas fault, to discuss the bathymetric evidence that suggests recent faulting along the Las Villas fault, and to address alignment of earthquakes with respect to tectonic activity of Las Villas fault. In response to RAI 41, Question 02.05.01-27, the applicant explained that Cotilla-Rodríguez et al. (2007) does not provide additional details or references regarding their statement of young eroded scarps, therefore, it is not clear if the fault scarps formed by recent slip on the Las Villas fault, formed by erosion along the fault trace or formed by preferential erosion of sheared rocks within the fault zone. Although geologic maps of the area (Case and Holcombe 1980; Perez-Othon and Yarmoliuk 1985; Pushcharovskiy et al., 1988) reveal no faulted units of Quaternary age, the coarse scale of the mapping (1:250,000 to 1:2,500,000) does not preclude recent activity. The applicant stated that the Las Villas fault is depicted differently in several maps and Malloy and Hurley (1970) and Pardo (2009) are the only researchers that show Las Villas fault as an offshore feature. The applicant stated that Malloy and Hurley (1970) also indicated that the Las Villas fault appears to be reflected in the bathymetry as a scarp, but presented no additional information in support of this interpretation.

Furthermore, Malloy and Hurley's depiction of the Las Villas fault roughly coincides with the Nortecubana fault of other authors.

Review of geologic mapping (Case and Holcombe 1980; Perez-Othon and Yarmoliuk 1985; Pushcharovskiy et al., 1988) reveals no faulted units of Quaternary age, but the coarse scale of the mapping (1:250,000 to 1:2,500,000) does not preclude recent activity. The applicant stated that the Las Villas fault is depicted differently in several maps and possibly the name "Las Villas" was applied to different geologic structures. Malloy and Hurley (1970) and Pardo (2009) are the only researchers that show Las Villas fault as an offshore feature. Therefore, the applicant concluded that the bathymetric expression that exists for the offshore Las Villas is not relevant to assess latest movement of this fault but rather for the Nortecubana fault. The staff notes that although Malloy and Hurley (1970) did not provide additional detail on the Las Villas scarp it was recognized in their bathymetric studies as a noticeable feature associated with the Las Villas fault, and north of the Las Villas fault, a scarp extends along the Sierra de Jatibonico fault for 37 km (20 nautical mi). The staff concludes that the applicant adequately characterized the Las Villas fault, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, staff considers RAI 41, Question 02.05.01-27 resolved.

Pinar Fault

The Pinar fault is outside the 320 km (200 mi) radius of the Turkey Point Units 6 and 7 site and is covered in RAI 41, Question 02.05.01-21 and -28. The staff evaluated the characterization of the Pinar fault within the context of RAI 02.05.01-28.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2.4, "Seismicity of Cuba," states that two of the largest earthquakes in the central and western region of Cuba occurred in January 1880 (MMI VIII and magnitude 6.0 to 6.6) near the Pinar fault in western Cuba. Therefore, in RAI 41, Question 02.05.01-28 the staff asked the applicant to provide more information on the Pinar fault particularly in regards to the January 22, 1880, M 6.0-6.6, San Cristobal earthquake. In response to RAI 41, Question 02.05.01-28 (ADAMS Accession No. ML14282A079) the applicant explained that the Pinar fault is located in western Cuba around 330 km (205 mi) from the Turkey Point Units 6 and 7 site. The northeast-striking, southeast-dipping fault is mapped inconsistently in the published literature including geologic maps with respect to location and extent (Garcia et al., 2003; Cotilla-Rodríguez et al., 2007; and Rosencratz 1990). Garcia et al. (2003) states that the Pinar fault is expressed as a scarp in the Sierra del Rosario mountain range, was reactivated in the Neogene-Quaternary, and considers Pinar fault the most important fault system in western Cuba, whose surface expression is clearly observed from satellite images. Cotilla-Rodríguez et al. (2007) agrees that the fault has a prominent relief but concludes it is inactive. The applicant explained that the Pinar fault is depicted on many geologic maps of Cuba (scales: 1:250,000 to 1:1,000,000). One map shows Jurassic-age limestones in fault contact against upper Pliocene to lower Pleistocene alluvial and marine deposits, which suggest fault activity. Another map places Jurassic-age rocks in fault contact against Eocene to Miocene rocks. The applicant stated that due to the map scale it is not possible to constrain an age with confidence. The applicant concluded that the Sierra del Rosario mountain range scarp associated to Pinar fault could be a result of differential erosion or a result of Miocene normal faulting that occurred in western Cuba.

The applicant stated that there are also conflicting opinions regarding the association of the 1880 earthquake event with the Pinar fault: Garcia et al. (2003) suggests that the Pinar fault produced the 1880 earthquake; Cotilla-Rodríguez et al. (2007) classifies the Pinar fault as inactive and attribute the 1880 earthquake to the Guane fault along with 19 other earthquakes,

the largest one being the 1880 Mw 6.13 earthquake; and Cotilla-Rodriguez and Cordoba-Barba (2011) conclude that historical accounts of the 1880 earthquake suggest that the most severe and concentrated damage was near the Guane fault and not in the vicinity of the Pinar fault. The applicant stated that the Phase 2 earthquake catalog shows sparse seismicity in the vicinity of the Pinar fault but moderate-magnitude earthquakes within 32 km (20 mi) of the Guane fault. However, the applicant stated that these studies are inconclusive because no focal mechanisms are available to identify the causative fault and no paleoseismic trench studies or detailed tectonic geomorphic assessments are available for either the Guane or Pinar fault.

The staff notes that in 2011 the Cuban National Centre for Seismological Research (CENAI), along with eight institutions of Cuba, started an investigation on the Pinar fault to identify areas that may have evidence of past earthquakes. In the applicant's SSHAC Level 2 questionnaire José Alejandro Zapata Balanqué, director of the CENAI project, indicated that the trenching results from the Pinar and possibly other faults are expected in 2014 or later.

Based on the applicant's response to RAI 41, Question 02.05.01-28 and independent examination of the literature and various geologic maps of Cuba, the staff concludes that the applicant summarized the various point of views regarding the Pinar fault presented by experts in the area, published literature and available maps. The staff acknowledges that various interpretations exist regarding the Pinar fault and that specific kinds of data to precisely constrain the age of movement are not available at this time. The staff considers that ongoing investigation along the Pinar fault will reveal more information on this feature particularly the studies that the Cuban National Centre for Seismological Research (CENAI) is developing in the vicinity of the Pinar fault. The staff concludes that the applicant adequately characterized the Pinar fault given the available information. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-28 resolved.

Cochinos Fault

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2.4 originally stated that Cotilla Rodriguez et al. (2007) provided no geologic evidence for activity in this fault and described it as covered by young sediments. The Turkey Point Units 6 and 7 COL FSAR also indicates that the Cochinos fault appears to be geographically associated with sparse instrumental seismicity, but that these earthquakes are poorly located and no focal mechanisms are available. In RAI 41, Question 02.05.01-26 the staff asked the applicant provide a map of to the Cochinos fault and to discuss geologic evidence for fault activity. The staff also asked the applicant to map the seismicity of the Cochinos fault. In response to RAI 41, Question 02.05.01-28, the applicant indicated that the Cochinos fault is a north-northwest-striking fault in south-central Cuba depicted and interpreted differently by various researchers and on several maps. The applicant's Phase 2 earthquake catalog shows the Cochinos fault approximately 330 km (205 mi) from the Turkey Point Units 6 and 7 site. The length of the fault taken from the publications ranges from 60 to 140 km (37 to 90 mi). Some studies conclude that the fault is neotectonic (includes the Neogene and Quaternary periods), that it is expressed geomorphically in the landscape as a graben and bathymetrically in the Bahia de Cochinos, and that the fault cuts a Quaternary-age marine erosional platform. The applicant indicated that the morphology of Cochinos basin suggests the possibility of a fault-controlled landscape. The staff reviewed the cited publications and maps and notes that the fault is most likely a normal fault or set of parallel faults with an intervening graben that is between 280 to 340 km (175 to 210 mi) from the Turkey Point Units 6 and 7 site. The staff notes that the neotectonic map of the Caribbean region from Mann et al. (1990) shows the Cochinos fault as two parallel north-northwest-striking

normal faults that form a graben. The staff notes that these publications do not provide specific data to support a case that the fault is active.

With respect to seismicity possibly associated with the fault, the applicant indicated that seismicity in the vicinity of the Cochinis fault is sparse as observed in the Phase 2 earthquake catalog. The Phase 2 earthquake catalog shows a November 1982 Mw 5.4 earthquake about 5 km (3 mi) northwest of the Cochinis fault trace; four other earthquakes, the largest Mw 4.1, are observed within 32 km (20 mi) of the Cochinis fault. The staff notes that Cotilla-Rodríguez et al. (2007) classified the Cochinis fault as active based on associated seismicity and the most important earthquake detected on this fault was a December 1982 Ms 5.0 event. The applicant concluded that the association of seismicity with the Cochinis fault is problematic due to the uncertainties associated with the locations of both faults and earthquakes in Cuba.

The staff notes that the Cochinis fault is described and depicted differently by several researchers and on various maps; however, most acknowledge that the southern portion of the Cochinis fault is expressed in the topography on land and bathymetry in the Bahia de Cochinis. Seismicity associated with this fault is of low intensity, with the strongest event an Mw 5.4 in 1982. Based on the staff's review of the response to RAI 41, Question 02.05.01-26 and independent examination of references and map products cited by the applicant, the staff concludes that the applicant appropriately characterized the Cochinis fault. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-26 resolved.

Hazard Sensitivity Calculation for Cuba Areal Source

In response to RAI 41, Question 02.05.01-21, the applicant conducted a hazard sensitivity calculation to assess the potential effect of intraplate Cuba fault sources on the PSHA for the Turkey Point Units 6 and 7 site because the possibility of Quaternary activity on intraplate Cuba faults cannot be precluded. The SSHAC Level II study assessed the hazard sensitivity of various modeling decisions regarding Cuba seismic sources and determined conservative source parameters for use in hazard sensitivity calculations for: (1) possible intraplate Cuba fault sources, and (2) alternative depictions of areal seismic sources for intraplate Cuba.

Eleven experts including geologists, seismologists, and hazard analysts from Cuba and elsewhere were contacted by the TI team with questions related to sensitivity calculations. The responses varied as many experts declined to participate, others provided only brief responses, and other experts provided detailed responses. The applicant explained that most of the contacted experts acknowledge the importance of considering possible fault sources in the hazard sensitivity calculations and most of them recognized the limitations from the lack of data with which to determine active faults in intraplate Cuba. There is disagreement among the experts, for example: Cotilla-Rodríguez does not consider the Pinar fault active but suggests that the Guane fault is active and produced the January 23, 1880, earthquake in western Cuba; however, Garcia et al. (2003) considers the Pinar fault active and the source of the 1880 earthquake but does not describe the Guane fault as a potential seismic source. Because of the uncertainty regarding whether the Pinar or Guane faults are active, the TI team elected to include both of these faults as sources in the hazard sensitivity calculation with a probability of activity of 1.0 for each.

The applicant indicated that using median modeled slip rates on fault sources, the predicted recurrence of Mw 7 earthquakes in intraplate Cuba is approximately one every 500 years. Table 3, from the RAI 41, Question 02.05.01-21 response dated October 3, 2014 (ADAMS

Accession No. ML14282A078), provides the input parameters for the hazard calculations (fault, dip, rupture depth, length, Mw, slip rate). The response to RAI 37, Question 02.05.02-04, discussed in detail in Section 2.5.2 of this SER, describes the alternative areal source approaches for Cuba, as well as the results of both fault source and alternative areal source hazard sensitivity calculations.

Based on review of the scientific literature, including maps and the applicant's response to the preceding RAI questions about Cuba faults, including RAI 41, Question 02.05.01-21, the staff acknowledges that there is insufficient information regarding specific parameters (slip rate, recurrence, length, depth) to model specific faults as seismic sources. The staff notes that the applicant incorporated information from different sources, including relatively recent publications as well as interviews with outside experts, providing a comprehensive overview of the tectonic geologic features of Cuba and their potential impact on the PSHA. The staff notes that the applicant justified modeling intraplate Cuba as a single areal source, as opposed to multiple fault sources. The staff acknowledges that the sensitivity results conducted to compare hazard from fault seismic sources, and different configurations of Cuba areal sources show that the Cuba areal source hazard is equivalent to the hazard for fault sources. Therefore, the staff concludes that the applicant assessed sufficient information to characterize the tectonic features of Cuba, particularly those within the 320 km (200 mi) radius of the Turkey Point Units 6 and 7 site. The staff further concludes that using the areal source for the Turkey Point Units 6 and 7 site PSHA is appropriate. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Questions 02.05.01-21, -24, -27, resolved.

The applicant proposed a revision to the Turkey Point Units 6 and 7 COL FSAR to include portions of the response to RAI 41, Question 02.05.01-21. Staff notes this includes Enclosure A to the RAI response titled "SSHAC Level 2 Questionnaire in Support of Cuba Hazard Sensitivity Calculations." The staff finds the proposed revisions acceptable and has confirmed that these changes have been incorporated into the Turkey Point Units 6 and 7 COL FSAR.

Uplifted Marine Terraces

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.2.3 states that "Late Miocene to Pliocene deposits are poorly developed and Pleistocene rocks include shelf and coastal carbonates that in places have been uplifted into terraces." The staff notes that this implies Pleistocene tectonic uplift. The staff further notes that Agassiz (1894) described the extensive marine terraces along the northern coast of Cuba and very young elevated patch reef corals in growth position, forming the lowest terraces. In addition, a suite of Quaternary terraces along the northern edge of Cuba is clearly depicted in available 1:500,000 scale geologic maps of the region. In RAI 41, Question 02.05.01-22, the staff asked the applicant to explain the tectonic context of these uplifted terraces in light of continued seismicity along the northern coast of Cuba and to discuss the implication for assessments of active faulting in the site region.

In an October 3, 2014 response to RAI 41, Question 02.05.01-22 (ADAMS Accession No. ML14282A079), the applicant explained that the elevated marine terraces along Cuba's north coast may have formed as the result of both fluctuations in sea level and epeirogenic uplift. Early research suggests reactivation of a regional scale anticline or differential tectonic uplift may be partly responsible for formation of the terrace surfaces near Matanzas, along the north coast of Cuba. However, later research suggests that these differences in elevation could be the result of erosion or miscorrelation of surfaces as well as worldwide changes in sea level.

The staff notes that there are about three Pleistocene marine terraces in the Havana-Matanzas coastal region. The youngest, and therefore lowest, is Terraza de Seboruco, which is 3 to 4 m (10 to 13 ft) above sea level, is approximately 120,000 to 142,000 years old (ka) (Toscano et al., 1999), and is linked, because of age dating, with the global substage 5e sea-level highstand at 122 ka. This terrace is similar in elevation to other 5e reef deposits in stable portions of the Caribbean, thus its position can be explained by changes in sea level. The applicant indicated that the Terraza de Seboruco is the only terrace in northern Cuba for which radiometric age control is available. There is not sufficient data on other marine terraces in northern Cuba to assess the implications for active faulting.

A more recent investigation (Pedoja et al., 2011) examines late Quaternary coastlines worldwide and reports minor uplift relative to sea level of approximately 0.2 mm/yr, even along passive margins, outpacing eustatic sea-level decreases by a factor of four. The authors suggest that since the Late Cretaceous, there is an increase in the average magnitude of compressive stress in the lithosphere producing low rates of uplift even along passive margins. Their data suggest that the Substage 5e terrace in the Matanzas area (i.e., the Terraza de Seboruco) has been uplifted at an average rate that, when accounting for eustatic changes in sea level, ranges from approximately 0.00 to 0.04 mm/yr over the last approximately 122 ka accounting for about 4.9 m (16 ft) uplift.

The staff notes that based on the most recent studies, active faulting is not required to explain the elevation of the Terraza de Seboruco along Cuba's north coast in the site region. Worldwide uplift of even passive margins is revealed in the most recent study for global coastlines. If there is ongoing uplift of terraces in northern Cuba, the rate of this uplift is very low and approaching the limit of detection by recent studies. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-22, resolved.

The applicant proposed a revision to the Turkey Point Units 6 and 7 COL FSAR to include portions of the response to RAI 02.05.01-22. The staff finds the proposed revisions acceptable and has confirmed that these changes have been incorporated into the Turkey Point Units 6 and 7 COL FSAR.

Cuban Fold and Thrust Belt

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3.2 discusses the Cuban Fold and Thrust Belt and Turkey Point Units 6 and 7 COL FSAR Figure 02.05.01-279 shows mapped basement faults of the Cuban Fold and Thrust Belt with overlying and laterally continuous reflectors that appear to be deformed and folded up to and including the seafloor. Also, in Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-282, the staff notes that Tertiary, post-tectonic deposits are faulted, and the uppermost Tertiary deposits appear to lap-onto, rather than drape, an underlying fold on the same figure. Both relations are consistent with deformation that continues to present day. In RAI 41, Question 02.05.01-23, the staff asked the applicant to discuss the tectonic implications of the seismic reflection features above the mapped faults for Plio-Pleistocene activity in the Cuban Fold and Thrust Belt.

In an October 3, 2014, response to RAI 41, Question 02.05.01-23 (ADAMS Accession No. ML14282A079), the applicant stated that in Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-279 the visible irregularities in the Oligocene and Pleistocene reflectors in the seismic profile, as discussed by Saura et al. (2008), are "bright, irregular, internally chaotic reflections above the front of the Cuban thrust belt" typical of the Cenozoic section in this area; and the irregular

reflectors correspond to olistostromic sediments, on the basis of their seismic character and published borehole and seismic data. The staff notes that olistostromic sediments (or mélangé) are described as mapable lens-like stratigraphic units lacking true internal bedding because it is a result of a submarine gravity slide. The applicant stated that Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-282 shows a schematic cross section of the evolution of the northern edge of Cuba wherein a topographic high in the lower Tertiary post-tectonic strata is shown as not completely covered by the later Tertiary post-tectonic strata. The applicant concluded that there are no indications of faulting or folding in the later Tertiary post-tectonic strata depicted on either FSAR Figure 2.5.1-279 or 2.5.1-282.

The staff agrees that there is no faulting or folding in late Tertiary strata in Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1- 279 or -282. The staff notes that Moretti et al. (2003) does not specifically address Quaternary activity, but conclude that thrusting ceased in the Eocene, whereas infilling of the basin continued to the Quaternary because of sediment influx with few minor reactivations occurred during the Tertiary. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, the staff considers RAI 41, Question 02.05.01-23, resolved.

Seismic Zones Defined by Regional Seismicity

The staff focused its review on elements that contributed most to the hazard finding. Based on hazard assessment, the Cuba areal source and the Oriente East and Oriente West faults contribute the most to the hazard from sources in Cuba and the Caribbean (details in SER Section 2.5.2).

Cuba Seismic Source

As part of the geological characterization of Cuba, the applicant described many features on the island of Cuba including faults, geologic terranes, stratigraphy, and geologic history. In response to RAI 41, Question 02.05.01.-21, the applicant ran a sensitivity analysis comparing hazard results from a Cuba areal source versus individual fault sources and concluded that the total hazard for the Turkey Point Units 6 and 7 site does not change significantly between the areal source and individual fault sources. Additional discussion of the hazard analysis is presented in SER Section 2.5.2. The staff concludes that the Cuba areal source is an acceptable and plausible alternative approach to modeling the SSC individual faults on the island of Cuba based on the staff's previous evaluation of RAI 41, Question 02.05.01.-21.

North American and Caribbean Plate Boundary

The plate boundary sources in the Caribbean contribute to the total seismic hazard at the Turkey Point Units 6 and 7 site. However, due to their large distance from the Turkey Point Units 6 and 7 site their contribution levels are relatively low. The staff identified that the Oriente West and Oriente East faults, off the coast of southern Cuba, contribute the most to the total seismic hazard among the identified plate boundary sources. The Oriente fault zone forms part of the boundary between the modern North American plate and the Caribbean plate, including the Gonave microplate. It is located directly off the southern coast of Cuba about 690 km (430 mi) from the Turkey Point Units 6 and 7 site and is a left-lateral strike-slip fault with 8 to 13 mm/year slip, hence the applicant classified this as a capable tectonic source. The staff did not ask RAIs for this section and conclude the applicant adequately characterized this seismic zone outside the 200 mile radius of the site. The range of slip provided for this fault zone is consistent with the published literature. The Oriente fault parameters in the Cuba and northern

Caribbean seismic source model is further described in Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.4.4.3.

Staff Conclusions on Regional Geology and Tectonic Setting

Based on review of Turkey Point Units 6 and 7 COL FSAR Sections 2.5.1.1.2, "Regional Tectonic Setting," and 2.5.1.1.3, "Regional Seismicity and Paleoseismology," the applicant's responses to RAs on those two FSAR sections, as well as independent examination of references cited by the applicant in those two sections, the staff finds that the applicant provided a complete and accurate description of the regional tectonic setting and regional seismicity and paleoseismology for the Turkey Point Units 6 and 7 site, including regional geologic setting, tectonic stress, gravity and magnetic data in the site region and site vicinity, principal regional tectonic structures, and seismic sources defined by regional seismicity in the CEUS both inside and outside the site region. The staff also finds that the descriptions provided in the Turkey Point Units 6 and 7 COL FSAR Sections 2.5.1.1.2 and 2.5.1.1.3 reflect the current literature and state of knowledge and meet the requirements of 10 CFR 52.79 and 10 CFR 100.23.

2.5.1.4.2 Site Geology

Site Area Physiography and Geomorphology

The large physiographic features bordering the plant property include the Everglades, Florida Keys, and the Atlantic Continental Slope, including Biscayne Bay and the submarine Miami Terrace. Site features include vegetated surficial depressions and patches on the floor of Biscayne Bay.

Vegetated Surface Depressions

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.8.2.1 concludes that shallow depressions preserved at the surface, observed at the site and in the site vicinity, are formed by gradual top-down, subaerial dissolution. The applicant stated that these features are unlikely to have underlying cavity voids with potential for sudden collapse. The applicant refers to these site features as vegetated surficial depressions. As a result of discussions during public meetings, site visits by the staff and RA questions pertaining to Turkey Point Units 6 and 7 COL FSAR Sections 2.5.1 and 2.5.3 (RA 41, Questions 02.05.01-1, -2, and -17, and 02.05.03-1) and Turkey Point Units 6 and 7 COL FSAR Section 2.5.4 (RA 40, Questions 02.05.04-1, and -25), the applicant conducted a supplement field investigation of the vegetated depressions on the Turkey Point Units 6 and 7 site and vicinity, as described in Turkey Point Units 6 and 7 COL FSAR Enclosure 9, "Surficial Muck Deposits Field and Laboratory Investigation Data Report"; and Enclosure 8, "Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 and 7." In addition, the applicant developed FSAR Appendix 2.5 AA, "Potential for Carbonate Dissolution and Karst Development at the Turkey Point Units 6 and 7 Site." In these three subsequent submittals, the applicant responded in a general manner to multiple RA questions and provided more data and described, in more detail, vegetated depressions at the Turkey Point Units 6 and 7 site and throughout southern Florida (Willard and Bernhardt, 2011). The staff notes that these features also fit the description of solution sinkholes from Stewart and Sinclair (1985), as described in SER Section 2.5.1.1.

Enclosure 9 describes the additional geotechnical borings conducted to describe surficial soil and sediment layers which include muck and peat deposits and to specifically characterize the vegetated surficial depressions. Core runs extended from ground surface to the Miami

Limestone contact at all sample locations (nine sample locations, Turkey Point Units 6 and 7 COL FSAR Enclosure 9, Figure 2-1). Peat was found primarily in depressions, natural water drainages, and as the basal deposits on Miami Limestone. Surficial layers within vegetated surficial depressions were characterized as peat and as thick as 2 m (6.68 ft) (borehole M-7-2a). Enclosure 8 describes the three inclined borings through hard rock that were intended to intersect zones of fractures beneath surface features such as the vegetated depressions and natural drains (see the applicant's response to RAI 44, Question 02.05.04-25). These borings were also aimed at finding potential cavities. No cavities of significant sizes were found under the targeted vegetated depression area or the drainage channels.

Vegetated Patches on the floor of Biscayne Bay

The staff notes the presence of the apparent semi-circular alignments of individual offshore depressions on the sea floor of Biscayne Bay within 3 km (1.8 mi) to the east of Units 6 and 7. In RAI 5875, Question 02.05.03-1, in SER Section 2.5.3.4, the staff asked the applicant to discuss these offshore features and their age of formation. In closely related RAI 41, Question 02.05.01-2, staff asked the applicant to discuss the possibility that the zones of secondary porosity found at the Turkey Point Units 6 and 7 site in the subsurface are in the same stratigraphic interval that contains the circular depressions or vegetated patches on the floor of Biscayne Bay.

In an October 3, 2014 response to RAI 43, Question 02.05.03-1 (ADAMS Accession No. ML14281A177), the applicant suggested that the vegetated patches on the floor of the bay appear to be paleo-dissolution features that formed subaerially, during the last glacial stage when sea level was approximately 328 ft (100 m) lower than today, exposing the bay floor to surficial dissolution by fresh rainwater. The staff agrees with the applicant's conclusion that the process of subaerial dissolution ended in Biscayne Bay when sea level rose and flooded the bay but continued on emergent areas, including the vegetated depressions at Turkey Point Units 6 and 7 site. In response to RAI 41, Question 02.05.01-2, The applicant replied that based on stratigraphic data and bathymetry in Biscayne Bay, the touching-vug porosity zone at the site (within the Miami and Key Largo Limestones) correlates with the stratigraphic interval in which the vegetated patches occur on the floor of Biscayne Bay. However, the applicant indicated that the vegetated patches in the bay formed by subaerial dissolution, similar to the surficial vegetated depressions on the site, rather than by groundwater mixing zones. This suggests that the vegetated patches in Biscayne Bay are not linked to the touching-vug porosity zone beneath the Turkey Point Units 6 and 7 site. The applicant concluded that the features on the floor of Biscayne Bay do not appear to have the capacity for development of large underground caverns with the potential for collapse and formation of sinkholes. The staff notes that based on stratigraphic data and bathymetry in the bay provided by the applicant that the moldic porosity zone in the Fort Thompson Formation is too deep to be expressed on the floor of Biscayne Bay. Therefore, the staff considers RAI 41, Question 02.05.01-2, and RAI 5875, Question 02.05.03-1, resolved.

Site Area Stratigraphy

The applicant described the upper 183 m (600 ft) of the Turkey Point Units 6 and 7 site stratigraphy as consisting of eight soil and rock formations including: a surficial muck layer (Holocene section), Miami Limestone, Key Largo Limestone, the Fort Thompson Formation, the Upper Tamiami Formation, the Lower Tamiami Formation, the Peace River Formation, and the Arcadia Formation. The staff focused its review on the surficial deposits that reveal the most recent geologic history of the site along with possible indications of tsunami and hurricane storm

deposits. The staff also considered the characterization of the bearing layer for Units 6 and 7, the Fort Thompson Formation.

Holocene Section

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.2 describes the Holocene section at the Turkey Point site. In response to RAI 41, Question 02.05.01-17, in part, and RAI 40, Question 02.05.04-1, in part, the applicant collected additional data and provided an analysis of the surficial sediment layers at the Turkey Point Units 6 and 7 site based on the supplemental field investigations (Turkey Point Units 6 and 7 COL FSAR Enclosures 8 and 9). These reports include a description of the muck layers and peat deposits and an evaluation for the lack of hurricane and tsunami deposits.

The applicant stated that surface sediments at the Turkey Point Units 6 and 7 site are indicative of fresh water conditions at the Turkey Point Units 6 and 7 site, formed after the area emerged with the drop in sea level during the last glacial period. The laminations in the organic-rich elastic silt and peat deposits at the site (Muck report) likely resulted from cyclical changes in redox conditions, with organic rich laminae deposited under low oxygen conditions and light colored, carbonate-rich laminae deposited under open marsh, shallow water and less anaerobic conditions (Flugel, 2009). In coastal Florida wetlands, marl deposition is typically associated with freshwater conditions. Within the Turkey Point Units 6 and 7 site cores, evidence for historic freshwater conditions is provided by the presence of intact specimens of *Planorbella* spp., a freshwater gastropod (Easton et al., 2012). The applicant pointed out (Enclosure 9) that the surficial deposits described at the Turkey Point Units 6 and 7 site generally correspond to the surficial sediment sequences described within other coastal wetland systems adjacent to Biscayne Bay (Willard and Bernhardt, 2011; Robles et al., 2005; Schroeder et al., 1958). Based on radiocarbon age determinations, the basal peat deposits from these locations generally date to between 4,400 and 1,100 years before present.

The applicant concluded that based on the boreholes and surface samples, the surficial sediment record or Holocene section at the site provides no direct evidence for material and sedimentary structures that could be interpreted as evidence for high-energy depositional events (e.g., hurricane or tsunami landfalls). That is, no storm bed, tsunamigenic deposits (upward fining clastic sequences), peaks in sand content (sand sheets), nor erosive surfaces, were identified in any borings at the site.

Staff concludes that the additional field investigation provided in Enclosure 9 provides the data to support the applicant's conclusion that there is no evidence in surficial peat depressions of tsunami or hurricane deposits. Staff also concludes that the applicant has characterized the youngest geologic layers at the Turkey Point Units 6 and 7 site sufficiently to determine the most recent geologic history.

Pleistocene Section

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.2 describes the Pleistocene section at the Turkey Point Units 6 and 7 site, which includes the Miami and Key Largo Limestones and the Fort Thompson Formation, and is about 31 to 38 m (102 to 125 ft) thick. In RAI 41, Question 02.05.01-17, staff asked the applicant to provide additional information and clarification on the isopach and structure contour maps of the Key Largo Limestone and the Fort Thompson Formation in order to verify that there is no deformation in those stratigraphic units. In response to RAI 41, Question 02.05.01-17, the applicant provided revised structure contour

and isopach maps and cross sections. The staff examined the isopach map of the Key Largo Limestone in comparison with the structure contour map of the top of the Fort Thompson Formation and notes that there is no strong correlation between the thickness of the Key Largo Limestone and the topography at the top of the Fort Thompson Formation suggesting the absence of a large collapse feature within the Fort Thompson Formation that extends upward into the Key Largo Limestone. The staff notes that the structure contour map of the top of the Key Largo Limestone does not correlate strongly with the locations of the vegetated surficial depressions, suggesting that any dissolution associated with the vegetated surficial depressions has not fully penetrated the Miami Limestone to affect the top of the underlying Key Largo Limestone. Staff examined both structure contour and isopach maps for the Key Largo and the Fort Thompson Formation and compared these to the geotechnical cross sections to verify essentially flat lying layers with no indication of disturbed, inclined layers or anomalous thicknesses to suggest collapsed cavities in the subsurface. Accordingly, the staff considers RAI 41, Question 02.05.01-17, resolved.

Structural Geology

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.3, describes the structural setting for the Turkey Point Units 6 and 7 site that considers published literature and maps, Units 3 and 4 UFSAR (FPL, 1992), and the supplemental exploration programs (MACTEC, 2008; Enclosure 8; Enclosure 9). The staff notes that these data indicate generally flat, planar bedding in Pleistocene and older units and an absence of geologic structures within the site area (see discussion in SER Section 2.5.1.4.2 Site Area Stratigraphy).

The applicant also stated that the site lies on the stable Florida carbonate platform, and that no faults or folds are mapped within more than 40 km (25 mi). The staff notes that there is a tectonic structure located in the subsurface in the Biscayne Bay within 40 km (25 mi) of the Turkey Point Units 6 and 7 site. In previously discussed and resolved RAI 81, Question 02.05.01-36, the staff asked the applicant to discuss this tectonic feature with respect to the Turkey Point Units 6 and 7 site and integrate it into the regional tectonic setting. Based on the applicant's response and conclusions in SER Section 2.5.1.4.1.3.1, the staff determines that this feature is neither a seismic hazard nor a surface deformation hazard to the Turkey Point Units 6 and 7 site.

Analysis of Lineaments and Fracture Patterns

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.3 analyzes lineaments and fracture patterns in the Turkey Point Units 6 and 7 region and site based on a response to RAI 40, Question 02.05.04-1. The 1940's aerial photographs (USGS, 2004) were used for the interpretation and analysis of the lineaments. This photo set shows the surface features of the site area prior to any significant modification of the landscape.

The staff examined the orientations of the lineaments at the site area and notes that they are consistent with large-scale, regional lineament trends identified in other studies, which linked these features to subsurface fracture orientations (Bond et al., 1981). The documented vertical or near-vertical fracture orientations in Florida (USACE, 2004) supported the initial assumption that the lineaments identified in the Turkey Point site area were associated with fractures in the subsurface. The staff notes that this is corroborated by results of the inclined boreholes completed by the applicant as part of the supplemental field program as documented in Enclosure 8. The staff notes that these subvertical fractures or joints in the region, and in particular at the Turkey Point Units 6 and 7 site, are possibly initiation points for the

development of the vegetated surface depressions. The staff also notes that there is no indication in the data that there are offsets along the joints to suggest faulting.

Site Geologic Hazard Evaluation

The applicant examined the Turkey Point Units 6 and 7 site area and found no evidence of active tectonic features, no known tsunami deposits, no evidence for seismically induced paleoliquefaction features or other indicators of paleoseismic activity, and no known sinkholes in the underlying karst terrane. For site geologic hazard evaluation at the Turkey Point Units 6 and 7 site, the staff focused on carbonate dissolution features in the site area, past evidence of storm or tsunami deposits, and a Miocene tectonic fault in Biscayne Bay. The staff independently reviewed relevant publications, supplemental reports from the applicant, including the field and laboratory investigation report provided in Turkey Point Units 6 and 7 COL FSAR Enclosure 9, as well as the applicant's responses to RAI 41, Questions 02.05.01-1, -2, -17; RAI 81, Questions 02.05.01-36 and 02.05.01-37, and RAI 40, Question 02.05.04-1, that pertain to carbonate dissolution features. The staff also notes that in response to RAI 82, Question 02.05.04-26, the applicant will develop a grouting program based on its test program for the subsurface beneath the nuclear island, which will grout the zone between EL -10.7 m and EL -18.3 m (EL -35 ft and EL -60 ft) and constrain any remaining voids not having potential to exceed 6.1 m (20 ft) equivalent diameter between EL -18.3 m and EL -33.5 m (EL -60 ft and EL -110 ft). Also, the applicant performed a sensitivity analysis to demonstrate the void size (6.1 m (20 ft)) constrained by the grouting program is not critical to the stability of subsurface materials and the integrity of SSCs. The staff's evaluation of the grouting plan and testing program, the sensitivity analysis, and the associated ITAAC are discussed in SER Section 2.5.4.4.4.

The staff finds that the Turkey Point Units 6 and 7 site has no known geologic hazards that would affect the safe operation of the proposed Units 6 and 7. Therefore, the staff concludes that the applicant provided a thorough and accurate description of site geologic hazard evaluation in support of the Turkey Point Units 6 and 7 application.

Site Area Engineering Geology

Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.5 addresses site engineering soil properties and behavior of foundation materials, zones of alteration, weathering, dissolution, and structural weakness, prior earthquake effects, and effects of human activities. Detailed discussions on earthquake effects are found in Turkey Point Units 6 and 7 COL FSAR Section 2.5.2 and details on soil properties and foundation materials are found in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4. The applicant stated that the foundation bearing strata will be evaluated and geologically mapped as the subgrade excavation is completed to confirm that the observed properties are consistent with those used in the design and that any deformation features discovered during construction do not have the potential to compromise the safety of the plant. The staff will be notified when safety-related excavations are open for inspection.

The applicant stated that its review and interpretation of aerial photography, the published literature, its field reconnaissance and the results of the subsurface exploration completed in support of the Turkey Point Units 6 and 7 COL FSAR found no unusual zones of alteration, weathering profiles, or structural weakness in the surface or subsurface. Additional discussion of the staff evaluations of the subsurface with respect to geotechnical engineering are found in SER Section 2.5.4. Based on the staff's review of the Turkey Point Units 6 and 7 COL FSAR, RAI responses and staff's own independent review of the published literature, the staff agrees with the applicant's conclusion. The staff concludes that the applicant provided a thorough and

accurate description of site engineering geology in support of the Turkey Point Units 6 and 7 application.

2.5.1.5 Post-Combined License Activities

There are no post-COL activities related to FSAR Section 2.5.1. However, SER Section 2.5.3.5 identifies a geologic mapping License Condition for Turkey Point Site Units 6 and 7 as the responsibility of the applicant. SER Section 2.5.3.5 defines the applicant's responsibility for geologic mapping at Turkey Point Units 6 and 7 as License Condition (2-1). In addition, SER Section 2.5.4.5 identifies an ITAAC for seismic Category I structures foundation grouting for Turkey Point Site Units 6 and 7 as the responsibility of the applicant and which establishes a set of actions and criteria for the grouting activity necessary to provide assurance that, when met, the stability of seismic Category I structures are in conformance with the combined license.

2.5.1.6 Conclusion

The staff reviewed the Turkey Point Units 6 and 7 COL FSAR and referenced DCD. Based on these reviews, the staff confirms that the applicant addressed the required information related to basic geologic and seismic characteristics, and there is no additional outstanding information that must be discussed in the Turkey Point Units 6 and 7 COL FSAR related to these characteristics. NUREG-1793 and its supplements document the results of the staff's technical evaluation of the information incorporated by reference into the Turkey Point Units 6 and 7 COL FSAR.

As set forth above, the staff has reviewed the information in PTN COL 2.5-1 and PTN SUP 2.5-1 finds that the applicant provided a thorough characterization of basic geologic and seismic information for the Turkey Point Units 6 and 7 site, as required by 10 CFR 100.23 and 10 CFR 52.79(a)(1)(iii). In addition, the staff concludes that the applicant identified and appropriately characterized all seismic sources significant for determining the GMRS, or SSE, for the COL site, in accordance with NRC regulations provided in 10 CFR 100.23 and 10 CFR 52.79(a)(1)(iii) and the guidance provided in RG 1.208. Based on the applicant's geologic investigations of the site region, site vicinity, site area, and site location, the staff concludes that the applicant has properly characterized regional and site lithology, stratigraphy, geologic and tectonic history, and structural geology, as well as subsurface soil and rock units at the Turkey Point Units 6 and 7 site. The staff also concludes that there is no potential for the effects of human activity (i.e., mining activity or groundwater injection or withdrawal) to compromise the safety of the site. Therefore, the staff concludes that the Turkey Point Units 6 and 7 site is acceptable from the standpoint of geologic and seismic information and meets the requirements of 10 CFR 100.23 and 10 CFR 52.79(a)(1)(iii).

PTN COL 2.5-1 addresses the provision of regional and site-specific geologic, seismic, and geophysical information, as well as conditions caused by human activity. Based on the discussion of the basic geologic and seismic information presented in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1, and the technical evaluation presented above in SER Section 2.5.1.4, the staff concludes that the applicant provided the information required to satisfy PTN COL 2.5-1.

2.5.2 Vibratory Ground Motion

2.5.2.1 Introduction

The vibratory ground motion is evaluated based on seismic, geologic, geophysical, and geotechnical investigations carried out to determine the site-specific ground motion response spectrum (GMRS), which must meet the regulations for the safe shutdown earthquake provided in 10 CFR 100.23. The GMRS is defined as the free-field horizontal and vertical ground motion response spectra at the plant site. The development of the GMRS is based upon a detailed evaluation of earthquake potential, taking into account the regional and local geology, Quaternary tectonics, seismicity, and site-specific geotechnical engineering characteristics of the site subsurface material. The specific investigations necessary to determine the GMRS include the seismicity of the site region and the correlation of earthquake activity with seismic sources. Seismic sources are identified and characterized, including the rates of occurrence of earthquakes associated with each seismic source. Seismic sources that have any part within 320 km (200 mi) of the site must be identified. More distant sources that have a potential for earthquakes large enough to affect the site must also be identified. Seismic sources can be capable tectonic sources or seismogenic sources. The staff's review covers the following specific areas: (1) Seismicity, (2) geologic and tectonic characteristics of the site and region, (3) correlation of earthquake activity with seismic sources, (4) PSHA and controlling earthquakes, (5) seismic wave transmission characteristics of the site, (6) site-specific GMRS, and (7) any additional information requirements prescribed in the "Contents of Application" sections of the applicable subparts to 10 CFR Part 52 Subparts.

2.5.2.2 Summary of Application

Section 2.5.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 2.5.2 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.5.2, the applicant provided supplemental, site-specific information to address the following:

AP1000 COL Information Items

- PTN COL 2.5-1

The applicant provided additional information in PTN COL 2.5-1 to address COL Information Item 2.5-1. PTN COL 2.5-1 addresses the provision of regional and site-specific geologic, seismic, and geophysical information, as well as conditions caused by human activities. This information includes: structural geology; seismicity of the site; geologic history; evidence of paleo-seismicity; site stratigraphy and lithology; engineering significance of geologic features; site groundwater conditions; dynamic behavior during prior earthquakes; zones of alteration, irregular weathering, or structural weakness; unrelieved residual stresses in bedrock; materials that could be unstable because of mineralogy or unstable physical properties; and the effects of human activities in the area.

- PTN COL 2.5-2

The applicant provided additional information in PTN COL 2.5-2 to address COL Information Item 2.5-2. PTN COL 2.5-2 addresses the provision for site-specific information related to the vibratory ground motion aspects of the site including: seismicity, geologic and tectonic characteristics, correlation of earthquake activity with seismic sources, PSHA, seismic wave transmission characteristics and the SSE ground motion.

- PTN COL 2.5-3

The applicant provided additional information in PTN COL 2.5-3 to resolve COL Information Item 2.5-3, which addresses the provision for performing site-specific evaluations, if the site-specific GMRS at foundation level exceed the response spectra in AP1000 DCD Figures 3.7.1-1 and 3.7.1-2 at any frequency, or if soil conditions are outside the range evaluated for the AP1000 DC.

Supplemental Information

- PTN SUP 2.5-1

The also applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.5, "Geology, Seismology, and Geotechnical Engineering," which provides summary information of detailed information in Turkey Point Units 6 and 7 FSAR Section 2.5.2, "Vibratory Ground Motion," for the Turkey Point Units 6 and 7 site.

2.5.2.2.1 *Seismicity*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.1 describes the development of an up-to-date earthquake catalog for the Turkey Point Units 6 and 7 site. Following guidance in RG 1.208, "A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion," the applicant used the CEUS) Electric Power Research Institute (EPRI)-Seismicity Owners Group (SOG) earthquake catalog as a starting point and updated it through February 2008, since the EPRI-SOG catalog is complete through 1984. However, the applicant noted that the seismic hazard at the Turkey Point Units 6 and 7 site is also affected by earthquakes in Cuba and the Caribbean region. The EPRI-SOG earthquake catalog does not cover this region. Therefore, the applicant developed a separate earthquake catalog primarily covering the regions of Cuba and the Caribbean. The applicant referred to the EPRI-SOG earthquake catalog update as the Phase 1 update, and to the development of the new earthquake catalog covering the regions of Cuba and the Caribbean as the Phase 2 update.

The Phase 1 earthquake catalog update covered a window from 22 ° to 35 ° N latitude and 100 ° to 65 ° W longitude. The applicant identified all earthquakes from 1984 to 2008 within this window using 34 regional catalogs and eliminated dependent events using the criteria described in EPRI (1988). For earthquakes with available body-wave magnitudes (m_b), the applicant adopted that magnitude directly. Otherwise, the applicant converted available magnitude measurements to m_b using procedures defined in the 1988 EPRI study. Since both the EPRI-SOG earthquake catalog and recurrence characterization of the EPRI-SOG seismic sources use the m_b scale, the applicant constrained the Phase 1 earthquake catalog update to maintain the magnitude scale in m_b . However, since modern seismic hazard analyses describe magnitudes in terms of moment magnitude (M_w) rather than m_b , the applicant also scaled m_b to M_w using established relationships to enable a consistent comparison between magnitude scales.

The Phase 2 earthquake catalog update covered a window from 15 ° to 24 ° N latitude and 100 ° to 65 ° W longitude. The applicant used 22 regional earthquake catalogs to compile this catalog. This region has variable seismic network data coverage, and therefore, variable quality data sets that cover different time spans. In addition, the applicant identified 19 different scales describing earthquake magnitudes in the Cuba and Caribbean regions. The applicant converted the different magnitude scales to moment magnitude (M_w or M) to obtain an earthquake catalog with a uniform magnitude scale. The earthquake catalogs compiled by the applicant contain both independent (e.g., mainshocks) and dependent (e.g., foreshocks, aftershocks, etc.) events. In order to ensure that the final Phase 1 and Phase 2 earthquake catalogs contain only independent events, the applicant declustered the catalogs to include only mainshock events in the final catalog. Figures 2.5.2-1 and 2.5.2-2 show the final updated earthquake catalog used in the Turkey Point Units 6 and 7 site's seismic hazard assessment. After the establishment of the updated earthquake catalog to be used in the Turkey Point Units 6 and 7 site's seismic hazard calculations, and in accordance with the 1988 EPRI-SOG PSHA study, the applicant also developed the earthquake completeness assessments in the zones not initially covered by the EPRI-SOG models.

2.5.2.2.2 *Geologic and Tectonic Characteristics of the Site and Region*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.2 describes original EPRI-SOG seismic source models and the need to update these models based on new data and information prior to using them in the Turkey Point Units 6 and 7 site's seismic hazard assessments.

Consistent with RG 1.208, the applicant used the 1986 EPRI-SOG seismic source model as a starting point for its seismic source characterization of the Turkey Point Units 6 and 7 site. The 1986 EPRI-SOG seismic source model comprises input from six independent earth science teams (ESTs): the Bechtel Group, Dames and Moore, Law Engineering, Rondout Associates, Weston Geophysical Corporation, and Woodward-Clyde Consultants. Figure 2.5.2-1 illustrates seismic sources located within 320 km (200 mi) of the Turkey Point Units 6 and 7 site that were delineated by each of these six ESTs.

Because of the time elapsed since the publication of these models, the applicant reviewed available geological, seismological, and geophysical data since the late 1980s to evaluate the need for modifications to the original EPRI-SOG ESTs' seismic source models. The applicant described various modifications including maximum magnitude (M_{max}) updates due to recent earthquakes, the addition of supplemental source zones to cover the entire 320 km (200 mi) radius of the site region, an update of the Charleston seismic source, and the addition of new sources outside the EPRI-SOG model coverage to include potential hazard impacts from seismic sources in the regions of Cuba and the North American-Caribbean plate boundary region. SER Section 2.5.2.2.4 discusses these updated seismic source models and their parameters.

2.5.2.2.3 *Correlation of Earthquake Activity with Seismic Sources*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.3 describes the correlation seismicity with the seismic source models used in the PSHA calculations. The FSAR states that the Turkey Point Units 6 and 7 site's PSHA included the updated EPRI-SOG seismic sources along with new supplementary sources specifically developed for this application. The applicant compared seismicity from the Phase 1 catalog update described above with the known geologic features described in the EPRI-SOG seismic source models and concluded that there was no clear

association of seismicity with any known geologic structures within EPRI-SOG seismic sources. Using the updated earthquake catalog, the applicant further concluded: (1) there is no unique seismicity cluster in the region requiring new sources, (2) the updated earthquake catalog does not show a pattern of seismicity, and (3) the Phase 1 earthquake catalog does not imply a significant change in seismicity parameters. The applicant, however, noted that the Phase 1 earthquake catalog requires updates to many of the EPRI-SOG seismic source models' M_{\max} values. The applicant further stated that correlation of seismicity with Cuban and Caribbean seismic sources are discussed in the PSHA and controlling earthquakes section of the FSAR; a summary of which is discussed in SER Section 2.5.2.2.4.

2.5.2.2.4 Probabilistic Seismic Hazard Analysis and Controlling Earthquakes

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.4 describes the results of the applicant's PSHA for the Turkey Point Units 6 and 7 site. In performing its PSHA, the applicant followed the guidance provided in RG 1.208 to determine the seismic hazard curves and controlling earthquakes for the Turkey Point Units 6 and 7 site. The applicant based its analyses on the original EPRI hazard study (1989) and used the seismic sources identified in EPRI-SOG's 1986 study and updated them as necessary. In addition, the applicant determined that seismic sources in Cuba and the northern Caribbean region also contributed to the total seismic hazard and established new seismic source models for these regions, because these regions were not covered in the 1986 EPRI-SOG study. Similarly, because the existing ground motion prediction models do not cover the Caribbean region, the applicant developed new ground motion prediction models to be used for seismic sources in Cuba and the Caribbean using a SSHAC Level II process.

The PSHA seismic hazard curves generated by the applicant represent generic hard rock conditions characterized by a shear wave velocity (V_s) in excess of 2.8 km per second (9,200 ft per second). In addition, the applicant described the earthquake potential for the site in terms of a Uniform Hazard Response Spectra (UHRS) and controlling earthquakes, the most likely earthquake magnitudes and source-site distances. The applicant determined the low- and high-frequency controlling earthquakes by deaggregating the PSHA seismic hazard curves at selected probability levels. The following sections describe the applicant's entire PSHA process.

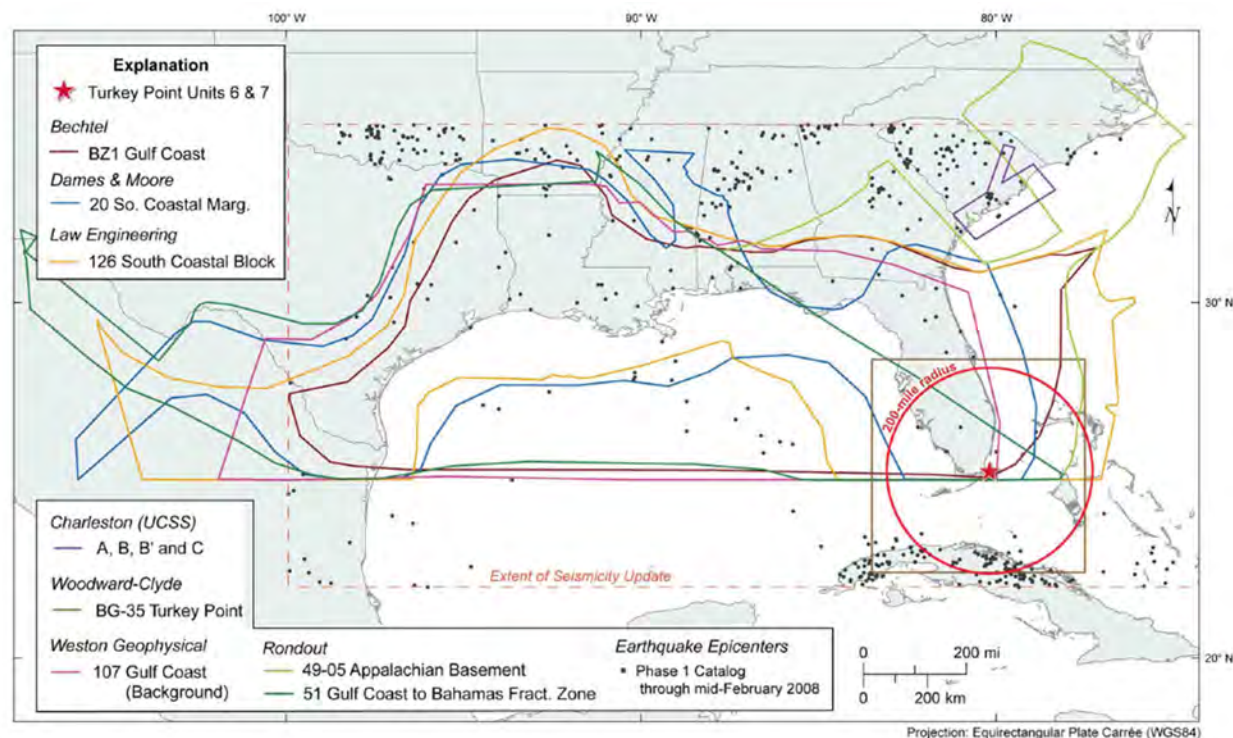


Figure 2.5.2-1. Map showing the updated EPRI earthquake catalog and CEUS seismic sources used for the Turkey Point Units 6 and 7 site (Reference Turkey Point Units 6 and 7 COL FSAR Figure 2.5.2-203).

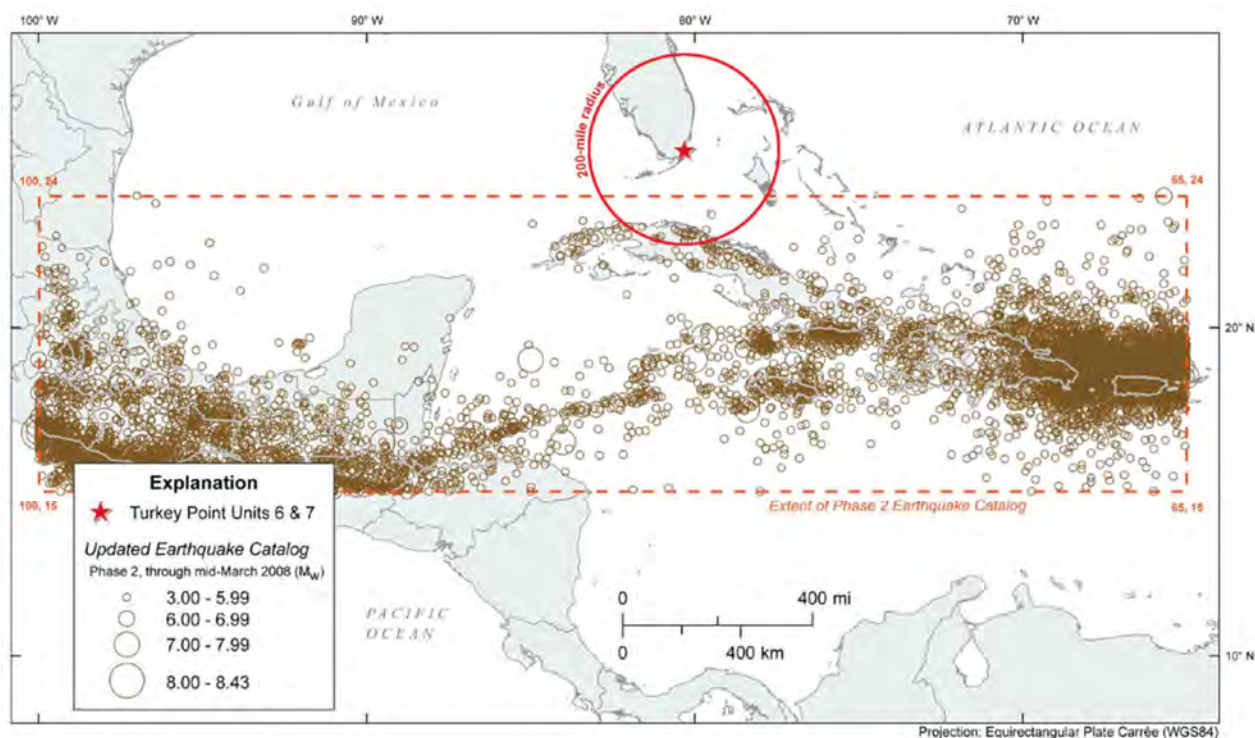


Figure 2.5.2-2. Map showing earthquakes included in the Phase 2 update (Reference Turkey Point Units 6 and 7 COL FSAR Figure 2.5.2-216).

PSHA Inputs

Before performing the PSHA, as outlined in RG 1.208, the applicant addressed the potential significant new information on seismic source characterization and developed new seismic source models for the Cuba and Caribbean regions. The following sections describe the applicant's efforts in developing a complete seismic source model to be used in the Turkey Point Units 6 and 7 site's PSHA.

Original EPRI PSHA Calculations and Updates to EPRI-SOG Seismic Sources

Initially, before conducting new PSHA calculations, the applicant first tested its own seismic hazard calculation code by re-calculating the 1989 PSHA results at the Crystal River Nuclear Generating Plant, approximately 450 km (280 mi) northeast of the Turkey Point Units 6 and 7 site, since the original EPRI PSHA study did not incorporate the Turkey Point site. The applicant showed that it could duplicate the original mean total seismic hazard curves at the Crystal River Nuclear Generating Plant site. Then, in accordance with the guidance in RG 1.208, the applicant assessed potential updates to the original seismic source model parameters following an extensive review of recently published information. The applicant primarily discussed the effects of the Phase 1 earthquake catalog updates on the published seismicity rates as well as the M_{\max} estimates for the selected EPRI-SOG seismic sources. The following provides a summary of the applicant's assessments.

1. Seismicity Rates

To evaluate potential effects of the updated EPRI-SOG earthquake catalog, the applicant selected a region covering the Florida Peninsula within the boundaries of the EPRI study region. The applicant then calculated earthquake recurrence parameters using both the original EPRI earthquake catalog and the updated catalog. The applicant compared the two results to show that the updated earthquake catalog produces slightly lower recurrence rates than those calculated using the original EPRI catalog. Based on this analysis, the applicant chose not to update the seismicity rates and used the original published rates in its seismic hazard analysis.

2. New Maximum Magnitude Information

Using the updated earthquake catalog, the applicant identified four moderate-sized earthquakes within the EPRI-SOG seismic source models that impact the seismic source model's original M_{\max} assignments. The earthquakes identified by the applicant are the **M5.9** September 10, 2006, Gulf of Mexico earthquake, the **M5.58** February 10, 2006, earthquake, the **M5.0** October 24, 1997, earthquake, and the approximately **M6.0** January 23, 1880, Cuba earthquake. The applicant stated that maximum magnitude values assigned to all but one of the EST sources within the site region needed to be updated because of these earthquakes.

Development of New Seismic Source Zones

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.4.4 describes the need to develop new seismic source models to fully characterize the seismic hazard at the Turkey Point Units 6 and 7 site. The applicant specifically addressed three types of new seismic source models that needed to be developed. Since the original EPRI-SOG models do not cover the 320 km (200 mi) site area completely, the applicant stated that additional models needed to be developed to

cover the entire area. Secondly, since the publication of the EPRI-SOG models in 1986, new information indicated that the Charleston seismic source needed to be exclusively defined in the seismic source models. Lastly, the applicant indicated that since the Turkey Point Units 6 and 7 site is relatively close to Cuba and some of the active plate boundary seismic sources in the Caribbean region, these sources' seismic hazard contributions needed to be incorporated into the total seismic hazard calculations. The following sections summarize the applicant's new seismic source model development efforts in these regions.

Development of Supplemental Sources

Since not all the EPRI seismic source zones cover the entire 320 km (200 mi) radius site region (Figure 2.5.2-1), the applicant added supplemental seismic source zones to fill the uncovered areas within the site region to the south and east of offshore the Florida peninsula. The applicant explained that these areas of the site region not covered by the original EPRI model are mostly devoid of seismicity and therefore simply expanding the EPRI seismic zones to cover the site region would smooth the earthquake rates and unrealistically decrease them. Therefore, the applicant created new source zones covering the offshore region south and east of the Florida peninsula to supplement each EPRI seismic source zone using model parameters obtained from the updated earthquake catalog.

Updated Charleston Seismic Source Model

The site of the 1886 Charleston, SC, earthquake with a magnitude of about **M7.0** lies approximately 800 km (500 mi) north of the Turkey Point Units 6 and 7 site. The applicant explained that the original EPRI-SOG seismic source model included an assessment of the Charleston seismic source; however studies post-dating this characterization required an updated Charleston Seismic Source Model (UCSS). The applicant used the UCSS model developed through a SSHAC Level II process for the Vogtle ESP application (SNC, 2008). The USSC model accounts for updated information regarding the location, size, and rate of earthquake occurrence for large magnitude earthquakes in the vicinity of Charleston, SC. The UCSS model includes four possible alternative source scenarios as limited information exists on the location and causative structure for these earthquakes. The size of the characteristic earthquake is assumed to vary from **M6.7** to **M7.5** in each of these four alternative source zones and the recurrence rates vary from about 550 years to 950 years.

Cuba and Northern Caribbean Source Models

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.4.4.3, the applicant described the seismic source models developed for Cuba and the North American-Caribbean plate boundary region through a SSHAC Level II study. Earthquake data for these sources were compiled through the development of the Phase 2 earthquake catalog (Figure 2.5.2-2). Through the SSHAC study, the applicant identified an areal seismic source for Cuba and nine seismic fault sources in the Caribbean region (Figure 2.5.2-3).

The applicant stated that to accommodate the potential seismic hazard from Cuba, which is partly within the 320 km (200 mi) site region, an areal source is appropriate. The applicant justified its use of an areal source based on the fact that limited information exists about fault behavior and slip rates for any of the faults in Cuba. The applicant further stated that the Cuban areal source is associated with a moderate level of seismicity with concentrations of earthquakes occurring along its northern boundary as well as along its southeastern boundary, closer to an active plate tectonic boundary in the region. The applicant listed the largest

historical earthquake in this areal source to be the 1914 earthquake with a magnitude of about **M6.3** located along the northeastern portion of the areal source. The applicant stated that it used the Phase 2 earthquake catalog to estimate the earthquake recurrence rates within the areal source. The applicant also indicated that earthquakes with a M_{\max} of **M7.0** to **M7.25** are expected in this source and used these values in defining the areal source's M_{\max} values.

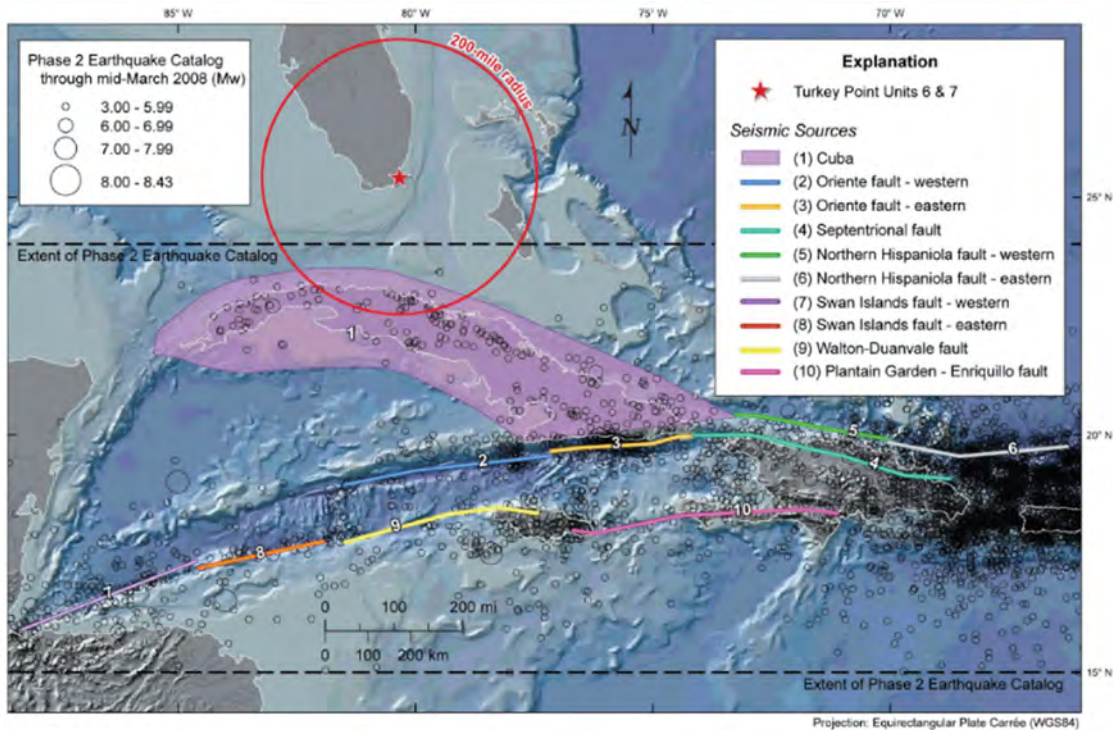


Figure 2.5.2-3. Map showing new seismic sources developed in the region of Cuba and the Caribbean. Phase 2 earthquake catalog data also plotted as black circles (Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.5.2-217)

To accommodate the remaining seismic sources in the Caribbean region, the applicant developed nine major fault sources that could potentially affect the Turkey Point Units 6 and 7 site. These seismic sources along the North American-Caribbean plate boundary zone are: Oriente fault – western, Oriente fault – eastern, Septentrional fault, Northern Hispaniola fault – western, Northern Hispaniola fault – eastern, Swan Islands fault – western, Swan Islands fault – eastern, Walton Duanvale fault, and Enriquillo-Plantain Garden fault (Figure 2.5.2-3). These fault sources are located approximately 670 km (420 mi) to 1,200 km (760 mi) from the Turkey Point Units 6 and 7 site. Through its SSHAC level II study, the applicant developed a range of seismic source parameters for these fault sources along with their uncertainties.

As a confirmatory check, the applicant compared the seismic source model parameters of some its newly developed seismic sources with those used in USGS Initial Seismic Hazard Maps for Haiti by Frankel et al. (2010). The applicant explained that four seismic sources in the Frankel et al. (2010) model are incorporated into the Caribbean Seismic Source Model for the Turkey Point Units 6 and 7 site and their source model parameters are comparable.

Ground Motion Models

The applicant used two ground motion prediction models in conducting its PSHA analysis based on the geographic location of the seismic sources. For the EPRI-SOG seismic sources, the applicant used the NRC-endorsed EPRI (2004, 2006) Ground Motion Prediction Equations (GMPEs). The applicant stated that Cuba and the Caribbean region do not have any published GMPE that could be used in the Turkey Point Units 6 and 7 site's PSHA. For these seismic sources, the applicant developed a new ground motion model using a SSHAC level II process. Since observational data is very limited, the applicant used a simulation procedure to develop the Caribbean region GMPEs. Using region-specific information such as lithospheric velocity models, seismic quality factor (Q), and established seismic waveform calculation programs and procedures, the applicant simulated many different alternative earthquake scenarios and used these results to develop ground motion propagation models for the Caribbean region. The applicant then compared the new GMPEs with the limited amount of observational data available in the region to show that the new models are, in general, conservative compared to the observational data and used the new GMPEs in its PSHA calculations.

PSHA Methodology and Calculation

The applicant performed PSHA calculations for peak ground acceleration (PGA) and spectral acceleration at ground motion frequencies of 0.5, 1.0, 2.5, 5, 10, and 25 hertz (Hz). Because the ground motion prediction models are valid at generic hard rock site conditions with shear wave velocities equal to 2.8 km/s (9,200 fps), the applicant's PSHA calculations are valid for hard rock conditions.

PSHA Results

The applicant performed the PSHA calculations using the EPRI-SOG and Caribbean seismic sources described in SER Section 2.5.2.2.2, EPRI (2004, 2006) GMPEs, GMPEs developed for Cuba and the Caribbean region, and the earthquake recurrence rates described in EPRI (1989) as well as those calculated using the Phase 2 earthquake catalog. In addition, the applicant incorporated the UCSS model (SNC, 2006) into its PSHA calculations. The applicant tested hazard contributions of the New Madrid seismic zone and small earthquakes in the updated UCSS and determined that these sources did not contribute to the total hazard at the Turkey Point Units 6 and 7 site. Using the total seismic hazard curves, the applicant developed UHRS, which are the spectral accelerations that have an equal likelihood of exceedance at different natural frequencies. Figure 2.5.2-4 shows the mean UHRS for the 10^{-4} , 10^{-5} , and 10^{-6} annual frequencies of exceedance for hard rock conditions at the Turkey Point Units 6 and 7 site.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.4.6 describes the earthquake potential for the site in terms of the most likely earthquake magnitudes and source-to-site distances, which are referred to as 'controlling earthquakes'. The applicant determined the controlling earthquakes that dominate low frequencies (LF) and high frequencies (HF), 1 and 2.5 Hz and 5 and 10 Hz, respectively. To determine the controlling earthquakes, the applicant deaggregated the PSHA at selected probability levels using the procedures outlined in RG 1.208. The applicant performed the deaggregation of the mean 10^{-4} , 10^{-5} , and 10^{-6} PSHA seismic hazard curves. The resulting parameters are listed in Figure 2.5.2-1. The deaggregation results indicate that local earthquakes are the primary contributors to the HF seismic hazard, while far away earthquakes also contribute. Low frequency seismic hazard is primarily controlled by far away sources, such as the Cuba areal source, UCSS, and some of the Caribbean sources.

Table 2.5.2-1. Controlling Earthquakes Magnitudes and Distances (Reference FSAR Table 2.5.2-225)

Struct. Frequency	Annual Freq. Exceed.	Overall Hazard		Hazard from R > 100 km	
		M	R, km	M	R, km
1 & 2.5 Hz	1E-04	7.1	400	7.3	570
5 & 10 Hz	1E-04	5.9	110	6.5	290
1 & 2.5 Hz	1E-05	6.7	190	7.2	560
5 & 10 Hz	1E-05	5.5	31	6.7	250
1 & 2.5 Hz	1E-06	6.3	61	7.2	600
5 & 10 Hz	1E-06	5.5	17	6.9	180

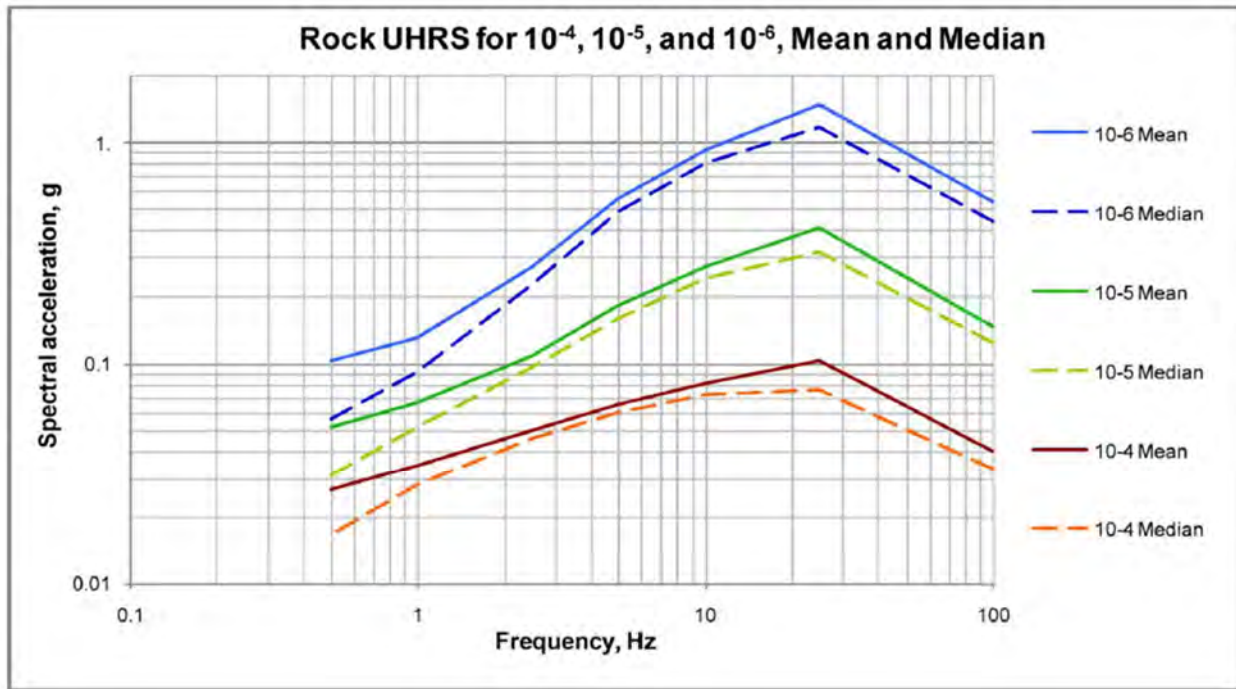


Figure 2.5.2-4. Uniform hazard respond spectra curves calculated for the Turkey Point site at the annual frequencies of exceedances of 10^{-4} , 10^{-5} , and 10^{-6} . These curves represent uniform hazard spectra at the hard rock levels beneath the site (Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.5.2.-225)

PSHA Sensitivity Analysis

The applicant submitted its original COL application in 2010. In 2012, the NRC issued NUREG-2115 describing new seismic source models to be used in future PSHA calculations. Consistent with RG 1.208, the applicant compared its PSHA results calculated based on the updated EPRI-SOG model to the results obtained based on the NUREG-2115 model (the

CEUS-SSC model). For both hazard calculations, the applicant held hazard from Cuba and Caribbean sources constant. The applicant stated that the EPRI-SOG PSHA results were comparable to the results obtained using the CEUS-SSC model, therefore, the applicant decided to maintain the original results in its PSHA analysis.

2.5.2.2.5 Seismic Wave Transmission Characteristics of the Site

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.5 describes the procedure the applicant used to assess the effects of near surface rocks on seismic wave transmission beneath the site. As defined above, the hazard curves generated by the PSHA are defined for generic hard rock conditions characterized by a shear-wave velocity (V_s) of 2.8 km/s (9,200 ft/s). For the Turkey Point Units 6 and 7 site, these hard rock conditions exist at a depth of 3,500 m (10,000 ft) beneath the ground surface, while materials with lower velocities exist in the upper 3,500 m (10,000 ft). To determine the near-surface UHRS, the applicant used Approach 2A procedures outlined in NUREG/CR-6728, "Technical Basis for Revision of Regulatory Guidance on Design Ground Motions: Hazard- and Risk-Consistent Ground Motion Spectra Guidelines". Following Approach 2A, the applicant: (1) developed velocity models for the Turkey Point Units 6 and 7 site, (2) randomized the models to account for variability, and (3) performed the final site response analysis.

Site Response Model

The applicant developed site-specific shallow V_s models for the upper 194 m (636 ft) of the subsurface based on the results of compression (P) and shear (S) wave measurements from P-S suspension logging and cone penetration testing (CPT). The applicant estimated velocities from a depth of 194 m (636 ft) to 3,660 m (12,000 ft) using deep velocity profiles taken from eight deep sonic logs located within 125 mi of the site. The applicant combined the median V_s data from the upper 194 m (636 ft) at the site with the median V_s data from the regional sonic logs to estimate an initial velocity profile for the upper 3,050 m (10,000 ft) of the subsurface for site response analysis.

The applicant also estimated the parameter kappa (κ) as input into the site response analysis. Kappa is a measure of seismic energy dissipation in near-surface rocks. The applicant used modulus reduction and damping relationships to account for the potential of nonlinear behavior in the upper 194 m (636 ft) of the profile. The applicant assumed that the remaining rock layers behave linearly during seismic shaking. In order to ensure physically realistic damping parameters for the site, the applicant calculated a total site κ and ensured that the total damping from the profile remained within this maximum κ .

The applicant's analysis resulted in the V_s profiles for the Turkey Point Units 6 and 7 site illustrated in Figure 2.5.2-5, which were used in the applicant's GMRS analysis.

Site Response Methodology and Results

The applicant used RG 1.208 to define the site-specific GMRS at elevation -10.7 m (-35 ft) within the Key Largo Limestone. Turkey Point Units 6 and 7 COL FSAR Section 2.5.4 states that material above the GMRS elevation (Miami Limestone and "muck") will be replaced with concrete and structural fill.

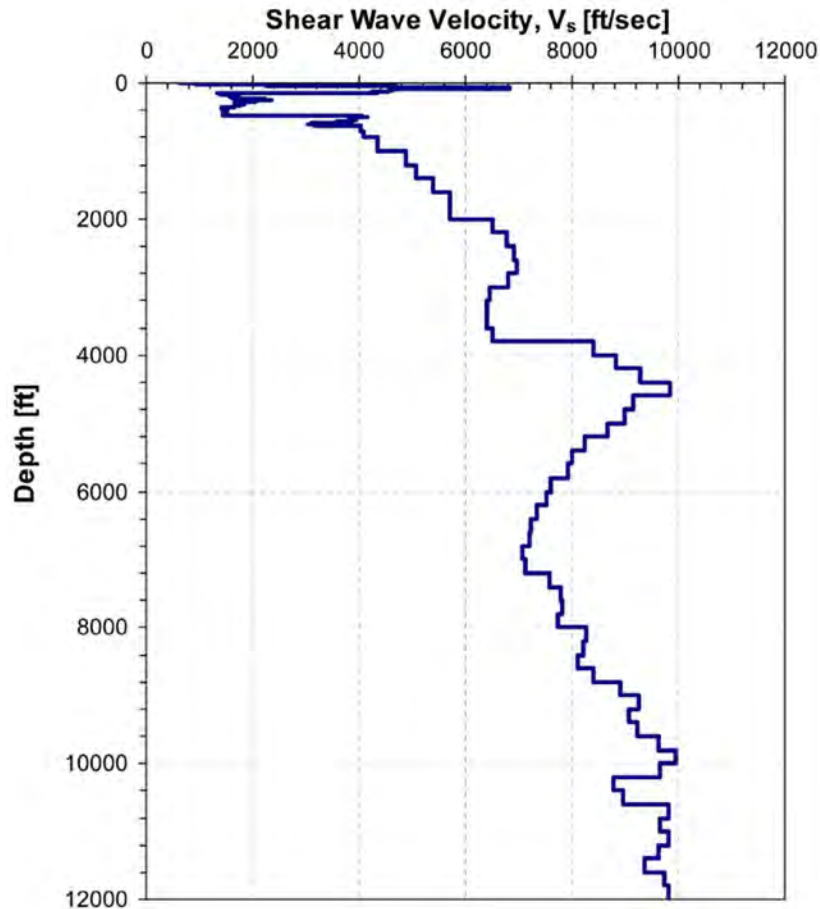


Figure 2.5.2-5. Base case shear velocity profile developed for the Turkey Point site. Hard rock conditions are observed at a depth of about 12,000 ft (3,658 m) (Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.5.2-235)

The applicant determined the appropriate soil and rock dynamic properties and then modeled the variability in the site data by randomizing the soil and rock V_s profiles, shear modulus reduction, and damping values. The applicant generated 60 randomized profiles using the V_s correlation model developed by Silva et al. (1996). These artificial profiles represent potential variability in the soil column from the top of bedrock to the ground surface.

The applicant developed response spectra for each controlling earthquake for two frequency ranges, HF (5 to 10 Hz) and LF (1 to 2.5 Hz), as defined in RG 1.208. The applicant then developed input ground motions using the controlling earthquake's magnitudes and distances and the hard rock spectral shapes for CEUS earthquake ground motions recommended in NUREG/CR-6728. These input ground motions were then used as input to a random vibration theory process to calculate site response. The applicant's site response calculations indicate that, in general, local site conditions amplify reference hard rock motions at frequencies lower than about 7 to 8 Hz, and de-amplify seismic energy at higher frequencies.

2.5.2.2.6 Ground Motion Response Spectra

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.6 describes the method the applicant used to develop the horizontal and vertical site-specific GMRS. To obtain the horizontal GMRS, the applicant used the performance-based approach described in RG 1.208. The applicant developed the GMRS by scaling the rock UHRS by the site amplification functions. The site-specific GMRS is defined at the elevation of -10.7 m (-35 ft). The applicant developed the vertical GMRS by applying vertical-to-horizontal response spectral ratios, based on RG 1.60, "Design Response Spectra for Seismic Design of Nuclear Power Plants," to the horizontal 10^{-4} and 10^{-5} UHRS values and calculating a site-specific vertical GMRS.

Horizontal GMRS

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.6.1, the applicant developed a horizontal, site-specific, performance-based GMRS using the method described in RG 1.208. The performance-based method achieves the annual target performance goal (P_F) of 10^{-5} per year for frequency of onset of significant inelastic deformation. This damage state represents a minimum structural damage state, or essentially elastic behavior, and falls well short of the damage state that would interfere with functionality. The horizontal GMRS for each spectral frequency, which meets the P_F , is obtained by scaling the smooth rock 10^{-4} UHRS by the design factor (DF) (SER Equation 2.5.2-1):

$$DF = \max(1.0, 0.6(A_R)^{0.8}) \quad \text{Equation (2.5.2-1)}$$

In SER Equation 2.5.2-1, the amplitude ratio, A_R , is given by the ratio 10^{-5} UHRS and the 10^{-4} UHRS spectral accelerations for each spectral frequency. When A_R exceeds 4.2, RG 1.208 specifies that the value of the GMRS is to be no less than 45 percent of the 10^{-5} UHRS. The resulting horizontal GMRS is shown as the green line in Figure 2.5.2-6

Vertical GMRS

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.6.2, the applicant calculated the vertical GMRS by applying the V/H ratios listed in RG 1.60 to the 10^{-4} and 10^{-5} UHRS and using SER Equation 2.5.2-1. Figure 2.5.2-6 shows the resulting GMRS as a violet line.

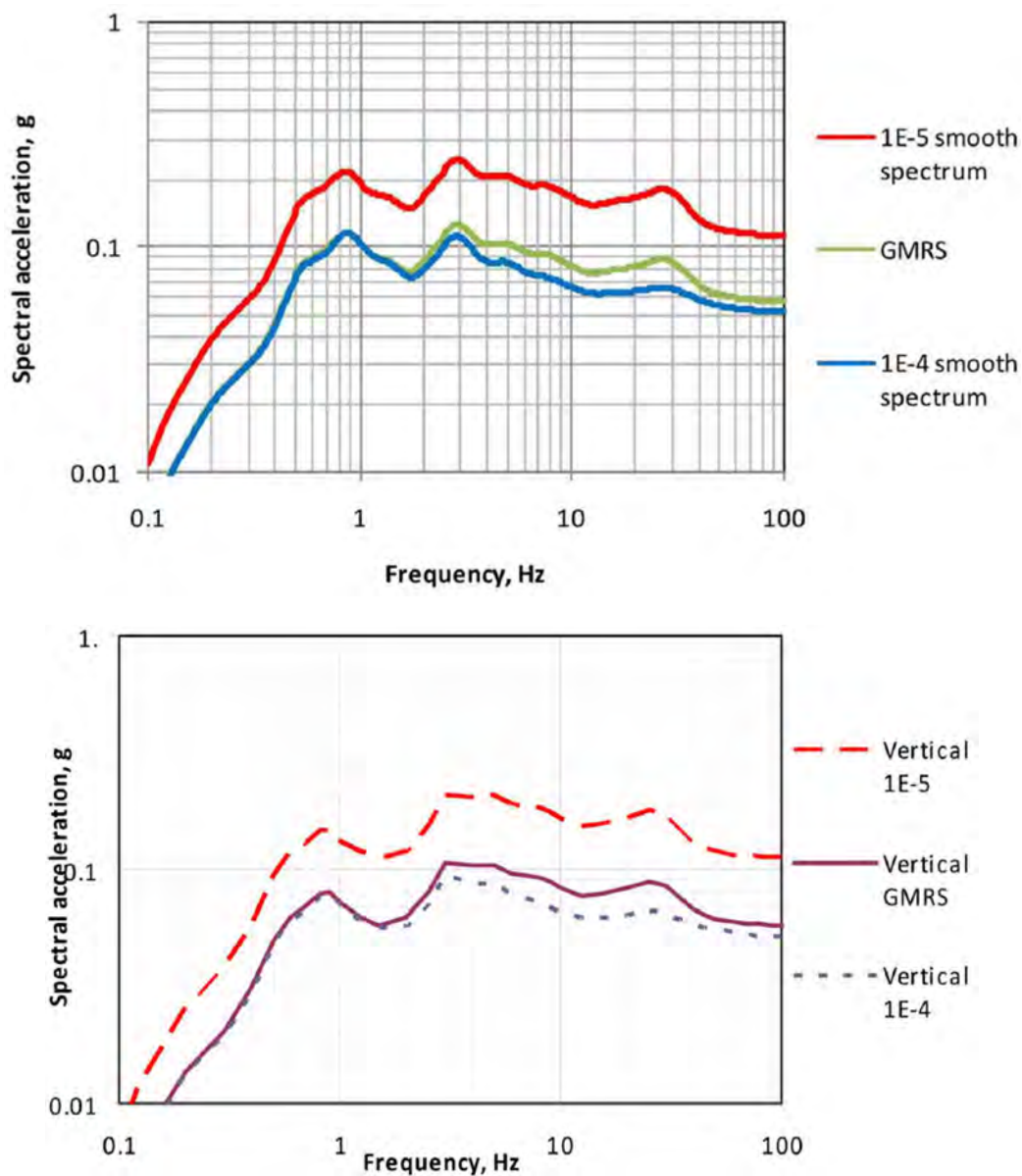


Figure 2.5.2-6. Horizontal (top) and vertical (bottom) GMRS curves calculated for the Turkey Point Units 6 and 7 site (Source: Turkey Point Units 6 and 7 COL FSAR Figures 2.5.2-253 and Figure 2.5.2-254)

2.5.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the applicable regulatory requirements for reviewing the applicant's discussion of vibratory ground motion are:

- 10 CFR 100.23 with respect to obtaining geologic and seismic information necessary to determine site suitability and ascertain that any new information derived from site-specific investigations does not impact the GMRS derived by a PSHA. In complying with this regulation, the applicant also meets guidance in RG 1.132, Revision 2 and RG 1.208.
- 10 CFR 52.79(a)(1)(iii), as it relates to consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity and period of time in which the historical data have been accumulated.

The related acceptance criteria NUREG-0800, Section 2.5.2 are summarized as follows:

- Seismicity: To meet the requirements in 10 CFR 100.23, this section is accepted when the complete historical record of earthquakes in the region is listed and when all available parameters are given for each earthquake in the historical record.
- Geologic and Tectonic Characteristics of Site and Region: Seismic sources identified and characterized by NUREG-2115 were used.
- Correlation of Earthquake Activity with Seismic Sources: To meet the requirements in 10 CFR 100.23, acceptance of this section is based on the development of the relationship between the history of earthquake activity and seismic sources of a region.
- Probabilistic Seismic Hazard Analysis and Controlling Earthquakes: For CEUS sites relying on the NUREG-2115 seismic source characterization model, the staff will review the applicant's PSHA, including the underlying assumptions and how the results of the site investigations are used to update the existing sources in the PSHA, how these site investigation results are used to develop additional sources, or how they are used to develop a new data base.
- Seismic Wave Transmission Characteristics of the Site: In the PSHA procedure described in RG 1.208, the controlling earthquakes are determined for generic rock conditions.
- Ground Motion Response Spectra: In this section, the staff reviews the applicant's procedure to determine the GMRS.

In addition, the geologic and seismic characteristics should be consistent with appropriate sections from: RG 1.60, RG 1.206, and RG 1.208.

2.5.2.4 *Technical Evaluation*

The staff reviewed Section 2.5.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represent the complete scope of information relating to this review topic.¹ The review confirmed that the information contained in the Turkey Point Units 6 and 7 COL FSAR and incorporated by reference addresses the required information relating to the vibratory ground motion. The staff's

technical evaluation of the information incorporated by reference related to vibratory ground motion are documented in NUREG-1793 and its supplements.

The staff review of the information contained in the Turkey Point Units 6 and 7 COL FSAR is discussed as follows:

AP1000 COL Information Items

- PTN COL 2.5-2

The staff reviewed COL Information Item 2.5-2, which addresses the provision for site-specific information related to the vibratory ground motion aspects of the site including: seismicity, geologic and tectonic characteristics, correlation of earthquake activity with seismic sources, PSHA, seismic wave transmission characteristics and the SSE ground motion.

- PTN COL 2.5-3

The staff reviewed COL Information Item 2.5-3, which addresses the provision for performing site-specific evaluations, if the site-specific GMRS at foundation level exceed the response spectra in DCD Figures 3.7.1-1 and 3.7.1-2 at any frequency, or if soil conditions are outside the range evaluated for AP1000 DC.

SER Section 2.5.2.4 of this report provides the staff's evaluation of the seismic, geologic, geophysical, and geotechnical investigations carried out by the applicant to determine the site-specific GMRS or the SSE ground motion for the Turkey Point Units 6 and 7 site. The applicant developed of the GMRS based on a detailed evaluation of earthquake potential, taking into account the regional and local geology, Quaternary tectonics, seismicity, and site-specific geotechnical engineering characteristics of the Turkey Point Units 6 and 7 site subsurface material.

During the early site investigation stage, the staff visited the site and interacted with the applicant regarding the geologic, seismic, and geotechnical investigations conducted for the Turkey Point Units 6 and 7 COL FSAR. To evaluate the original geologic, seismic, and geophysical information submitted by the applicant thoroughly, the staff obtained additional assistance from experts at USGS.

In addition to RAIs addressing specific technical issues discussed below, the staff also prepared clarification and data request RAIs (RAI 19, Question 02.05.02-1 and RAI 37, Question 02.05.02-13) to help its review. Because the information provided by the applicant in response to those clarification RAIs did not substantively change information in the Turkey Point Units 6 and 7 COL FSAR, these RAIs are resolved.

2.5.2.4.1 *Seismicity*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.1 describes the seismicity and earthquake catalog used by the applicant to calculate the seismic ground motion hazard for the Turkey Point Units 6 and 7 site. The applicant used the CEUS EPRI-SOG earthquake catalog as a starting point and updated it through February 2008 (Phase 1 catalog). The applicant supplemented the updated EPRI-SOG catalog with seismicity in Cuba and the Caribbean because the applicant identified seismic sources in these regions affect the total seismic hazard

at the Turkey Point Units 6 and 7 site (Phase 2 catalog). The applicant's combined Phase 1 and Phase 2 earthquake catalog covers the seismicity in the Turkey Point Units 6 and 7 site region through 2008 and provides data to assess seismic source model parameters used in the Turkey Point Units 6 and 7 site's PSHA study. Seismic source model parameters, such as maximum magnitudes and earthquake recurrence rates, are primarily determined based on information available in the earthquake catalog. The staff's technical evaluation of COL FSAR Section 2.5.2.1 focused on (1) development of the Caribbean earthquake catalog and updates to the EPRI-SOG earthquake catalog, (2) whether earthquakes that have occurred since completion of the applicant's catalog affect the seismic sources and their parameters, and (3) the methodology used by the applicant to convert earthquake magnitudes into a consistent magnitude scale.

Staff Confirmatory Seismicity Analysis

As part of its review of Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.1, the staff developed its earthquake catalog for the Caribbean region and the CEUS region covering the time period from February 1985 to January 2015. The staff used this supplemental earthquake catalog to determine whether the applicant's updated earthquake adequately characterized the seismicity in the region and that there are no new earthquakes in the entire region since the development of the applicant's catalog that might impact the parameters of seismic sources used in the Turkey Point Units 6 and 7 site's PSHA.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.1.2 describes the updated Phase 1 and Phase 2 earthquake catalogs. The staff recognized that 15 of the 34 earthquake catalogs used by the applicant cite USGS National Earthquake information Center (NEIC) "Earthquake Search" Web site. In RAI 37, Question 02.05.02-10, the staff asked the applicant to clarify how it identified the contribution from each sub-catalog in USGS NEIC database. In response to this RAI, the applicant provided the staff with clarifying information, indicating that the appropriate catalog reference in the Turkey Point Units 6 and 7 COL FSAR should have been the National Geophysical Data Center (NGDC). Because the NGDC catalog reference lists a table, which indicates the contribution from each sub-catalog and the applicant updated the Turkey Point Units 6 and 7 COL FSAR accordingly, the staff considers RAI 37, Question 02.05.02-10, resolved.

The staff's independent confirmatory earthquake catalog for the region is primarily from USGS NEIC earthquake catalog. Figure 2.5.2-7 depicts the earthquakes identified in the staff's earthquake catalog and the applicant's earthquake catalog from February 1985 to December 2007. The comparison of these data sets illustrates that the applicant's updated earthquake catalog adequately characterizes the seismicity within the site region.

Since the applicant's earthquake catalog is complete through 2007, the staff also searched for significant seismic events that have occurred since 2007 that would potentially impact the seismic hazard. The yellow circles in Figure 2.5.2-7 illustrate the seismicity documented in USGS catalog from December 2007 through January 2015. Overall, the pattern of seismicity occurring in the period after the end of the applicant's catalog is consistent with the information contained in the catalog. The staff noted only one moderate magnitude ($M_w = 5.1$) earthquake that occurred within the 200 mile (320 km) site region in Cuba on January 9, 2014. The staff concludes that the applicant's seismic hazard models encompass this event because similar sized earthquakes have previously occurred in the region and the minimum M_{max} defined by the applicant for the Cuba areal source is 7.0.

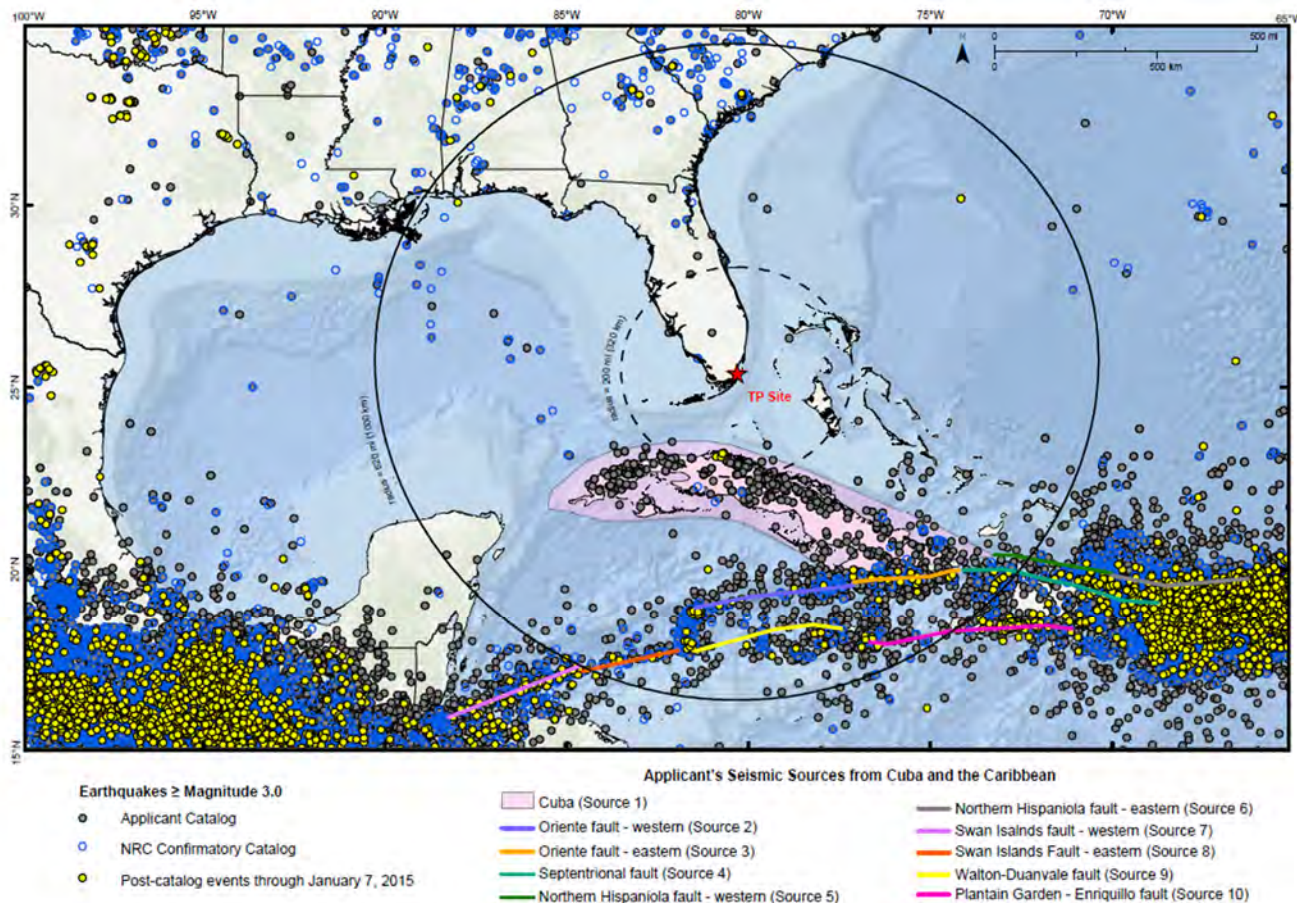


Figure 2.5.2-7. Comparison of the applicant's earthquake catalog with staff's confirmatory catalog for events with moment magnitudes (M) equal to or greater than 3.0 in the CEUS, Cuba, and the Caribbean. The applicant's seismic sources for Cuba and the Caribbean are also illustrated.

Magnitude Conversions

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.1.3.1 states that moment magnitude (M_w) was used as the uniform magnitude measure in the Phase 2 earthquake catalog (Cuba and Caribbean region update) development efforts, however, the applicant's Phase 1 earthquake catalog (EPRI-SOG earthquake update) uses body-wave magnitudes (m_b) as the uniform magnitude measure. In RAI 37, Question 02.05.02-5, the staff asked the applicant to explain if this would pose an issue since the Phase 1 catalog is based on m_b (body wave magnitude) and the Phase 2 catalog is based on M_w (moment magnitude). In an October 3, 2014 response to RAI 37, Question 02.05.02-5 (ADAMS Accession No. ML14282A014), the applicant provided the staff with its rationale for selecting two alternative magnitude scales. The applicant stated that it used m_b for the Phase 1 catalog update, since both the EPRI-SOG seismicity catalog and recurrence calculations used the m_b scale. The applicant stated that, in general, the m_b scale adequately characterized the seismic energy released by sources in the central and eastern United States. However, M_w was more appropriate for the Caribbean because it provided a better measure of the energy released for a greater range of magnitudes, especially for large magnitude earthquakes characterized by large fault dimensions or complex rupture

mechanisms expected in the Caribbean. The applicant further explained that m_b saturates the energy release for earthquakes greater than magnitude 5.0 due to the difference in period and the seismic-wave type used to determine the magnitude size and is therefore not appropriate for seismicity in the Caribbean.

The applicant explained that the total number of earthquakes greater than or equal to magnitude 3.0 using m_b or M_w as the uniform magnitude measure could vary depending on the details of the magnitude conversion. However, the applicant confirmed that it did not exclude any earthquakes of m_b 3.0 or greater by their conversion to M_w for the Caribbean region. The applicant also evaluated the effect on the number of Phase 2 catalog earthquakes of M_w 3.0 and greater calculated using the CEUS-SSC magnitude scale conversion relations in EPRI et al. (2012) instead of the relations presented in the Turkey Point Units 6 and 7 COL FSAR. The applicant concluded that if it implemented the CEUS-SSC magnitude conversion methodology, there would be an increase in the number of small magnitude events and a decrease in the magnitude for all events with M_w 4.5 and greater. As a result of RAI 37, Question 02.05.02-5, the applicant added a discussion and the rationale for selecting M_w as the uniform magnitude scale for the Phase 2 catalog and their magnitude conversion process for earthquakes in the Caribbean to Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.1.3.1. Since the applicant used both the EPRI-SOG and Caribbean seismic source models, and each model is based exclusively on either m_b or M_w magnitudes, the staff finds that having two different types of base magnitudes is justified. Furthermore, because the applicant showed in its RAI response that when applied, the most recent m_b to M_w conversion methodology results in somewhat less conservative results (as it provides fewer number of events greater than magnitude 4.5), the staff considers RAI 37, Question 02.05.02-5 resolved.

Staff Conclusions Regarding Seismicity

Based upon the staff's confirmatory earthquake catalog, a review of Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.1, and the resolution of RAI 37, Questions 02.05.02-5 and 02.05.02-10, the staff concludes that the applicant developed a completed and accurate earthquake catalog for the region surrounding the Turkey Point Units 6 and 7 site. The staff concludes that the earthquake catalog as described by the applicant in the Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.1 forms an adequate basis for the seismic hazard characterization of the site.

2.5.2.4.2 Geologic and Tectonic Characteristics of the Site and Region

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.2 describes the seismic sources used by the applicant to calculate the seismic ground motion hazard for the Turkey Point Units 6 and 7 site. This SER section provides the staff's evaluation of the seismic source models the applicant used as part of its PSHA. Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.2 describes that the applicant used the original EPRI-SOG seismic source models (EPRI-SOG, 1986) as a starting model and updated them using new data and information. Consistent with RG 1.208, the applicant evaluated more recent seismic hazard studies and new data available for the region surrounding the site for comparisons to the 1986 EPRI-SOG seismic source models. As a result of this evaluation, the applicant updated several of the original source models developed by the EPRI-SOG ESTs. In its geologic and tectonic site characterization, the applicant also determined that several of the Caribbean seismic sources that are outside the 320 km (200 mi) site region might also contribute to the seismic hazard at the site. In COL FSAR Section 2.5.2.4, the applicant described the development of a new seismic source model for the Caribbean region. The following sections describe the staff's evaluation of updates to

the EPRI-SOG seismic source models and the newly developed Caribbean seismic source models.

2.5.2.4.1.2 EPRI Seismic Sources

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.2, the applicant stated that, consistent with RG 1.208, it chose to use the EPRI-SOG seismic models in its seismic hazard calculations and updated them to be consistent with new geologic, tectonic, and earthquake information available in the region. The applicant stated that recent earthquakes in the Gulf of Mexico and U.S. Gulf Coast required modifications to M_{\max} distributions of several of the EPRI-SOG seismic sources. In addition, the applicant stated that the EPRI-SOG model did not cover the site region fully, and it would develop supplemental seismic sources to cover the entire site region adequately. In Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.4, the applicant described these updates to the EPRI-SOG model. Because RG 1.208 specifically mentions the EPRI-SOG model as a potential seismic source model in new reactor seismic hazard assessments in the CEUS, the staff focused its review on the updates the applicant conducted to bring this model up-to-date.

Update of the Charleston Seismic Source

New scientific evidence available after the publication of the EPRI-SOG model in 1986 indicates that the models representing two of the largest seismic sources in the CEUS, the New Madrid Seismic Zone and Charleston seismic source, needed updating. The original EPRI-SOG model incorporates these two seismic sources, however, in the time since its publication; researchers have discovered evidence for higher earthquake recurrence rates for large magnitude earthquakes in these seismic sources. The applicant evaluated the impacts of such updates to these two seismic sources in the CEUS region and determined that due to the distance of the New Madrid Seismic Zone to the Turkey Point Units 6 and 7 site, the updates did not impact the total seismic hazard at the Turkey Point Units 6 and 7 site. However, the proposed updates to the Charleston seismic source model impacted the total seismic hazard estimates at the Turkey Point Units 6 and 7 site. Hence, the applicant discussed the new evidence, revised the seismic sources of the EPRI-SOG model, and added an updated Charleston Seismic Source (UCSS) to accommodate increased hazard estimates from this source in its seismic hazard calculations.

The applicant updated the original EPRI-SOG Charleston seismic source models with a model originally presented in the SSAR for the Vogtle ESP site (SNC, 2008). This update was based on the results of several post-EPRI PSHA studies (e.g., Frankel et al., 2002; Chapman and Talwani, 2002) and the availability of paleoliquefaction data (Talwani and Schaeffer 2001). The Site Safety Analysis Report (SSAR) for the Vogtle ESP Site (SNC, 2008) provides the details of the UCSS model and NUREG-1923, "Safety Evaluation Report for an Early Site Permit (ESP) at the Vogtle Electric Generating Plant (VEGP) ESP Site," describes the staff's review of the UCSS. The UCSS model development followed the guidelines provided in RG 1.208 and used a SSHAC Level II (SSHAC, 1997) expert elicitation method to incorporate current literature and data and the understanding of experts into an update of the Charleston seismic source model. During the review of the Turkey Point Units 6 and 7 COL FSAR, there was an additional update to the Charleston seismic source model developed as part of the most recent CEUS regional seismic source model published in NUREG-2115. The NUREG-2115 model modified the UCSS model, and SER Section 2.5.2.4.4 discusses the staff's evaluation of the impact of this new model at the Turkey Point Units 6 and 7 site.

Cuba and Caribbean Seismic Source Models

The 320 km (200 mi) site region of the Turkey Point Units 6 and 7 site extends beyond the physical boundaries of the EPRI-SOG seismic model, which ends just south of the Florida peninsula. The 320 km (200 mi) site region extends into Cuba, as seen in Figure 2.5.2-7. In accordance with RG 1.208, the applicant should analyze all seismic sources within the 320 km (200 mi) site region for potential contributions to the seismic hazard. In addition, RG 1.208 also recommends that an applicant must expand the area of investigation beyond the site region, if capable seismic source zones outside the site region affect the seismic hazard at the site of interest. There are large seismic sources in the Caribbean region associated with the plate boundary between North American and the Caribbean. These sources extend from just outside the 320 km (200 mi) site region to greater than 1,000 km (620 mi) from the site. Despite these sources' large distances, the applicant stated that several have the potential to contribute to the total seismic hazard at the Turkey Point Units 6 and 7 site. Figure 2.5.2-7 shows the large seismic sources in the Caribbean used in the applicant's PSHA. Through a SSHAC Level II study, the applicant conducted a seismic source characterization study and developed new seismic source models for several of these large seismic sources for use in the Turkey Point Units 6 and 7 site's PSHA study. SER Section 2.5.1.4.1 provides a detailed description of the geologic and tectonic characterization of these Cuba and Caribbean sources. Potential impacts of these structures on the seismic hazard is evaluated in SER Section 2.5.2.4.4.

Staff Conclusions of the Geologic and Tectonic Characteristics of the Site and Region

Based upon its review of Turkey Point Units 6 and 7 COL FSAR Sections 2.5.2.2 and 2.5.2.4, and the resolution of RAIs, the staff concludes that the applicant adequately described the geologic and tectonic characterization of potential seismic sources in the region of the Turkey Point Units 6 and 7 site. The staff finds the applicant's characterization of the updated EPRI-SOG models and the newly developed Caribbean seismic source models adequate and consistent with the guidance provided in RG 1.208.

2.5.2.4.3 Correlation of Earthquake Activity with Seismic Sources

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.3, the applicant described the correlation between the seismicity and the EPRI-SOG seismic source model. Consistent with RG 1.208, the applicant updated the EPRI-SOG earthquake catalog (1627 to 1984) to include events recorded through December 2007. The applicant described this earthquake catalog as the Phase 1 catalog. From this updated catalog, the applicant concluded that seismicity in the CEUS site region did not correlate with any known geologic structures and that there were no patterns of seismicity that required a significant revision to the geometry of the EPRI-SOG seismic sources.

The applicant provided information on correlations of earthquakes with just the EPRI seismic source models, but not with other seismic sources, such as the Cuba areal source and the Caribbean seismic sources used in its hazard estimates for the Turkey Point Units 6 and 7 site. In RAI 37, Question 02.05.02-7, the staff requested for the applicant to provide a thorough, detailed description in the COL FSAR of the correlations of seismicity with all of the seismic sources used in the Turkey Point Units 6 and 7 site's PSHA study. In response to this RAI, the applicant provided additional information on the correlation of seismicity (described in its Phase 2 earthquake catalog) with the Cuba and Caribbean seismic sources in COL FSAR Section 2.5.2.4.4.3.

In its evaluation, staff examined its confirmatory earthquake catalog and maps of tectonic features in the study area. The staff agrees with the applicant that seismicity in the CEUS region does not show any correlation with any known tectonic features. In Cuba, the staff determines that establishing a discernable correlation between seismicity and known tectonic structures, such as faults, is quite difficult. Local seismicity in Cuba indicates that although some earthquakes concentrate along known faults, both the quality and quantity of data do not permit a clear determination of correlation. However, for the larger seismic sources in the Caribbean, fault activity is very clear as evidenced by concentration of seismicity along the faults sources (Figure 2.5.2-7).

The staff further evaluated the applicant's use of the updated earthquake catalog in seismic sources' maximum magnitude (M_{\max}) assignments. Using its confirmatory earthquake catalog, the staff confirmed that the M_{\max} assignments were adequate for each seismic source. This assessment showed that the M_{\max} values used by the applicant were consistent with the seismic observations and that there were no observed earthquakes within each of the seismic sources with magnitudes greater than the assigned M_{\max} values. Therefore, the staff concludes that the M_{\max} values used by the applicant are acceptable for use in the Turkey Point Units 6 and 7 site's PSHA calculations.

Based on the staff's own independent earthquake catalog and confirmatory analyses of earthquake sources, the staff concludes that the Turkey Point Units 6 and 7 site's earthquake catalog adequately characterizes regional and local seismicity. Furthermore, the staff agrees with the applicant's conclusion that the spatial distribution of earthquakes in the region had not changed significantly since the publication of the EPRI-SOG earthquake catalog and that there are no substantial changes in seismicity patterns identified by the Phase 1 catalog. In addition, the staff agrees that seismicity demonstrated in the Phase 2 catalog adequately represented the Cuba and northern Caribbean seismic sources. Therefore, the staff concludes that the applicant has adequately evaluated the potential for new seismic sources or for revisions to existing source geometries based on seismicity patterns. Accordingly, the staff considers RAI 37, Question 02.05.02-7, resolved.

2.4.6.4.5 *Probabilistic Seismic Hazard Analysis and Controlling Earthquakes*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.4 presents the applicant's PSHA results and its estimate of the earthquake potential for the Turkey Point Units 6 and 7 site in terms of the controlling earthquakes. The applicant determined the high- and low-frequency controlling earthquakes by deaggregating the PSHA results at selected probability levels following the guidance provided in RG 1.208. Before conducting PSHA calculations and determining the controlling earthquakes, the applicant investigated the local and regional geologic and tectonic features, updated existing seismic sources and their model parameters, and developed new seismic source models for the Caribbean seismic sources as described in Section 2.5.2.4.2 of this report. Since there were no applicable ground motion prediction equations (GMPE) to the Cuba and Caribbean seismic sources, the applicant also developed a new GMPE for the Cuba and Caribbean seismic sources. The staff focused its review on the applicant's EPRI-SOG source model updates, development of new seismic source models for Cuba and the Caribbean and the GMPEs specifically developed for the Cuba and Caribbean regions.

PSHA Calculations

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.4.1, the applicant stated that it used the 1989 EPRI-SOG seismic source model and the procedures outlined therein as the starting point for probabilistic seismic hazard calculations at the Turkey Point Units 6 and 7 site.

Since the EPRI-SOG model covers the entire CEUS region and it may be unnecessary to use very far away seismic sources with lower activity rates in its PSHA calculations, the applicant first identified a subset of the EPRI-SOG seismic sources that will impact the seismic hazard calculations at the Turkey Point Units 6 and 7. In addition, because the EPRI-SOG model does not cover the entire site region, and large seismic sources exist in Cuba and the Caribbean region outside the site region, the applicant supplemented the EPRI-SOG seismic models within the site region and developed new seismic source models for Cuba and the Caribbean following the SSHAC Level II study guidelines. Using the EPRI-SOG seismic sources and the newly developed Cuba and Caribbean seismic source models along with the EPRI (2004, 2006) GMPEs and the newly developed Caribbean GMPEs, the applicant calculated generic hard rock seismic hazard curves. Using the hard rock seismic hazard curves, the applicant then obtained uniform hazard response spectra (UHRs) at the mean annual frequency of exceedances of 10^{-4} , 10^{-5} , and 10^{-6} . Using the procedures outlined in RG 1.208, the applicant also determined the controlling earthquakes for the site along with their magnitudes and distances. The following sections describe the staff's assessment of the applicant's PSHA calculations and the determination of the controlling earthquakes and their parameters.

PSHA Inputs

To conduct a PSHA study, three essential data sets are needed: seismic sources, earthquake activity rates in these sources, and ground motion prediction models. Figure 2.5.2-1 shows the relevant seismic sources the applicant extracted from the CEUS EPRI-SOG model impacting the Turkey Point Units 6 and 7 site's seismic hazard. The applicant stated that it used the criterion described in the EPRI (1989) study to select these seismic sources. The EPRI (1989) study's seismic source selection criterion was that only those seismic sources that contributed at least 1 percent to the total seismic hazard would be used in a PSHA study. Because seismicity is relatively low in Florida, and the geology and tectonics of the site region are uniform, hazard contributing seismic sources are mainly the background seismic sources (seismic sources that incorporate the site). The applicant stated that none of the nearby CEUS EPRI-SOG seismic sources contributed more than 1 percent to the total seismic hazard. Since the original EPRI (1989) study used an older set of GMPEs to calculate percent contributions for each of the seismic sources in the EPRI-SOG model, in RAI 37, Question 02.05.02-6, the staff asked the applicant to clarify whether it used the newer EPRI (2004, 2006) GMPEs in its seismic source screening for the 1 percent contribution limit criterion. In its response, the applicant stated that its 1 percent contribution assessment used the newer EPRI (2004, 2006) GMPEs. Since the applicant used the process defined in the EPRI (1989) study with newer GMPEs to estimate seismic sources' contribution levels, the staff considers RAI 37, Question 02.05.02-6 resolved.

Following the seismic source selection process, the applicant investigated whether it needed to update the original earthquake recurrence rates provided for the selected EPRI-SOG seismic sources. To determine this, the applicant conducted a sensitivity study. First, the applicant defined a rectangular geographic area bounded by 25 to 30 ° North latitudes and 80 to 83 ° West longitudes. This region is large enough to cover the site and much of its vicinity. Using

the original EPRI-SOG earthquake catalog and the updated earthquake catalog, the applicant conducted two separate rate calculations within this zone and compared the results. The comparison showed that the original earthquake catalog produced recurrence rates slightly higher than the rates obtained using the updated earthquake catalog. The applicant stated that because the original rates are higher, it opted to use them in its Turkey Point Units 6 and 7 site's PSHA. Since the higher rates will result in higher hazard calculations, the staff concludes that the use of the older catalog rates are adequate and will result in more conservative hazard estimates at the Turkey Point Units 6 and 7 site.

Since the EPRI-SOG seismic sources did not cover the entire site region of the Turkey Point Units 6 and 7 site, the applicant also developed supplementary seismic sources as shown in Turkey Point Units 6 and 7 COL FSAR Figures 2.5.2-204 through 2.5.2-209. Since there is little seismicity in these supplementary seismic sources, using the updated earthquake catalog, the applicant estimated earthquake recurrence rates in a larger region. Once the applicant calculated the earthquake recurrence rates in a larger zone, it converted them into a total rate for each of the supplementary source zones using sources' areas. The staff evaluated the applicant's process and concluded that this is a conservative approach compared with the alternative of distributing the original rates calculated within the background sources to these supplementary sources. Extending existing rates to the supplementary zones would dilute the rates and would result in slightly lower hazard calculations. The applicant's process added earthquake rates into the total earthquake rate budget in the site region and will result in slightly more conservative seismic hazard estimates. The applicant, however, did not discuss the a - and b -values it calculated for these new supplementary seismic sources. In RAI 37, Question 02.05.02-11, the staff asked the applicant to provide the a - and b -values for these new supplementary sources. The applicant responded by stating that average a - and b -values were -2.28 and 1.03, respectively. The a -value is \log_{10} of the annual rate of earthquakes with m_b between 3.3 and 3.9, per equatorial square degree. The applicant assigned these a - and b -values to the supplementary sources after scaling them using the individual sources' areas. Since the applicant provided numerical values of the a - and b -values, the staff considers RAI 37, Question 02.05.02-11, resolved.

Another seismic source model parameter that might need updating based on the new earthquake catalog is the maximum magnitudes defined for each of the selected EPRI-SOG seismic sources. M_{\max} values represent the magnitude of the largest expected earthquake in a given source. Because of the uncertainty in determining the largest expected earthquake magnitudes in any region, rather than assigning a single M_{\max} value, seismic source models usually provide a range of possible M_{\max} values for each source. Each possible M_{\max} value is also associated with a weight representing the degree of confidence on that value. The applicant stated that six out of the seven EPRI-SOG seismic source models required updates to at least one of the assigned M_{\max} values. The applicant identified four moderate sized earthquakes in the updated earthquake catalog with magnitudes greater than the lower bound M_{\max} values assigned to these sources. Using the process identified in EPRI-SOG (1986), the applicant updated several of the lower bound M_{\max} values. Table 2.5.2-2 shows the names of the sources along with older and updated M_{\max} distributions. To evaluate this update, the staff also conducted its own confirmatory study using its own earthquake catalog update and determined that the updates applied by the applicant are adequate and there are no other larger observed earthquakes in any of the selected seismic sources than the M_{\max} magnitudes listed in Table 2.5.2-2.

As Figure 2.5.2-7 shows, while the Turkey Point Units 6 and 7 site region is devoid of significant earthquake activity, there is substantial seismic activity beyond the 320 km (200 mi) site region. Specifically, in Cuba and along the active plate boundaries of the Caribbean region, seismicity levels are elevated relative to the surrounding region (Figure 2.5.2-7). The applicant stated that despite their significant distances to the Turkey Point Units 6 and 7 site, some of these seismic sources contributed to total seismic hazard at the Turkey Point Units 6 and 7 site. Because there are no seismic source models for Cuba and the Caribbean seismic sources applicable for nuclear power plant applications, following the guidance in RG 1.208, the applicant conducted a SSHAC Level II study to develop new seismic source models for Cuba and the Caribbean regions. The applicant stated that the SSHAC study produced 10 new seismic sources, which included an areal source for the region of Cuba and nine fault sources. Figure 2.5.2-7 shows the locations of these seismic source models. Using these newly created models along with the EPRI-SOG models described above form the basis of the applicant's PSHA study to determine the total seismic hazard at the Turkey Point Units 6 and 7 site.

**Table 2.5.2-2. Updated M_{max} (m_b) values of the seismic sources and associated weights
(Revised from Turkey Point Units 6 and 7 COL FSAR Table 2.5.2-207)**

Source Name	Original M_{max} Distribution	Updated M_{max} Distribution
Bechtel Group - Gulf Coast	5.4 [0.10] 5.7 [0.40] 6.0 [0.40] 6.6 [0.10]	6.1 [0.10] 6.4 [0.40] 6.6 [0.10] 6.7 [0.40]
Dames & Moore – S. Costal Margin	5.3 [0.80] 7.2 [0.20]	5.6 [0.80] 7.2 [0.20]
Law Engineering – S. Coastal Block	4.6 [0.90] 4.9 [0.10]	5.6 [0.90] 5.7 [0.10]
Rondout Assoc. – Appalachian Basement	4.8 [0.20] 5.5 [0.60] 5.8 [0.20]	5.0 [0.20] 5.5 [0.60] 5.8 [0.20]
Rondout Assoc. – Gulf Cost to Bahamas Fracture Zone	4.8 [0.20] 5.5 [0.60] 5.8 [0.20]	6.1 [0.30] 6.3 [0.55] 6.5 [0.15]
Weston Geophysical – Gulf Coast	5.4 [0.71] 6.0 [0.29]	6.6 [0.89] 7.2 [0.11]

As Figure 2.5.2-7 shows, while the Turkey Point Units 6 and 7 site region is devoid of significant earthquake activity, there is substantial seismic activity beyond the 320 km (200 mi) site region. Specifically, in Cuba and along the active plate boundaries of the Caribbean region, seismicity levels are elevated relative to the surrounding region (Figure 2.5.2-7). The applicant stated that despite their significant distances to the Turkey Point Units 6 and 7 site, some of these seismic sources contributed to total seismic hazard at the Turkey Point Units 6 and 7 site. Because there are no seismic source models for Cuba and the Caribbean seismic sources applicable for nuclear power plant applications, following the guidance in RG 1.208, the applicant conducted a SSHAC Level II study to develop new seismic source models for Cuba and the Caribbean regions. The applicant stated that the SSHAC study produced 10 new seismic sources, which

included an areal source for the region of Cuba and nine fault sources. Figure 2.5.2-7 shows the locations of these seismic source models. Using these newly created models along with the EPRI-SOG models described above form the basis of the applicant's PSHA study to determine the total seismic hazard at the Turkey Point Units 6 and 7 site.

Because the Turkey Point Units 6 and 7 COL FSAR did not provide details of the SSHAC process, in RAI 37, Question 02.05.02-3, the staff asked the applicant to provide specific details of the SSHAC process including the makeup of the TI team, experts interviewed, peer reviewers, how differing views of the experts were integrated into the final models and why the final models represented the consensus of the informed community. In its response, the applicant stated that the SSHAC level II project started with a comprehensive literature review performed by the TI team. The TI team initially came up with a draft seismic source model. The TI team also identified resource experts and conducted interviews with these resource experts to determine whether the draft seismic models represented the region adequately and if any additional seismic sources and/or source parameters were needed. During the entire process, the TI team also consulted with the project's technical advisory group composed of five additional seismic hazard experts about the applicability of the draft seismic source models for the Turkey Point Units 6 and 7 site's PSHA study. After the interviews with the identified resource experts and comments from the technical advisory group, the TI team modified the initial models and finalized them for use in the Turkey Point Units 6 and 7 site's PSHA study. The applicant stated that there were a few conflicting opinions among the resource experts on the nature and makeup of the seismic source models. Specifically, the issue of how to represent seismic activity in Cuba in seismic source models was of apparent debate. Some resource experts stated that rather than simply using an areal source for Cuba, which was in the initial model of the TI team, perhaps it was more appropriate to model seismicity with both areal and fault sources, as there are several mapped faults in Cuba. The TI team considered all the input and retained the single areal seismic source for the region of Cuba in its PSHA because there is very little known about the activity rates of the mapped faults. In the absence of observational evidence, the TI team opted to use an areal source and background seismicity in its Cuba seismic source model.

The applicant stated that the fault sources developed as part of the SSHAC Level II process for the Caribbean region are in agreement with the published literature and expert judgements as well. During the site audit conducted by the staff on May 24 and 25, 2011 (ADAMS Accession No. ML111881052), the staff also had the opportunity to review the full details of the SSHAC documents and concluded that the applicant conducted the SSHAC Level II process properly as established in NUREG/CR-6372. Based on new information provided by the applicant in response to this RAI and the staff's audit results the staff closes RAI 37, Question 02.05.02-3.

In RAI 37, Question 02.05.02-4, the staff asked the applicant to further discuss the rationale for using a single areal source exclusively for the seismic sources zones in Cuba. The staff specifically asked if an areal source would result in more conservative hazard estimates, whether a uniform seismicity model or smoothed seismicity model is used for the Cuba areal source, further details on the earthquake catalog's completeness, and whether large earthquakes in this areal source are modeled using finite faults. In a March 15, 2015 response to RAI 37, Question 02.05.02-4 (ADAMS Accession No. ML15077A177), the applicant stated that the use of individual faults would require the knowledge of fault activity and recurrence parameters. The lack of adequate data to evaluate and characterize the faults as potential distinct faults prevented the use of individual faults as potential seismic sources. However, the applicant conducted a sensitivity study in which it allowed certain fault sources to be active. Since there is lack of information about the fault slip rates, the applicant used a large uncertainty

on fault slip rates to show that the potential impact of using individual faults in its PSHA is minimal. The staff performed a confirmatory sensitivity study using a subset of scenarios considered by the applicant and concluded that the use of discrete faults has little impact on the site hazard. A detailed discussion of the staff's evaluation of this sensitivity study is in the 'PSHA Methodology and Calculation' section of this SER.

The applicant also stated that it used a spatially uniform seismicity rate model calculated using the Phase 2 earthquake catalog. In its response to the staff's RAI, the applicant presented the results of a sensitivity study in which it divided the single areal source into two areal sources to address a potential impact of non-uniform seismicity distribution in the area. The northern portion of the areal source includes a larger number of earthquakes, which would result in higher rate calculations in the region closer to the Turkey Point Units 6 and 7 site and may result in higher seismic hazard contributions from this region. Through its sensitivity study the applicant showed that seismicity rates in the northern portion of the areal source would be about 10 percent higher than rates calculated using the single areal source. Using these higher rates for the entire areal source, the applicant calculated the amount of increases in seismic hazard estimates for the 10^{-4} mean annual frequency of exceedance UHRS and showed that the higher rates would result in less than 2 percent increase in the UHRS values.

In response to the question regarding the earthquake catalog's completeness, the applicant stated that it took the completeness periods for Cuban earthquakes directly from the published literature. Garcia et al. (2008) provided earthquake completeness periods for a series of earthquake magnitudes ranges for the Cuba region. The applicant stated that earthquakes with magnitudes larger than 6 are complete since the year 1500, earthquakes with magnitudes within the range of 5 and 6 are complete since the year 1850, earthquakes with magnitudes in the range of 4 to 5 and magnitudes between 3 and 4 are complete since 1940 and 1960, respectively. The staff also evaluated the work published by Garcia et al. (2008) and concluded that the completeness periods used by the applicant are consistent with the available published data.

With regard to the question of whether the earthquakes are modeled as finite faults in the Cuba areal source, the applicant stated that earthquakes are modeled using point sources rather than finite sources, and that the impact of using the point source approximation for Cuba earthquake is minimal due to the distances involved. The staff notes that larger magnitude earthquakes require larger fault sizes, and at short distances, the use of a finite fault approximation can be shown to influence hazard calculations. Although the point source assumption is not valid for large magnitude earthquakes, considering the distances of these seismic sources to the Turkey Point Units 6 and 7 site are on the order of 320 km (200 mi) or greater and the orientation of the tectonic features that are likely to cause such large earthquakes are preferentially oriented in the east-west direction, the staff concludes that this approach will result in adequate seismic hazard estimates at the Turkey Point Units 6 and 7 site. Therefore, the staff considers RAI 37, Question 02.05.02-4, resolved.

As part of its technical evaluation regarding the seismic source model development efforts for the overall Cuba and Caribbean regions, the staff also conducted its own review of the seismotectonics of the Cuba and the Caribbean regions. The section titled 'Principal Tectonic Structures' of SER Section 2.5.1.4.1 describes the details of the staff's evaluation of the applicant's seismic source characterization efforts in the Cuba and Caribbean region. The staff asked several RAIs regarding the acceptability of the Cuban and Caribbean seismic sources for the Turkey Point Units 6 and 7 site's PSHA calculations. In this SER Section, the staff describes the details of the staff's efforts. Upon resolution of all related RAIs regarding the

development of seismic source models to be input into the Turkey Point Units 6 and 7 PSHA study, the staff concludes that the Cuba and Caribbean seismic sources are appropriate for the Turkey Point Units 6 and 7 site's PSHA.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.4.4.3.2 discusses the existence of additional several large distance seismic sources that the applicant did not incorporate into its seismic source model. Regarding these sources, the applicant stated that they do not significantly contribute to the site hazard. In RAI 37, Question 02.05.02-12, the staff asked the applicant whether this conclusion was based on sensitivity studies or on best judgement. In its response, the applicant stated that it used a combination of judgement and sensitivity studies to exclude some of the large distance seismic sources in its PSHA inputs. The applicant indicated that it based the rationale to exclude seismic sources, such as the Puerto Rico Trench and the Muertos Trough, on their great distances from the Turkey Point site. The applicant stated that in an earlier sensitivity study it calculated hazard contributions from the New Madrid Seismic Zone and shown that this source did not contribute to the total seismic hazard. Because these additional sources are at least the same distance to the site with comparable or lower recurrence levels, the applicant stated that they would not contribute to the total seismic hazard at the Turkey Point Units 6 and 7 either. The staff analyzed these additional seismic sources, confirmed their distances to the Turkey Point Units 6 and 7 site, and agrees with the applicant that their contribution to the total seismic hazard will be insignificant based on the applicant's earlier sensitivity analysis results conducted for the New Madrid Seismic Zone. Therefore, the staff considers RAI 37, Question 02.05.02-12, resolved.

Ground Motion Models

After identifying appropriate seismic sources and model parameters, in COL FSAR Section 2.5.2.4.5, the applicant described the ground motion models (GMM) it used to conduct a PSHA for the Turkey Point Units 6 and 7 site. For sources in the CEUS, including the updated and extended EPRI-SOG sources and the UCSS, the applicant used a GMM previously approved by the NRC (EPRI, 2004 and 2006). For sources in the Caribbean, the applicant stated that the EPRI (2004, 2006) GMM was not appropriate due to the tectonic setting of the Caribbean sources. Therefore, the applicant stated that it developed a new GMM for the Caribbean for use in the Turkey Point Units 6 and 7 site's PSHA.

The applicant began its GMM development study with a literature survey to find potential candidate GMMs for the region, finding one developed for Puerto Rico (Motazedian and Atkinson, 2005). The applicant stated that this model, developed for soft rock conditions consistent with Puerto Rico, represented the starting point for its GMM development effort. Because the Motazedian and Atkinson (2005) model did not incorporate distance and magnitude ranges, the applicant performed stochastic simulations for earthquakes with magnitudes between **M**4.75 and **M**8.75 and a distance range of 150 to 2,000 km (93 to 1,253 mi) using the regional anelastic attenuation and source parameters of Motazedian and Atkinson (2005). The applicant explored the model space within the simulation by varying the stress parameter, anelastic attenuation constant, and source model.

The staff reviewed information in the Turkey Point Units 6 and 7 COL FSAR and noted that the model of Motazedian and Atkinson (2005) was developed for a subduction zone plate boundary, a tectonic setting distinct from the seismic sources relevant to the Turkey Point Units 6 and 7 site. Additionally, the applicant provided limited information about the process it followed in developing the GMM. Therefore, in RAI 37, Question 02.05.02-2, the staff requested that the applicant to explain why GMM based on Puerto Rico settings are applicable to the Caribbean

generally, provide more information about the SSHAC process used to develop the Caribbean GMM, compare the Caribbean GMM with EPRI (2004, 2006), and discuss any evidence that seismic source scaling varies systematically in the Caribbean. In a letter dated November 16, 2011 (ADAMS Accession No. ML11321A319), the applicant provided its first response and later, on October 3, 2014 (ADAMS Accession No. ML14282A015), the applicant provided a revised, more comprehensive response. In its response, the applicant provided additional information regarding the development and applicability of the Caribbean GMM to seismic sources used in the Turkey Point Units 6 and 7 site's PSHA, additional information regarding the SSHAC process, and a comparison between the Caribbean GMM and the EPRI (2004, 2006) GMM, including the results of two sensitivity studies.

In its revised RAI response, the applicant stated that no GMM were currently available that directly address the impact of earthquakes in the Caribbean on the CEUS. Therefore, the applicant selected the model of Motazedian and Atkinson (2005) as a starting point. The applicant noted that it did not use this model directly, but as a starting point to develop a new model. The applicant further noted that there were insufficient strong motion recordings in Cuba and the northern Caribbean to develop a GMM from observations directly. The applicant also stated that Motazedian and Atkinson (2005) took pains to ensure that subduction zone earthquakes minimally affected their strong motion dataset by limiting the depth of earthquakes used in their study and by comparing their results to GMM for regions such as California and the CEUS. The applicant stated that because these comparisons are favorable, and there is a lack of other candidate models, that the model of Motazedian and Atkinson (2005) represents a reasonable starting model for developing the Caribbean GMM.

In its initial response to the staff's RAI requesting the details of the SSHAC Level II study conducted in the development of GMM, the applicant stated that it did not conduct a formal SSHAC Level II study for the development of the Caribbean GMM. The staff evaluated this initial response and found it inadequate, and requested that the applicant to follow a SSHAC Level II process, consistent with the guidance provided NUREG/CR-6728. After the staff's request, the applicant conducted additional studies to bring the level of its initial work to a level compatible with a SSHAC Level II study and provided its results in the revised RAI response. The applicant's revised response stated that the applicant contacted outside technical experts, requested their reviews of what had already been developed and conducted new sensitivity studies to address the experts' concerns. In its updated RAI response, the applicant further justified the use of a GMM based on the Motazedian and Atkinson (2005) study. The applicant stated that two individuals with significant experience in GMM development conducted its initial study and that the study participants reached out to several other experts throughout the process of model development. The applicant also noted that the lack of GMM for the Caribbean region meant that finding proponent experts, individuals who are able to advocate for a particular technical conclusion or position, was difficult. Therefore, the applicant reached out more broadly to experts in GMM development. These experts provided feedback to the study participants and served as a peer review group. The applicant's revised response stated that this effort broadly met the guidance for a SSHAC Level II study and was consistent with current industry practice.

As part of its revised response to the staff's RAI, the applicant also conducted two studies to assess if the Caribbean GMM were appropriate for use with seismic sources in the Caribbean and Cuba. In the first study, the applicant compared the Caribbean GMM with the EPRI (2004) GMM and with limited observational data available in the region (Figure 2.5.2-8). As Figure 2.5.2-8 indicates, the Caribbean GMM produce spectral accelerations lower than the EPRI (2004) Midcontinent GMM, but higher than the EPRI (2004) Gulf Coast models. Comparisons

with limited observational data available from an earthquake that occurred south of Cuba on February 4, 2007, indicate that observations fall in between the Caribbean and Gulf Coast EPRI (2004) models, suggesting that, for this event, the Caribbean GMM are slightly more conservative, and the EPRI stable continental GMM are overly conservative.

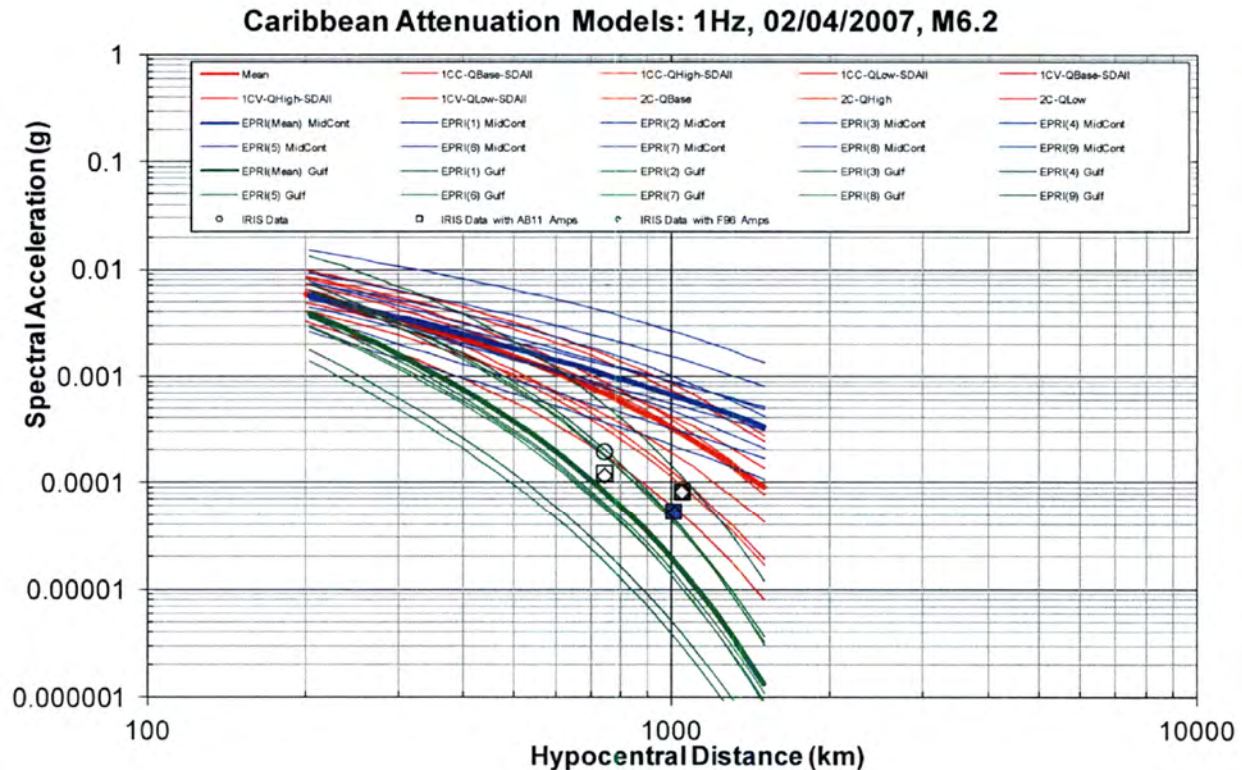
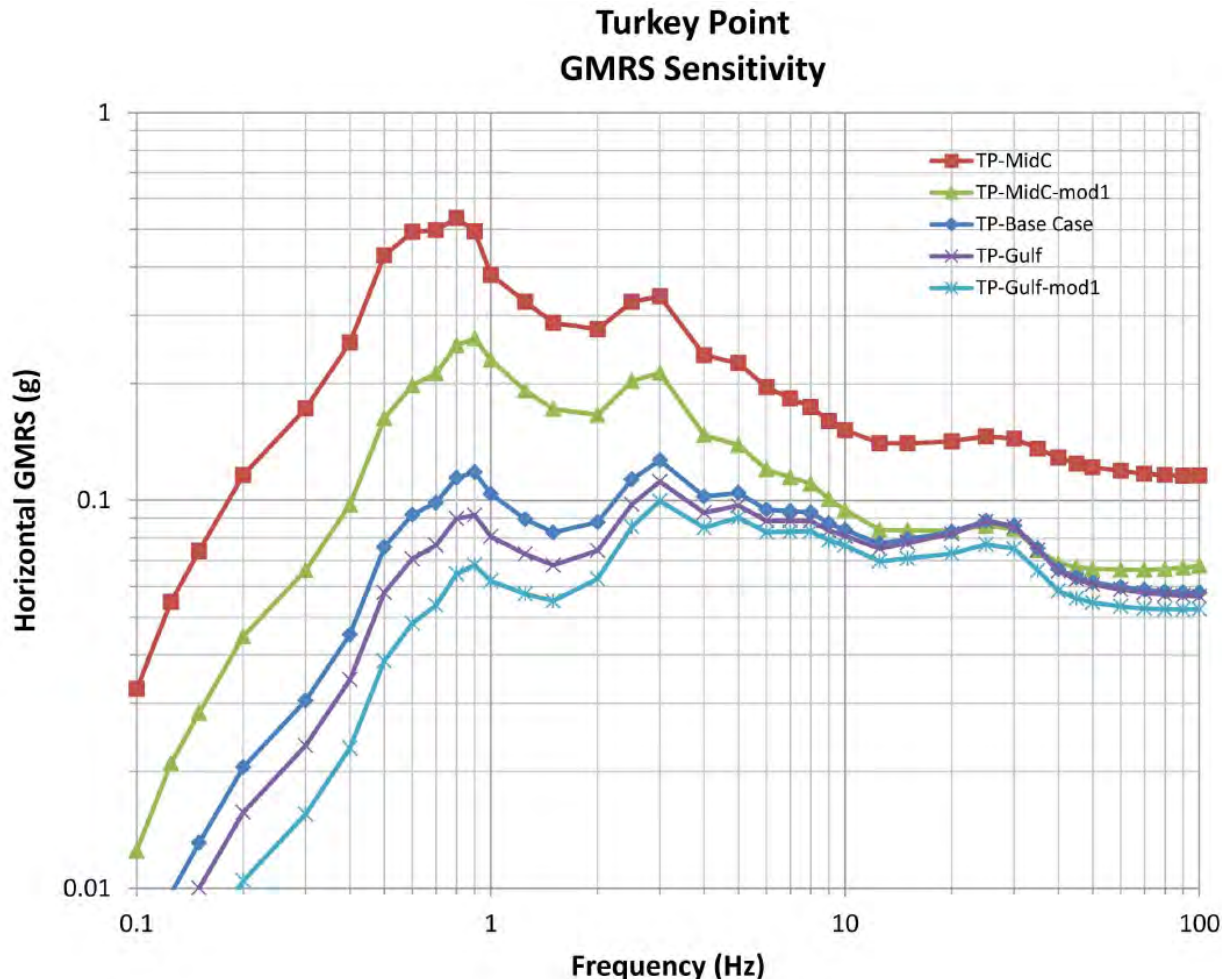


Figure 2.5.2-8. Comparison of observed earthquake ground acceleration (circles and squares) with predictions from the Caribbean GMM (Red) and Midcontinent (Blue) and Gulf (Red) versions of the EPRI (2004, 2006) GMM (Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.5.2-260b)

In the second study, the applicant considered, as a sensitivity study, the effect of using alternative GMM for the Caribbean sources on the Turkey Point GMRS. The applicant calculated a GMRS for five alternative ground motion model scenarios. The applicant performed its GMRS sensitivity analysis so that the only thing that changed was which GMM it used to calculate the contribution to hazard from the Caribbean seismic sources. The base case GMRS is the one calculated using the Caribbean GMM. The remaining four alternative GMRS curves represent results obtained by using the midcontinent and gulf versions of the EPRI (2004, 2006) GMM either as published or with modifications. The modified versions of the EPRI GMM were obtained by eliminating the highest ground motion producing equation at large distances from the published model. Figure 2.5.2-9 shows the results of the applicant's sensitivity study. The applicant stated that the results of its analysis reveal the GMRS that results from the Caribbean GMM is intermediate between the midcontinent and gulf versions of the EPRI (2004) GMM and the midcontinent versions are not realistic representations of the site-specific GMRS. The applicant concluded based on this study and results of the observed ground accelerations that the Caribbean GMM is appropriate for use for Caribbean sources

because it results in higher ground motions than using the gulf version of the EPRI GMM and is more consistent with observations.



**Figure 2.5.2-9. GMRS sensitivity to GMM selection for Caribbean Seismic Sources
(Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.5.2-263)**

In addition to providing the results of these two additional studies that examined the differences between the Caribbean GMM and the EPRI GMM for Caribbean seismic sources, the applicant also compared the expected ground motions from the two GMMs for a variety of distances and earthquake magnitudes. Earthquake distances ranged from 200 to 1,000 km (124 to 621 mi) and earthquake magnitudes ranged from **M6** to **M8**. The applicant showed that expected ground motions for the Caribbean GMM were generally lower than those for the midcontinent version of the EPRI GMM, except at a frequency of 1 Hz for a **M6** earthquake 200 km (124 mi) away.

Based on the results of these sensitivity studies conducted by the applicant in response to RAI 37, Question 02.05.02-2, the staff finds that the use of the Caribbean GMM is conservative relative to observed data. Therefore, the staff finds that the applicant's Caribbean GMM is

adequate for use in the PSHA for at the Turkey Point Units 6 and 7 site and considers RAI 37, Question 02.05.02-2, resolved.

PSHA Methodology and Calculation

In COL FSAR Section 2.5.2.4.6, the applicant described its approach to performing a PSHA for the Turkey Point Units 6 and 7 site. The applicant considered the impact of multiple potential seismic sources including updated EPRI-SOG sources, Cuba and North American-Caribbean plate boundary faults as well as the updated Charleston seismic source.

As described above in this section and in SER Section 2.5.1.4.1, the applicant modeled seismic sources in Cuba as a single areal source despite the presence of several large faults in the region. The applicant stated that there is little geologic or seismic evidence to constrain the parameters (e.g., slip rate, M_{\max} , fault length, etc.) on these faults important to conducting a PSHA. Based on the presence of these faults and the fact that they represent potentially tectonically capable faults within 320 km (200 mi) of the Turkey Point Units 6 and 7 site, in RAI 37, Question 02.05.02-4, the staff requested further justification on the use of a single areal source to represent seismic hazard from Cuba.

In a response to RAI 37, Question 02.05.02-4 dated October 3, 2014 (ADAMS Accession No. ML14282A014), and updated on March 16, 2015 (ADAMS Accession No. ML15077A177), the applicant addressed the staff's concerns regarding the treatment of the Cuba areal source in its PSHA. The applicant conducted a sensitivity study using the SSHAC Level II guidelines to model the effect of subdividing the Cuba areal source into several areal sources or treating the source as a number of discrete faults. The applicant selected several potential seismic source models for the Cuba region ranging from the single areal source model currently implemented in the PSHA to a full fault (FF) model that modeled all seismic sources as discrete fault sources. Figure 2.5.2-3 summarizes the models considered by the applicant in its sensitivity study. Shaded models are those that the SSHAC Level II participants deemed technically defensible interpretations of the available data and were included in the applicant's sensitivity analysis. The applicant discarded the other scenarios for a number of reasons. The FF model results in a greater seismic moment release than is observed in the seismicity catalog. Therefore, the applicant did not consider any scenario that incorporates the FF model because it deemed this interpretation overly conservative. The remaining discarded models were not used either because they include the FF model, arrive at an answer within the range of the acceptable models (e.g., Z6+SF), or are based on an arbitrary increase in background seismicity (Z11). Of the scenarios selected by the applicant for conducting its sensitivity study, none results in an increase in seismic hazard greater than 0.004 g, which is insignificant compared to the overall hazard at the site.

The applicant did not include the effect of the FF model on the site hazard as it was considered overly conservative. However, because very limited data are available on the activity of the faults, the staff determines that these alternative models should also be considered in the uncertainty analysis. To better assess the effect of incorporating the FF model into the Turkey Point Units 6 and 7 site's PSHA analysis, the staff conducted a confirmatory study and considered two scenarios discarded by the applicant as viable options. The staff used the hazard curves for the FF model to assess the effect on Turkey Point Units 6 and 7 site seismic hazard by considering the FF scenario and the Z1+FF scenario in Table 2.5.2-3. Figure 2.5.2-10 shows the staff's results for these two scenarios and indicates that the inclusion of the FF model results in a relatively small increase to the total hazard at the Turkey Point Units 6 and 7 site. At 1 Hz, the increase in hazard is less than 0.004 g at the 10^{-4} mean annual frequency of

exceedance and 0.008 g at the 10^{-5} hazard level for the Z1+FF model (the most conservative scenario considered). These increases are small relative to the hazard at the site (less than 12 percent of the total hazard). In its sensitivity analysis, the staff ignored the fact that seismic moment attributed to Cuba faults would need to be removed from the Cuba areal source when calculating a - and b -values, leading to additional conservatism in the sensitivity results. Because the applicant's sensitivity study and the staff's confirmatory calculations have shown that consideration of alternative seismic source models do not impact the total hazard significantly, the staff agrees that the One Areal Source Zone (Z1) model used by the applicant adequately addresses the contribution to seismic hazard at the Turkey Point Units 6 and 7 site from Cuba.

Table 2.5.2-3: Scenarios Selected for Cuba Seismic Source Sensitivity Study (Z1* used as basis for PSHA) (Modified from Turkey Point Units 6 and 7 COL FSAR Table 2.5.2.-233)

		Areal Source Zone Scenarios (Hazard Increases →)			
		No Areal Source Zones	Six Areal Source Zones (Z6)	One Areal Source Zone (Z1)	One Areal Source Zone with 11% Increase in Seismicity Rate (Z11)
Fault Source Scenarios (Hazard Increasing ←)	No Fault Sources		Z6	Z1*	Z11
	Scaled Fault Sources (SF)	SF	Z6+SF	Z1+SF	Z11+SF
	Full Fault Sources (FF)	FF	Z6+FF	Z1+FF	Z11+FF

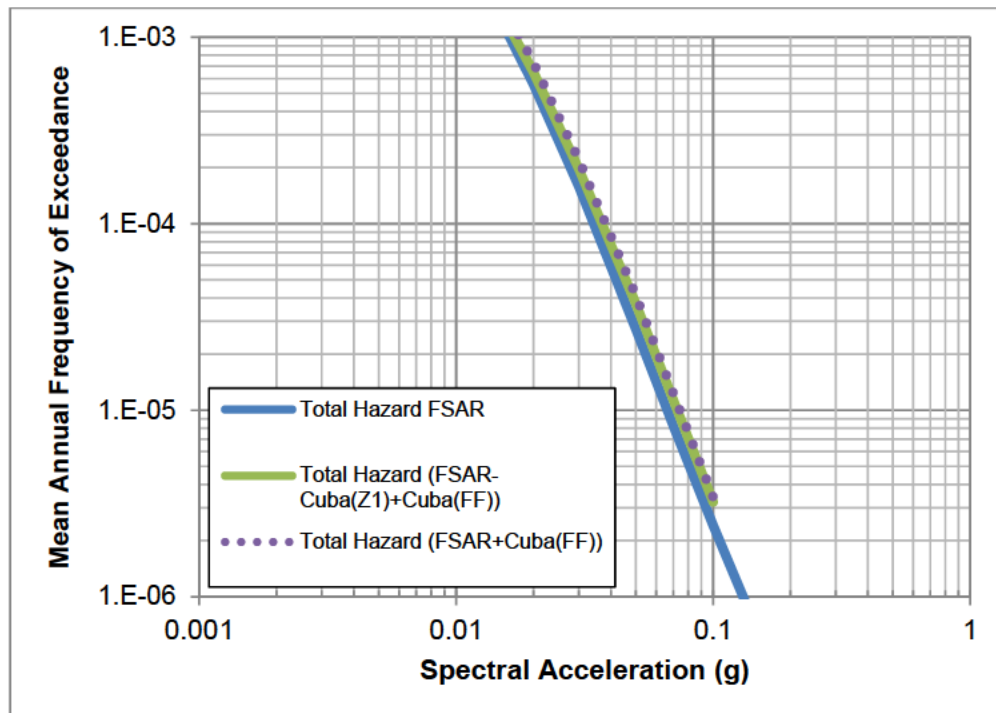


Figure 2.5.2-10. Comparison of 1 Hz hazard curves when including Cuba full fault (FF) scenario or the Cuba FF and One Areal Source Zone (Z1) scenario in the Turkey Point Units 6 and 7 site's PSHA

As discussed in Section 2.5.1.4.1.3.1 of this report, the staff also conducted a couple of sensitivity studies for two possible active strike-slip faults identified within the site region. Seismic reflection data collected by a recent research cruise in the Santaren Channel (Kula, 2014) identified a potential Quaternary fault. Based on information provided by the applicant in its response to RAI 81, Question 02.05.01-34, the applicant reached the conclusion that structures identified by Kula (2014) do not represent Quaternary faulting. However, the staff considered that based on data available at hand, it was not conclusive that the faults are not active. To assess the potential impact of this structure on the Turkey Point Units 6 and 7 site's PSHA analysis, the staff conducted a sensitivity study.

In its sensitivity study, the staff used the most recent NRC approved GMPEs (EPRI, 2013) for the midcontinent region of the CEUS and a simplified magnitude distribution to calculate potential seismic hazard curves at the Turkey Point Units 6 and 7 site from the possible faults. The staff calculated mean seismic hazard curves using a fault length (40 km) and distance (155 km) consistent with seismic reflection profiles identified in Kula (2014) for Fault A at a variety of slip rates ranging from 0.01 to 10 mm/yr. The staff compared these seismic hazard curves to the PSHA results in the Turkey Point Units 6 and 7 COL FSAR to determine the impact of a possible Fault A on the PSHA for the site. Figure 2.5.2-11 shows the impact of this sensitivity study on the PSHA results and indicates that the possible existence of Fault A has a minor impact on overall hazard at reasonable slip rates (less than 1.0 mm/yr). The staff's sensitivity analysis includes several conservative assumptions, including a single seismogenic thickness of 15 km (9 mi) and the use of the midcontinent version of the EPRI (2013) GMPEs. The small increase in overall hazard due to the potential Fault A and the conservative assumptions used in the staff's sensitivity analysis provide assurance that the applicants PSHA for the Turkey Point Units 6 and 7 site would not change, even if this fault were active.

In addition to analyzing the impact of a potential Quaternary fault within the Santaren Channel (Fault A discussed above), the staff analyzed the potential impact of a fault within the Miami Terrace anticline, discussed in SER Section 2.5.1.4.1. The staff considered the impact of this fault on the hazard at the Turkey Point Units 6 and 7 site in a manner consistent with the analysis above. Based on a lack of information about the fault size, the staff assumed a fault length of 15 km (9 mi), consistent with the assumed seismogenic thickness of the crust, and a distance from the site of 50 km (31 mi). Based on these parameters, the staff calculated hazard curves for a number of possible slip rates and compared these results to the hazard at the Turkey Point Units 6 and 7 site reported in the COL FSAR. As shown in Figure 2.5.2-12, the contribution to seismic hazard from the Miami Terrace anticline fault is moderate at frequencies above 5 Hz for slip rates greater than 0.05 mm/yr. The staff notes that its analysis incorporates a number of simplifications and conservatisms, including the use of a single seismogenic thickness and the use of the midcontinent version of the EPRI (2013) GMPEs. Based on the staff's analysis and the lack of geologic and geophysical evidence to provide constraints on the fault length, dip, and slip rate, the staff concludes that the applicant's PSHA adequately incorporates the hazard from the potential Miami Terrace anticline fault.

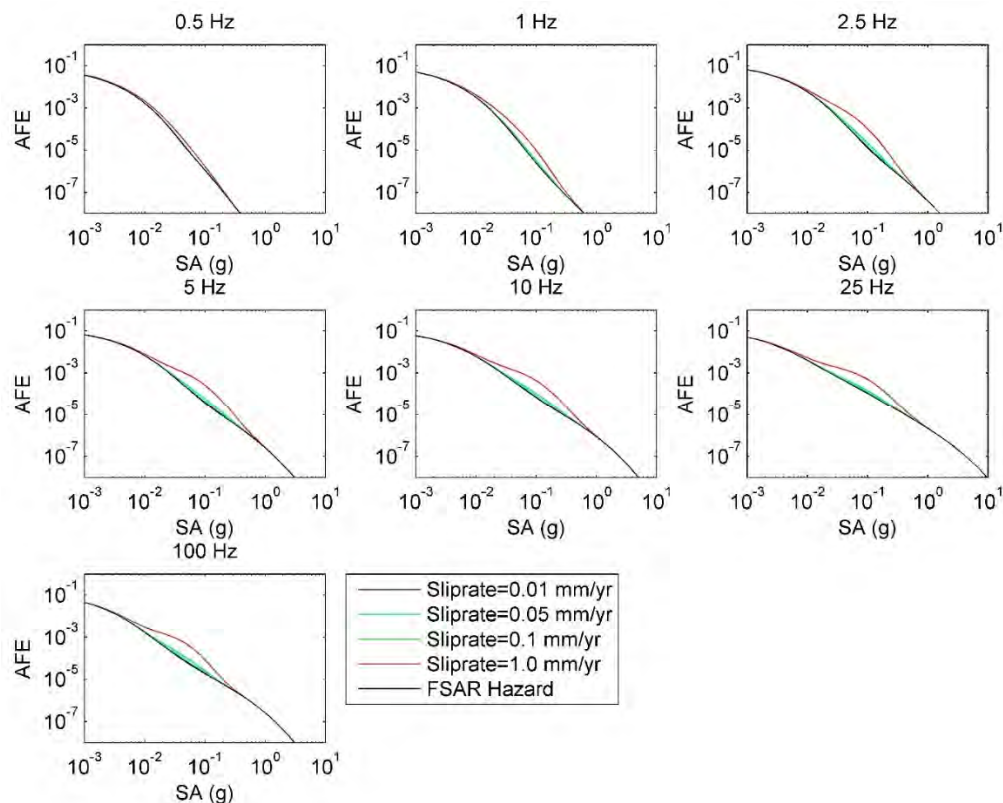


Figure 2.5.2-11. Sensitivity of COL FSAR hazard (black) to Fault A under a number of different slip rate scenarios. The inclusion of Fault A has a minor potential impact on PSHA results at slip rates less than 1 mm/yr, which is not supported by geologic evidence. The x-axis for each plot shows the spectral acceleration (SA) in g and the y-axis shows the annual exceedance frequency. The hazard levels important for the GMRS are 10^{-4} and 10^{-5} mean annual frequency of exceedance.

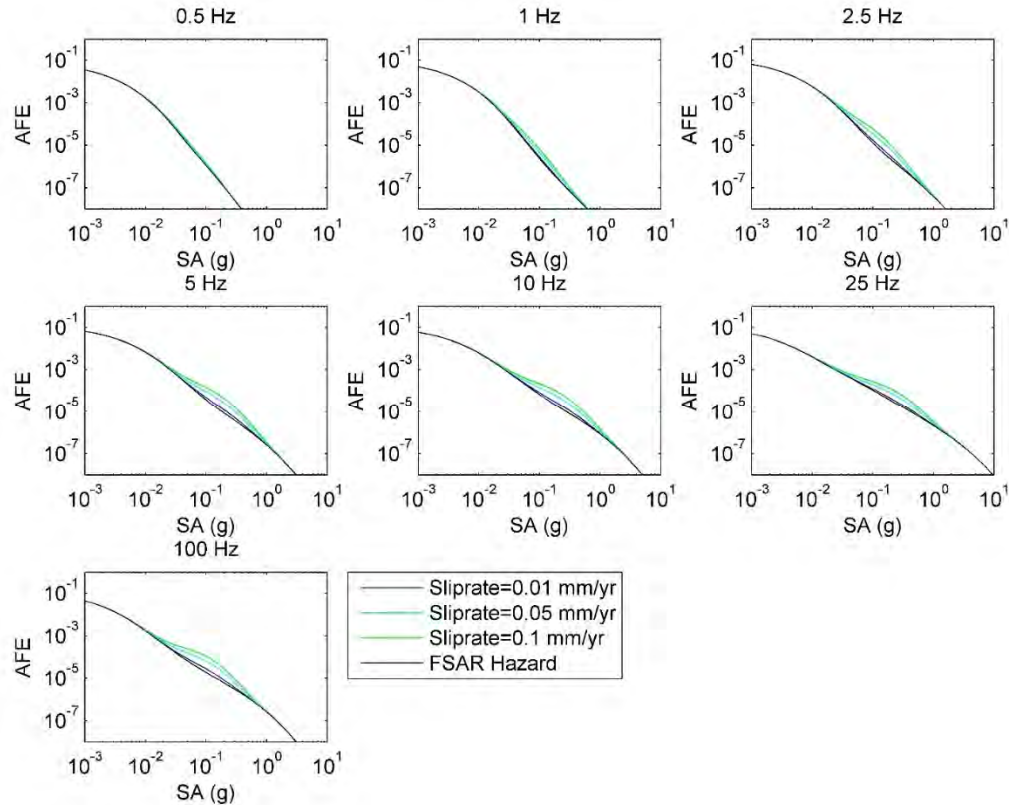


Figure 2.5.2-12. Sensitivity of COL FSAR hazard (black) to Miami Terrace Anticline Fault under a number of different slip rate scenarios. The inclusion of the fault has a minor potential impact on PSHA results. The x-axis for each plot shows the spectral acceleration (SA) in g and the y-axis shows the annual exceedance frequency. The hazard levels important for the GMRS are 10^{-4} and 10^{-5} mean annual frequency of exceedance.

After the 2011 Fukushima Dai-ichi nuclear power plant accident in Japan, which occurred because of the Great Tohoku earthquake and the subsequent tsunami, the NRC Near-Term Task Force (NTTF) issued a series of recommendations for reevaluating and improving nuclear power plant safety in the United States. Consequently, on March 12, 2012, the NRC issued an information letter requesting that licensees of all operating nuclear power plants in the United States reevaluate the seismic hazard at their respective plants using the most recent data and evaluation methodologies available. That information letter also requested that licensees of operating plants in the CEUS use the seismic source model provided in NUREG-2115 to characterize seismic hazard at their respective plants. Consistent with existing guidance in RG 1.208 pertaining to the need to consider the latest information in the evaluation of seismic hazard, the NRC also requested that all COL and ESP applicants in the CEUS address seismic hazard for their respective proposed plant sites using information in NUREG-2115 and modify the ground motion response spectra (GMRS), if needed. The staff issued this request to the applicant in RAI 47, Question 1.5-1.

In responses to RAI 47, Question 01.05-1 dated February 12, 2013 (ADAMS Accession No. ML13044A570) and March 31, 2015 (ADAMS Accession No. ML15092A222), the applicant stated that it conducted a sensitivity study to determine that the EPRI-SOG model, as updated and modified in the Turkey Point Units 6 and 7 COL FSAR, is acceptable for use at the Turkey

Point Units 6 and 7 site. In its sensitivity study, the applicant combined seismic hazard curves developed using the CEUS-SSC model described in NUREG-2115 with hazard curves for the Caribbean region and compared these to the hazard curves that result from combining the updated EPRI-SOG model with the Caribbean. The applicant's sensitivity shows that the EPRI-SOG model results in slightly higher hazard at frequencies greater than 1 Hz, and slightly lower hazard less than 1 Hz. Based on the results of the sensitivity study, the applicant chose to continue using the EPRI-SOG model for its PSHA.

To confirm the applicant's sensitivity study results presented in the Turkey Point Units 6 and 7 COL FSAR, the staff performed an independent confirmatory analysis. The staff used the CEUS-SSC, as published in NUREG-2115, along with the midcontinent version of the EPRI (2004, 2006) GMM to calculate hazard for all sources within 1,000 km (620 mi) of the site. The staff compared its results for the CEUS-SSC with hazard curves developed by the applicant for the CEUS using the EPRI-SOG model and UCSS. The staff did not consider the effect of the Caribbean sources for its confirmatory analysis because the contribution of the Caribbean sources to the total hazard remains the same regardless of which seismic source model is used for the CEUS. Figure 2.5.2-13 shows the results of the staff's confirmatory analysis along with the applicant's results. The staff's PSHA results obtained using the CEUS-SSC model are lower than the applicant's results at 10 Hz and peak ground acceleration (PGA), and slightly higher at 1 Hz. Based on the results of the applicant's sensitivity study and the staff's confirmatory analysis, the staff considers the use of the EPRI-SOG model is adequate to represent the total seismic hazard at the site and the staff considers RAI 47, Question 1.5-1, resolved.

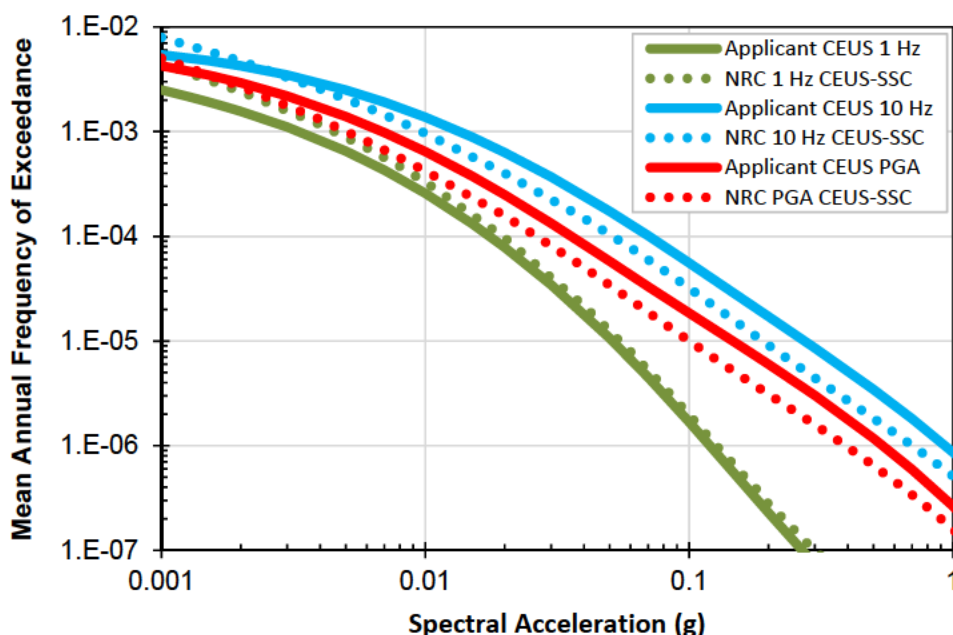


Figure 2.5.2-13. Comparison of Applicant's PSHA Results Using EPRI-SOG and UCSS Sources to Staff's Confirmatory Analysis Using CEUS-SSC at 1, 10, and 100 Hz (PGA)

Controlling Earthquakes

To determine the LF and HF controlling earthquakes, the applicant used a procedure called deaggregation of the seismic hazard. The applicant followed the deaggregation procedures

outlined in RG 1.208, Appendix D. The deaggregation results showed that local seismic sources within 60 km (38 mi) of the Turkey Point Units 6 and 7 site are the primary contributors to the high-frequency seismic hazard at the site, while the large Caribbean fault sources and the Charleston source are a significant source of low-frequency seismic hazard at the Turkey Point Units 6 and 7 site. Table 2.5.2-1 of this report shows the applicant's deaggregation results for the mean 10^{-4} , 10^{-5} , and 10^{-6} annual frequencies of exceedance results. The applicant calculated the controlling earthquakes for two different cases: overall hazard and hazard from earthquakes located beyond 100 km (62 mi). As shown in Table 2.5.2-4, for the HF hazard, the controlling earthquakes are those with magnitudes less than **M6** occurring at distances 110 km (68 mi) or less. For the LF hazard, the controlling earthquakes are several hundred kilometers away with magnitudes greater than **M7**. The applicant selected the gray shaded values shown in Table 2.5.2-1 of this report as representative of the controlling earthquakes for the Turkey Point Units 6 and 7 site.

During its review, the staff noted that figures of deaggregation results for Turkey Point Units 6 and 7 showed only a minor contribution from the distance range of the Cuba seismic source zone in contrast to COL FSAR Section 2.5.2.4.5, which states that the Cuba seismic source zone contributes significantly to seismic hazard at Turkey Point Units 6 and 7. In RAI 37, Question 02.05.02-8, the staff requested that the applicant explain this apparent discrepancy and provide a detailed breakdown of the contribution of the Cuba seismic source zone to seismic hazard at the Turkey Point Units 6 and 7 site.

In a response dated November 16, 2011, and supplemented on October 3, 2014, the applicant provided a breakdown of the contribution of the Cuba seismic source zone to the total hazard. The applicant stated that it contributed, on average, 22 percent to the low-frequency seismic hazard at the 10^{-4} mean annual frequency of exceedance. The applicant further stated that the contribution of the Cuba seismic zone is distributed across a wide range of distance and magnitude bins and provided a table detailing the contribution of the Cuba seismic source zone within a number magnitude and distance bins at the 10^{-4} and 10^{-5} annual frequencies of exceedance.

On the basis of the applicant's response, the staff agrees that the contribution from Cuba source zone earthquakes is distributed across a number of distance and magnitude bins and is properly accounted for in the applicant's deaggregation results. Therefore, staff considers RAI 37, Question 02.05.02-8, resolved.

Staff Conclusions Regarding PSHA and Controlling Earthquakes

After fully evaluating the applicant's PSHA and controlling earthquakes determinations, the staff concludes that the applicant's PSHA adequately characterizes the seismic hazards for the region surrounding the Turkey Point Units 6 and 7 site, and that the controlling earthquakes determined by the applicant are representative of earthquakes that would be expected to contribute the most to the hazard. The staff concludes that the applicant's PSHA and controlling earthquake analysis meets the guidance in RG 1.208.

2.5.2.4.5 *Seismic Wave Transmission Characteristics of the Site*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.5 describes the method used by the applicant to develop the Turkey Point Units 6 and 7 site soil UHRS. The seismic hazard curves calculated by the applicant are defined for generic hard rock conditions characterized by a shear wave (V_s) velocity of at least 2.8 km/s (9,200 ft/s). The applicant stated that these hard rock

conditions exist at a depth of more than 4,572 m (15,000 ft) beneath the ground surface at the Turkey Point Units 6 and 7 site. To determine the effect of the soil column between the hard rock and the surface, the applicant performed a site response analysis. The output of the applicant's site response analysis are the site amplification functions, which are then used to determine the soil UHRS at three uniform hazard levels of 10^{-4} , 10^{-5} , and 10^{-6} mean annual frequency of exceedance.

Site Response Inputs

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.5, the applicant summarized the low strain S-wave velocity, material damping, and strain-dependent properties of the base case soil and rock profile, which the applicant used as the input model to its site response calculations. The applicant stated that it investigated the upper 185 m (611 ft) of the Turkey Point Units 6 and 7 site's subsurface using test borings, cone penetration testing, test pits, and geophysical methods. For the deeper sedimentary rocks (greater than 185 m (611 ft)), the applicant obtained the information from nearby wells and geological data sets.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.5.1 states that the applicant used P-wave velocities from eight deep wells to develop the deeper sections of the site response model. These wells are approximately 100 km (62 mi) to 180 km (112 mi) away from the Turkey Point Units 6 and 7 site. In RAI 37, Question 02.05.02-9, the staff asked the applicant to provide additional information on the applicability of seismic velocity information at these long distances from the site, including how it considered the variation in geology in the projection of these datasets to the site. The staff also asked the applicant to provide individual velocity profiles for each of the eight wells used in estimating the average profiles and for further details on how it accounted for larger uncertainties in deeper layers, thicknesses, and depths in the randomization of the site profile. In response to RAI 37, Question 02.05.02-9, the applicant provided the velocity profile data used to develop the deeper site profile. The applicant stated that based on its review of relevant publications, regional geologic cross sections, and the sonic logs, there is minimal variation in the stratigraphy in the upper 1,829 m (6,000 ft) between the deep well logs and the Turkey Point Units 6 and 7 site. The applicant also stated that alternative models used in the randomization process in site response input models accommodate any potential variations in the deeper velocities. Since the applicant showed in the RAI response that the variability between the site and the well log locations was minimal, the staff considers the applicant adequately used the available data and RAI 37, Question 02.05.02-9, resolved.

The applicant used the Random Vibration Theory (RVT) methodology to calculate the site response amplification function at the Turkey Point Units 6 and 7 site. RG 1.208 mentions the use of RVT in site response calculations as an acceptable alternative to the time series approach. RG 1.208 specifically states, "...RVT methods are acceptable as long as the strain dependent soil properties are adequately accounted for in the analysis." Hence, the staff focused its review on the input parameters used in the site response calculations. Inputs to the RVT method include response spectra that are based on the hard rock UHRS, shear wave velocity and density profiles, degradation and damping curves, effective strain ratio, and strong motion duration. The applicant estimated the strong-motion durations using the site-specific controlling earthquakes' magnitudes and distances and the formulation provided in American Society of Civil Engineers report ASCE 4-98, titled "Seismic Analysis of Safety-Related Nuclear Structures and Commentary" (ASCE, 2000). Since the applicant used published reference tables in ASCE 4-98 to estimate the strong motion ground durations and also the staff's determination that site response is only slightly dependent on the duration used, the staff

concludes that the applicant's selection of duration values are within range and adequate for site response calculations at the Turkey Point Units 6 and 7 site.

The applicant stated that it calculated the effective strain ratios using the formulation provided in Idriss and Sun (1992) and the program P-SHAKE (Der Kiureghian, 1980; Rathje and Ozbey, 2006), which uses a procedure based on RVT. The applicant used an effective strain ratio of 0.65, defined by the applicant as the ratio between the peak acceleration of earthquake time history and the equivalent harmonic wave going through the layers. The staff confirmed these values and concluded that the input effective strain ratios determined by the applicant are within the acceptable values commonly used by the engineering community.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1, the applicant discussed its site-specific soil and rock column. In that section, the applicant stated that it used site-specific RCTS-based shear modulus degradation and damping ratio curves for the site amplification function analysis for the Key Largo Limestone, Fort Thompson Formation, and upper and lower Tamiami Formation. In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.16, the applicant detailed the strain-dependent properties developed for the Turkey Point Units 6 and 7 site by comparing the generic EPRI (1993) shear modulus and damping curves to the site-specific data from RCTS tests. The applicant developed site-specific curves from the RCTS tests on 14 undisturbed soil samples down to approximately 55 m (180 ft). The applicant used the site-specific data to choose the best fit EPRI generic curves in characterizing the strain-dependent properties above 55 m (180 ft). These curves were used as input to the site response analysis for the Key Largo Limestone, Fort Thompson Formation, and natural soils above (Lower Tamiami Formation) and below (Peace River and Arcadia Formations) 46 m (150 ft). Based on the data provided, the staff confirmed that the applicant's use of site-specific and generic EPRI curves to characterize the strain-dependent properties beneath the Turkey Point Units 6 and 7 site is adequate.

Another primary input to the RVT site response calculations is the response spectra calculated for the generic hard rock conditions beneath the site. The applicant used the low- and high-frequency UHRS spectra at the 10^{-4} and 10^{-5} mean annual frequency of exceedance levels to estimate input ground motions. Consistent with DC/COL-ISG-017, "Ensuring Hazard-Consistent Seismic Input for Site Response and Soil Structure Interaction Analyses," the applicant also stated that it conducted the calculations using the full soil column including the soils above the GMRS horizon, and estimated the strain-compatible properties associated with each of the input rock motions and repeated the process again after removing the soil layers above the GMRS horizon, and calculated site responses and obtained the mean amplification function for the site.

Staff Site Response Confirmatory Analyses

To determine the adequacy of the applicant's site response calculations, the staff performed its own confirmatory site response calculations. As input, the staff used the static and dynamic soil properties provided in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4. To represent the input rock motions, the staff used the applicant's low- and high-frequency 10^{-4} and 10^{-5} rock spectra. The staff performed its site response calculations using the STRATA software (Kottke and Rathje, 2008).

As shown in Figure 2.5.2-14, the applicant's amplification functions are similar to the staff's confirmatory amplification functions across the frequency range typically important for engineering purposes (i.e., 0.5 Hz to 10 Hz) and they are within the limits of uncertainties

expected from these calculations. In addition to confirming the applicant's calculations, the staff also conducted sensitivity studies to test the impacts of the strong motion duration. The staff's confirmatory calculations showed that the Turkey Point Units 6 and 7 site response is not strongly sensitive to duration of strong motion.

Staff Conclusions Regarding Seismic Wave Transmission Characteristics of the Site

Based on its review of the applicant's site response methodology and results, the applicant's response to RAIs related to site response, and the staff's independent confirmatory analysis, the staff concludes that the applicant's site response analysis adequately characterizes the expected response of the Turkey Point Units 6 and 7 site to input ground motions. The staff concludes that the applicant's site response analysis meets the guidance in RG 1.208.

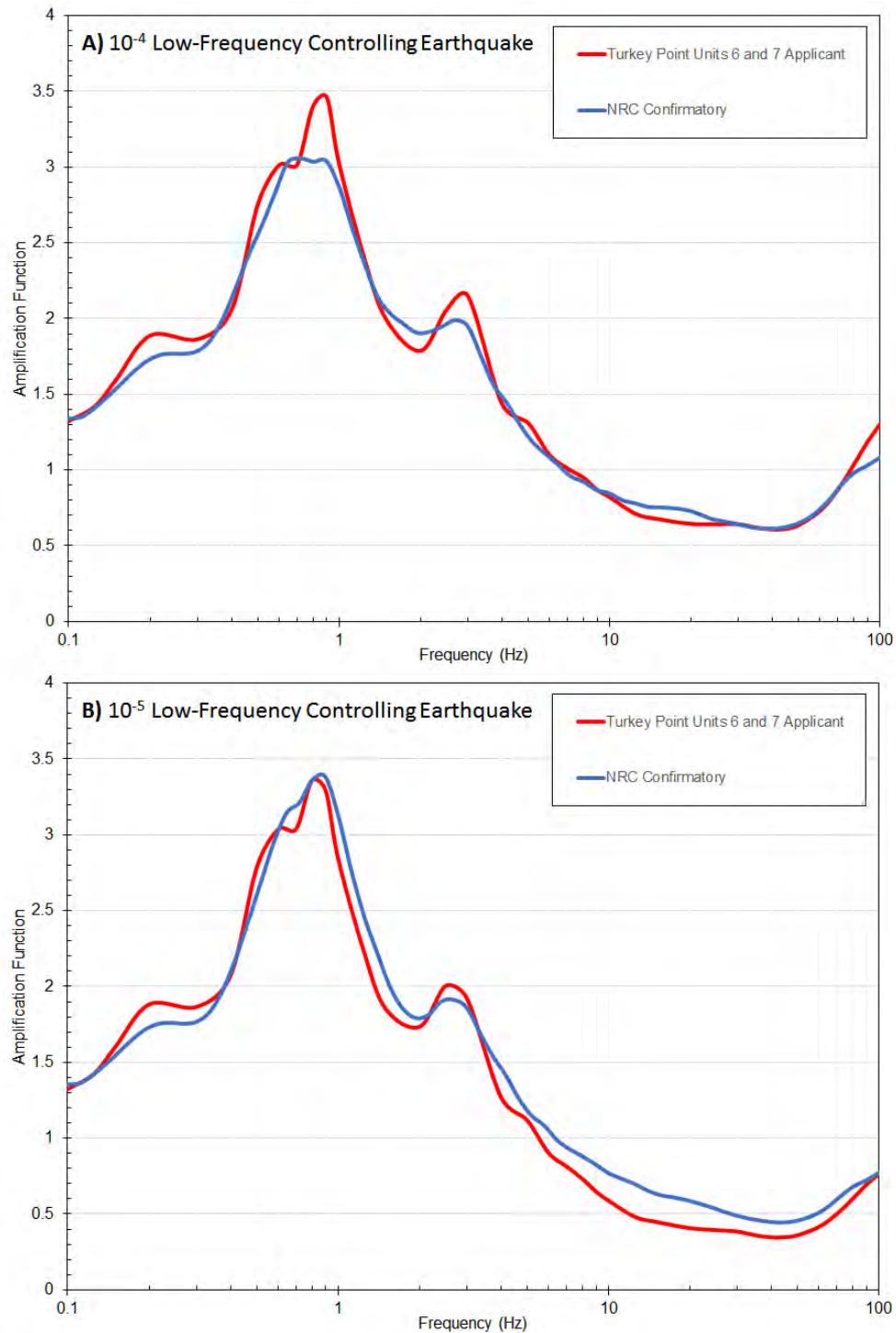


Figure 2.5.2-14 Comparisons of the staff's site response amplification function with the amplification function determined by the applicant for the A) 10^{-4} and B) 10^{-5} mean annual frequency of exceedance for low-frequency controlling earthquake at the Turkey Point Units 6 and 7 site

2.5.2.4.5 *Ground Motion Response Spectra*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.2.6 describes the method used by the applicant to develop the horizontal and vertical, site-specific, GRMS. To obtain the horizontal GMRS, the applicant used the performance-based approach described in RG 1.208, and American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI) Standard 43-05, "Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities. COLFSAR Section 2.5.2.4.6 states that the horizontal GMRS (for each spectral frequency), is obtained by scaling the soil 10-4 UHRS by the design factor specified in RG 1.206.

In COL FSAR Section 2.5.2.4.7, the applicant stated that it multiplied the horizontal GMRS by a frequency-dependent scaling factor in order to obtain the vertical GMRS. The applicant used the envelope of three V/H ratios calculated using three different methods as its final V/H ratio to calculate the vertical GMRS.

Staff Conclusions Regarding Ground Motion Response Spectra

Since the applicant used the standard procedures outlined in RG 1.208 and NUREG/CR-6728 to develop both the horizontal and vertical GMRS, the staff concludes that the applicant's GMRS adequately represents the site ground motion. This information addresses and resolves PTN COL 2.5-2 and PTN COL 2.5-3.

2.5.2.5 *Post Combined License Activities*

There are no post-COL activities related to this section.

2.5.2.6 *Conclusion*

The staff reviewed the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to vibratory ground motion, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR.

As set forth above, the staff reviewed the seismic information submitted by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.5.2, PTN COL 2.5-1, PTN COL 2.5-2, PTN COL 2.5-3, and PTN SUP 2.5-1. On the basis of its review, the staff finds that the applicant has provided a thorough characterization of the seismic sources surrounding the site, as required by 10 CFR 100.23. In addition, the staff finds that the applicant has adequately addressed the uncertainties inherent in the characterization of these seismic sources through a PSHA, and this PSHA follows the guidance provided in RG 1.208. The staff concludes that the controlling earthquakes and associated ground motion derived from the applicant's PSHA are consistent with the seismogenic region surrounding the COL site. In addition, the staff finds that the applicant's GMRS, which was developed using the performance-based approach, adequately represents the regional and local seismic hazards and accurately includes the effects of the local site subsurface properties. The staff concludes that the proposed Turkey Point Units 6 and 7 COL site is acceptable from a geologic and seismologic standpoint and meets the requirements of 10 CFR 52.79 and 10 CFR 100.23.

2.5.3 Surface Deformation

2.5.3.1 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3 evaluates the potential for tectonic and non-tectonic surface deformation within a 40 km (25 mi) radius of the Turkey Point Units 6 and 7 site. The applicant addressed the following topics: geologic, seismic, and geophysical investigations; geologic evidence, or absence of evidence for tectonic surface deformation; correlation of earthquakes with capable tectonic sources; ages of most recent deformation; relationship of tectonic structures in the site area to regional tectonic structures; characterization of capable tectonic sources; designation of zones of Quaternary deformation in the site region; and potential for surface tectonic deformation at the site.

2.5.3.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR Section 2.5 incorporates by reference Section 2.5.3 of the AP1000 DCD. In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.5.3, the applicant provided the following information:

AP1000 COL Information Item

- PTN COL 2.5-4

The applicant provided additional information in PTN COL 2.5-4 to address COL Information Item 2.5-4 (COL Action Item 2.5.3-1). PTN COL 2.5-4 addresses the evaluation of site-specific surface and subsurface geologic, seismic, and geophysical information related to the potential for surface or near-surface faulting affecting the site.

The applicant developed Turkey Point Units 6 and 7 COL FSAR Section 2.5.3 for the Turkey Point Units 6 and 7 site based on information derived from its review of published literature and geologic maps; interpretation of aerial photographs and satellite images, interpretation of aerial photographs and satellite images; and field geologic and aerial reconnaissance investigations performed specifically for the Turkey Point Units 6 and 7 site COL FSAR. The applicant also used information presented in the Updated Final Safety Analysis Report (UFSAR) for Turkey Point Units 3 and 4, Revision 7.

Based on the information derived from these sources, the applicant concluded in Turkey Point Units 6 and 7 COL FSAR Section 2.5.3 that there are no capable tectonic fault sources or bedrock faults and there is no potential for tectonic fault rupture within the site area or vicinity. The applicant noted that the only non-tectonic surface deformation features within the Turkey Point Units 6 and 7 site area are features related to surficial dissolution of carbonate strata in the site area.

The following SER Sections 2.5.3.2.1 through 2.5.3.2.8 summarize the information provided by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.5.3 related to surface and near-surface tectonic deformation due to faulting, as well as surface and near-surface non-tectonic deformation.

Supplemental Information

- PTN SUP 2.5-1

The applicant also provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.5, “Geology, Seismology, and Geotechnical Engineering,” which provides summary information of detailed information in Turkey Point Units 6 and 7 FSAR Section 2.5.3, “Surface Faulting,” for the Turkey Point Units 6 and 7 site.

2.5.3.2.1 Geologic, Seismic, and Geophysical Investigations

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.1 describes geological, seismological, and geophysical investigations performed by the applicant to assess the potential for tectonic and non-tectonic surface and near-surface deformation in the Turkey Point Units 6 and 7 site vicinity and site area. The following SER sections summarize these investigations and conclusions made by the applicant based on them in regard to tectonic and non-tectonic surface and near-surface deformation at the Turkey Point Units 6 and 7 site.

Previous Investigations

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.1.1 discusses investigations conducted at the Turkey Point Units 6 and 7 site. The applicant used information presented in the UFSAR for Turkey Point Units 3 and 4 to assess information about the stratigraphy and structures within the site area. The applicant stated that previous geological and seismological investigations presented in the UFSAR for Turkey Point Units 3 and 4 as well as for Turkey Point Units 6 and 7 revealed no tectonic or non-tectonic surface deformation hazards existing at the site. However, the applicant identified local depressions in the surface of the limestone bedrock at the site that the applicant classified as surficial erosion or solution features created by solution activity from groundwater during periods of low sea level. The applicant cross-referenced FSAR Section 2.5.4.4.5 and the UFSAR for Turkey Point Units 3 and 4 for a discussion on how bedrock beneath the site is competent and capable of supporting heavy loads.

Regional and Local Geological Studies Geologic Mapping

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.1.2 discusses the results of geologic mapping conducted in the site area by the Florida Geological Survey and other researchers. The applicant indicated that no faults are identified at the surface on the Florida peninsula within the 320 km (200 mi) radius of the Turkey Point Units 6 and 7 site region. In addition, the applicant reported that USACE used Landsat satellite data to identify possible linear features across central and southern Florida. The Landsat satellite data identified around 500 lineaments (linear patterns) in sinkholes and solution depressions, ponds or lakes and streams. The applicant stated that the features exhibited a northwest and northeast orientations, which are typical for all of Florida; in addition the lineaments are recognized as reflecting joint or fracture patterns in the limestone, which are enhanced by karstic dissolution.

Seismicity Data

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.1.3, the applicant discussed the seismicity data of the Turkey Point Units 6 and 7 site and region. The applicant indicated that Florida peninsula is an area of low seismicity and based on the original EPRI catalog, three earthquakes occurred within the 320 km (200 mi) radius of the site region. The applicant

clarified that the original EPRI catalog did not cover parts of the Gulf of Mexico and Cuba. The applicant indicated that the EPRI earthquake catalog for the Turkey Point Units 6 and 7 COL investigation includes earthquakes that occurred after the publication of the EPRI catalog; this update covers the entire site region, including Cuba and beyond. The applicant indicated that the catalog for the Phase 1 seismicity investigation contains a total of 700 earthquakes; 66 of them are located within the 320 km (200 mi) radius of the Turkey Point Units 6 and 7 site and no earthquakes inside the 40 km (25 mi) radius of the site location. The applicant stated that most of these earthquakes are concentrated in a zone of seismicity in and around Cuba as shown on Turkey Point Units 6 and 7 COL FSAR Figure 2.5.3-203.

Current Aerial and Field Reconnaissance

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.1.4 discusses the current aerial and field reconnaissance for the Turkey Point Units 6 and 7 site. The applicant stated that aerial photography, satellite imagery, and topographic maps revealed no evidence indicative of the potential for tectonic surface deformation (i.e., faulting or folding).

During aerial and field reconnaissance the applicant identified three north south trending vegetation lineaments located around 8 km (5 mi) west of the Turkey Point Units 6 and 7 site. The applicant explained that it found no evidence for surface rupture or geomorphic features indicating active faulting. Four other features identified in southern Florida were further investigated: a rock reef approximately 32 km (20 mi) northwest of the Turkey Point Units 6 and 7 site in Everglades National Park; tree lineaments located 29 km (18 mi) west of the Turkey Point Units 6 and 7 site near the intersection of Flamingo Road and Ingram Highway in Everglades National Park; a linear segment about 55 km (34 mi) west of the site in the Shark River channel in Everglades National Park; postulated faults from borehole data in the McGregor Isles about 193 km (120 mi) northwest of the Turkey Point Units 6 and 7 site. The applicant indicated that geologic field and aerial reconnaissance did not identify evidence for surface rupture or offset of geomorphic features indicative of active faulting within the site or site area. The applicant stated that it identified vegetated depressions during field and aerial reconnaissance. Aerial photographs indicate that the construction of Turkey Point Units 3 and 4 cooling canals removed many of the surficial depressions.

2.5.3.2.2 Geologic Evidence, or Absence of Evidence, for Surface Deformation

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.2 the applicant indicated that a review of published literature did not reveal any evidence for active tectonic deformation within the Turkey Point Units 6 and 7 site vicinity or site area. The applicant indicated that the site vicinity lies in the Florida carbonate platform, characterized by horizontal and undisturbed bedding and low rates of seismicity. Furthermore, the applicant did not report any features such as salt domes, Quaternary volcanic features, and glacial related deformation in the Turkey Point Units 6 and 7 site vicinity.

The applicant identified the only geomorphic feature possibly related to faulting within the site vicinity, as the Grossman's Hammock also called "rock reef." The applicant described the Grossman's Hammock as a 13 km (8 mi) long ridge, similar to other ridges found in southern Florida. Steinen et al. (1995) interpreted a fault due to the apparent offset of a buried Quaternary erosion surface identified in some boreholes beneath Grossman's Hammock. However, the applicant stated that in a more recent work, a ground-penetrating radar study shows no offset on the on the underlying Quaternary surface. Proposed explanations for Grossman's Hammock include fracture-related preferential cementation, and preservation of

paleoshorelines or paleo-mud banks. Grossman's Hammock was classified as a Class D feature by Crone and Wheeler (2000), meaning that geologic evidence demonstrates that the feature is not a tectonic fault or structure.

The applicant stated that it did not identify any geomorphic features or lineaments associated with faulting within the site area during analysis of aerial imagery, but did observe numerous linear and ellipsoidal/circular features associated with changes in vegetation. The applicant stated that these features are the result of surficial dissolution of the limestone bedrock.

Aerial photographs from the 1940s revealed three main lineament orientations are east-west, northeast-southwest, and northwest-southeast with two minor orientations of east-northeast-west-southwest and north-northeast-south-southeast. Through fieldwork, the applicant determined that three north-south trending vegetation lineaments located 8-10 km (5-6 mi) west of the site are wide swaths of cut down vegetation. The applicant stated that these features show no geomorphic expression or other evidence that would indicate tectonic faulting associated with these vegetation lineaments.

As part of the field investigations, the applicant examined two features beyond the site vicinity. The first feature is a linear segment on the Shark River channel approximately 55 km (34 mi) west of the site on Everglades National Park. The applicant stated that field investigation showed no evidence that suggest a tectonic origin in the linear segment, and possibly the linearity of this feature was likely human controlled. Another featured found about 193 km (120 mi) northwest of the Turkey Point Units 6 and 7 site, are possible faults in the McGregor Isles area near Fort Myers. The applicant identified these features from borehole data. Based on gamma-ray logs from several wells, Sproul et al. (1972) interpreted faulting on mid-Miocene (~16–11.6 Ma) strata. However, field reconnaissance and inspection of aerial photography, in addition to more recent studies by Scott and Missimer (2001), revealed no evidence of surficial faulting in the area.

2.5.3.2.3 Correlation of Earthquakes with Capable Tectonic Sources

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.3 of the Turkey Point Units 6 and 7 site discusses correlation of earthquakes with capable tectonic sources. The applicant updated the original EPRI earthquake catalog to incorporate earthquakes that occurred between 1985 and February 2008. The applicant explained that the updated Phase 1 earthquake catalog contained no earthquakes within the Turkey Point Units 6 and 7 site vicinity. The applicant concluded that there is no seismicity or capable tectonic sources within the Turkey Point Units 6 and 7 site vicinity or site area, and thus, no spatial correlation of earthquake epicenters or capable tectonic sources.

2.5.3.2.4 Ages of Most Recent Deformation

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.4 discusses the ages of most recent deformations within the Turkey Point Units 6 and 7 site. Based on field reconnaissance, review of published literature and interpretation of aerial photography, the applicant indicated that there is no evidence for tectonic deformation within the Turkey Point Units 6 and 7 site vicinity. In addition the applicant stated that there is no correlation of geologic structures to ages of recent deformation.

2.5.3.2.5 Relationships of Site Area Tectonic Structures to Regional Tectonic Structures

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.5 of the Turkey Point Unit 6 and 7 site discusses the relationship of tectonic structures within the site area. The applicant stated that field reconnaissance, review of published literature and interpretation of aerial photography within the Turkey Point Units 6 and 7 site showed no evidence for tectonic deformation. The applicant indicated that subsurface exploration program at the site revealed continuous, horizontal stratigraphy that precludes the existence of faults, folds, or structures related to tectonic deformation, therefore the applicant stated that there is no correlation of geologic structures in the Turkey Point Units 6 and 7 site to capable tectonic structures.

2.5.3.2.6 Characterization of Capable Tectonic Sources

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.6 of the Turkey Point Units 6 and 7 site addresses the characterization of capable tectonic sources. Based on review of published literature, interpretation of aerial photography, and field reconnaissance, the applicant concluded that no evidence exists for capable tectonic sources within the Turkey Point Units 6 and 7 site vicinity. The applicant supported this conclusion by the results of the subsurface exploration program, which indicates continuous, horizontal stratigraphy that precludes the presence of faults, folds, or structures related to tectonic deformation. The applicant stated that based on these data there are no capable tectonic sources within the site vicinity or site area.

2.5.3.2.7 Designation of Quaternary Deformation Zones in the Site Region

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.7 characterizes the zones of Quaternary (2.6 Ma to present) deformation in the Turkey Point Unit 6 and 7 site region. The applicant concluded that review and interpretation of aerial photography, review of published literature and field reconnaissance, revealed no evidence for Quaternary tectonic deformation, including paleoliquefaction, within the Turkey Point Units 6 and 7 site area, or site vicinity. The applicant, however, indicated that within the site region, potential Quaternary deformation and seismicity are limited to the faults within the Cuba areal source zone, located about 225 km (140 mi) south of the Turkey Point Units 6 and 7 site. In addition, the applicant stated that other areas that may exhibit possible deformation are the Walkers Cay fault located approximately 320 km (200 mi) northeast of the site and the Santaren anticline located about 240 km (150 mi) southeast of the Turkey Point Units 6 and 7 site. The applicant indicated that published literature does not identify any sand blows or paleoliquefaction features. The applicant noted that karstic dissolution is a source of non-tectonic Quaternary deformation found in Florida and the Bahamas within the Turkey Point Units 6 and 7 site region.

2.5.3.2.8 Potential for Surface Tectonic Deformation at the Site

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.8 of the Turkey Point Units 6 and 7 site addresses the potential for surface tectonic and nontectonic deformation at the site. The applicant stated that there are no sources for potential tectonic deformation at the site; however, they noted that the only evidence for non-tectonic deformation at the site is potholes attributed to surficial dissolution. The applicant referred to Appendix 2.5AA of the Turkey Point Units 6 and 7 COL FSAR for a detailed discussion on potential for carbonate dissolution and karst development at the Turkey Point Units 6 and 7 site.

2.5.3.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, and its supplements. The applicable regulatory requirements for surface faulting are as follows:

- 10 CFR 52.79(a)(1)(iii), as it relates to identifying geologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity and period of time in which the historical data have been accumulated.
- 10 CFR 100.23, as it relates to determining the potential for surface tectonic and nontectonic deformation at and in the region surrounding the site.

In addition, the related acceptance criteria associated with relevant requirements of NRC regulations for surface deformation are given in NUREG-0800, Section 2.5.3, as follows:

- **Geologic, Seismic, and Geophysical Investigations:** Requirements of GDC 2 in Appendix A of 10 CFR Part 50, 10 CFR 52.17(a)(1)(vi), or 10 CFR 52.79(a)(1)(iii) and 10 CFR 100.23(c) and 10 CFR 100.23(d)(2), are met and the guidance in RG 1.208 and RG 4.7 followed for this area of review if discussions of Quaternary tectonics, structural geology, stratigraphy, geochronologic methods used for age dating, paleoseismology, and geologic history of the site vicinity, site area, and site location are complete, compare reasonably well with studies conducted by others in the same area, and are supported by detailed investigations performed by the applicant. Site vicinity, site area, and site location-specific geologic maps and cross-sections constructed at scales adequate to clearly illustrate surficial and bedrock geology, structural geology, topography, and relationship of power plant foundations and site boundaries to these features should be included in the application. For sites located near bodies of water, the application should address how investigations have been conducted to detect possible surface deformation features that might be located beneath water.
- **Geologic Evidence for Surface Deformation:** Requirements of GDC 2 in Appendix A to 10 CFR Part 50, 10 CFR 52.17(a)(1)(vi) or 10 CFR 52.79(a)(1)(iii), 10 CFR 100.23(c) and 10 CFR 100.23(d)(2), are met and guidance RG 1.208, and RG 4.7 followed for this area of review if the applicant provides sufficient surface and subsurface information for the site vicinity, area, and location to confirm and characterize presence or absence of surface deformation (e.g., faulting, growth faulting, subsidence or collapse related to dissolution of limestone, salt or gypsum deposits, or salt diapirism and paleoliquefaction) features. The applicant should also take into account the potential for blind faults.
- **Timing of Deformation:** Requirements of GDC 2 in Appendix A to 10 CFR Part 50, 10 CFR 52.17(a)(1)(vi) or 10 CFR 52.79(a)(1)(iii), and 10 CFR 100.23(c) and 10 CFR 100.23(d)(2), are met for this area of review if recognized surface deformation features (e.g., tectonic faults and non-tectonic features including growth faults) and features associated with a blind fault, are investigated in sufficient detail to constrain the age of the most recent surface deformation event, and, if applicable, the ages of preceding deformation events. The application shall also provide an acceptable evaluation of sensitivity and resolution of the exploratory geologic and geophysical

techniques used to determine whether or not appropriate techniques were applied to assess the age of the most recent displacement.

- Correlation of Earthquakes with Tectonic Feature: Requirements of GDC 2 in Appendix A to 10 CFR Part 50, 10 CFR 52.17(a)(1)(vi or 10 CFR 52.79(a)(1)(iii)), and 10 CFR 100.23(c) and 10 CFR 100.23(d)(2), are met for this area of review if the applicant evaluates all reported historical earthquakes within the site vicinity with respect to accuracy of hypocenter location and source of origin, and with respect to correlation to tectonic features. The applicant shall evaluate the potential for historical activity on tectonic features in the site vicinity. The application should include a plot of earthquake epicenters superimposed on a map showing tectonic features in the site vicinity.
- Relationship of Geologic Features in the Site Vicinity to Regional Geologic Features: Requirements of GDC 2 in Appendix A to 10 CFR Part 50, 10 CFR 52.17(a)(1)(vi) or 10 CFR 52.79(a)(1)(iii), and 10 CFR 100.23(c) and 10 CFR 100.23(d)(2), are satisfied for this area of review if the applicant evaluates the relationships between faults or other deformation features in the site vicinity and the regional framework. The application should provide an acceptable evaluation of the relationships between the regional (tectonic and non-tectonic) framework and deformation features in the site vicinity, including growths faults and growth fault systems. The applicant should show how this information is used in the evaluation of potential for future surface deformation at the site.
- Potential for Surface Deformation at the Site: To meet requirements of GDC 2 in Appendix A to 10 CFR Part 50, 10 CFR 52.17(a)(1)(vi) or 52.79(a)(1)(iii), and 10 CFR 100.23(c) and 10 CFR 100.23(d)(2), for this area of review, the applicant shall assess the potential future tectonic and nontectonic surface deformation at the site. The applicant should provide sufficient geological, seismological, and geophysical information to clearly establish whether there is potential for future surface deformation at the site. If the potential for future surface deformation exists at the site, the application must provide information that demonstrates the potential effects of surface deformation are within the design basis of the proposed facility. NRC regulations do not restrict building in an area with surface faulting potential, but if that potential exists, the regulations require that surface deformation must be taken into account in the design and operation of the proposed nuclear power plant. It is questionable whether it might be feasible to design for surface deformation with any degree of confidence that safety-related SSCs would maintain their safety functions if surface displacements occur in the future. Consequently, it is NRC policy (e.g., RG 1.208) to recommend that any site located on a surface or near-surface feature with a potential for future displacement be re-located to an alternate site.

2.5.3.4 *Technical Evaluation*

The staff reviewed Section 2.5.3 of the Turkey Point Units 6 and 7 site COL FSAR and the referenced DCD to ensure that the combination of information presented in the FSAR and the DCD completely represents the required information related to tectonic (i.e., faulting) and non-tectonic surface and near-surface deformation. The staff's review confirmed that information contained in the application or incorporated by reference addresses the information required for this review topic.¹ NUREG-1793 and associated supplements document the results of the staff's evaluation of information incorporated by reference into the Turkey Point Units 6 and 7

Site COL FSAR. The staff reviewed the following information in the Turkey Point Units 6 and 7 Site COL FSAR:

AP1000 COL Information Item

- PTN COL 2.5-4

The staff reviewed PTN COL 2.5-4 included in Section 2.5.3 of the Turkey Point Units 6 and 7 COL FSAR. Turkey Point Units 6 and 7 Site COL FSAR Section 2.5.3 addresses the potential for surface or near-surface tectonic and non-tectonic deformation within the site vicinity and site area and at the site location. The COL information item from AP1000 DCD, Section 2.5.3, states:

Combined License applicants referencing the AP1000 certified design will address the following surface and subsurface geological, seismological, and geophysical information related to the potential for surface or near-surface faulting affecting the site: (1) geological, seismological, and geophysical investigations, (2) geological evidence, or absence of evidence, for surface deformation, (3) correlation of earthquakes with capable tectonic sources, (4) ages of most recent deformations, (5) relationship of tectonic structures in the site area to regional tectonic sources, (6) characterization of capable tectonic sources, (7) designation of zones of Quaternary deformation in the site region, and (8) potential for surface tectonic deformation at the site.

Based on the discussion of the potential for tectonic and non-tectonic surface deformation at the site presented in Turkey Point Units 6 and 7 Site COL FSAR Section 2.5.3, the staff concludes, as described below, that the applicant provided the information required to satisfy PTN COL 2.5-4.

SER Section 2.5.3.2 above specifies the data sources used by the applicant to develop Turkey Point Units 6 and 7 Site COL FSAR Section 2.5.3, which contains information related to the potential for tectonic and non-tectonic surface and near-surface deformation within the site vicinity, area and location. Through the review of the Turkey Point Units 6 and 7 Site COL FSAR Section 2.5.3, the staff determined whether the applicant had complied with the applicable regulations and conducted the investigations at an appropriate level of detail in accordance with RG 1.208. To evaluate the original geologic, seismic, and geophysical information submitted by the applicant thoroughly, the staff obtained additional assistance from experts at USGS.

Site Visits

The staff visited the Turkey Point Units 6 and 7 site on May 24 and 25, 2011 (ADAMS Accession No. ML111881052), and on August 22 and 23, 2013 (ADAMS Accession No. ML13248A497), to meet with the applicant and its consultants regarding the geologic, seismic, geophysical, and geotechnical investigations conducted at the Turkey Point Units 6 and 7 site for the Turkey Point Units 6 and 7 COL FSAR. The purpose of the May 2011 visit was to acquaint the staff with the nuclear station site, examine drill cores, dissolution features, and calculation packages. The staff examined drill cores from selected intervals of various boreholes completed within the nuclear island footprint and focused on the Key Largo Formation and Fort Thompson Formation cores. These boreholes include B-730, B-704DH, B-701DH and B-703 from Unit 7 and B-629, B-604DH, B-601DH and B-606 from Unit 6. The staff also visited

shallow surface depression dissolution features that support distinct woody vegetation at Units 6 and 7 and along the interceptor canal road, near the western plant boundary. The surficial dissolution features along the canal road are in a more natural pristine condition than the ones at Units 6 and 7 building site.

The August 2013 site visit was an audit of the subsurface investigation work being performed by Paul C. Rizzo Associates, Inc. at the Turkey Point Units 6 and 7 site (ADAMS Accession No. ML13248A497). The staff interviewed individuals representing the applicant and Rizzo Associates at the Unit 7 drilling site for the new supplemental boring program that included specific sampling of the vegetated depressions at the site. The applicant used the Macaulay sampler to provide undisturbed peat samples for the basis of Holocene stratigraphy at the site. The applicant examined undisturbed peat samples for presence of tsunami and storm surge deposits from prehistoric events.

The staff also examined newly extracted core from the Miami, Key Largo, and Fort Thompson Limestone Formations. This was the first opportunity to directly observe Miami Limestone because the heavily weathered nature of this surface unit previously prevented sufficient RQD. The staff observed the increasing clastic content with depth in the Fort Thompson formation and the open reef like fabric in the Key Largo Formation. Terminated calcite crystals cover open surfaces indicating a precipitating, rather than a dissolving in situ environment.

The following SER Sections 2.5.3.4.1 through 2.5.3.4.8 present the staff's evaluation of information provided by the applicant in Turkey Point Units 6 and 7 site COL FSAR Section 2.5.3 and the applicant's responses to RAIs for Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.

2.5.3.4.1 Geologic, Seismic, and Geophysical Investigations

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.1 describes the geologic, seismic, and geophysical investigations performed by the applicant to support the Turkey Point Units 6 and 7 COL FSAR and specifically to assess the potential for tectonic and nontectonic surface or near-surface deformation within a 40 km (25 mi) radius (site vicinity) of Turkey Point Units 6 and 7. The applicant considered information from various investigations and sources that include the following:

- compilation and review of existing data and literature,
- interpretation of old and new aerial photography that include pre a post construction photos to look especially for both tectonic and non-tectonic surface deformation,
- review of seismicity data based on the historical earthquakes,
- field and aerial reconnaissance to examine geomorphic features and lineations,
- geologic reconnaissance and aerial photograph analysis of vegetated surficial depressions, and
- integrated Multi-method Geophysical Survey to locate possible subsurface dissolution features.

The applicant concluded that there are no capable tectonic fault sources or bedrock faults, no potential for tectonic fault rupture, and no evidence of Quaternary tectonic surface faulting or tectonic deformation within the site, site area, or site vicinity. The applicant further concluded that there are non-tectonic surface deformation features within the site area and the site. Site investigations relate these features to surficial dissolution of carbonate strata in the site area.

For the Section 2.5.3 review, the staff considers the evidence provided by the applicant to assess the potential for surface deformation from tectonic and non-tectonic features, structures, or processes. Because tectonic features that are Quaternary age or younger are more likely to be formed in the current tectonic regime, and more likely to move in the future, the staff focused on tectonic features that are potentially Quaternary aged. The staff also focused on non-tectonic sources of surface deformation such as limestone dissolution processes or features.

The staff evaluated several RAI responses in SER Section 2.5.1 that pertain to the evaluation of surface deformation at the Turkey Point Units 6 and 7 site. The following SER Sections present the staff's evaluations of the geologic, seismic, and geophysical investigations performed by the applicant for the Turkey Point Units 6 and 7 site and refer back to related and previously evaluated RAI responses found in SER Section 2.5.1.

Previous Site Investigations

The applicant referred to results of previous geologic and seismologic investigations in the 1992 UFSAR for Turkey Point Units 3 and 4 and in a more detailed study of the 8 km (5 mi) radius site area (Grupton and Berry, 1976). Both studies conclude that no tectonic or non-tectonic surface deformation hazard exists at the site. The 1992 UFSAR identified the vegetated surface depressions at the site and suggested that these depressions are not sinkholes associated with collapse above an underground solution channel, but rather potholes, which are surficial erosion or solution features. The 1992 UFSAR concluded that the Miami Limestone and Fort Thompson Formations have been susceptible to solution activity from groundwater during periods of low sea level (Pleistocene glacial advances), but that the "bedrock beneath the site is competent with respect to foundation conditions and is capable of supporting heavy loads."

Staff asked several RAIs regarding limestone dissolution in the site region and area. SER Sections 2.5.1, 2.5.3.4.2, and 2.5.3.4.6 evaluate the responses. The staff also notes that SER Section 2.5.4 addresses the stability of the subsurface with respect to supporting SSCs.

Regional and Local Geological Studies

The applicant described three geological studies that pertain to this review area. None of these studies concludes or indicates surface faulting in southern Florida. Results of regional and local geologic mapping by the Florida Geological Survey and other researchers do not indicate any faults at the surface on the Florida peninsula. USGS compiled a catalog of all known or suggested Quaternary faults, liquefaction features, and possible tectonic features in CEUS (Crone and Wheeler, 2000; Wheeler, 2006). The applicant stated that these compilations identify no Quaternary tectonic faults or tectonic features in the site region or site area. The applicant also summarized the USACE study (2004), which identified lineations in central and southern Florida using Landsat satellite data and digital orthophoto quadrangles. The applicant concludes that the lineaments are typical for all of Florida and are the surface expression of joint or fracture patterns in the underlying limestone. USACE reports no offsets along any of these lineaments, nor are any designated as faults.

In reviewing Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.3, staff notes that the applicant also provided new geologic information from the 2008 geologic mapping and exploration program performed as part of the Turkey Point Units 6 and 7 COL FSAR (MACTEC, 2008), the supplemental field investigation (Rizzo, 2014a), sampling performed in surficial muck deposits using a McCauley Sampler (Rizzo, 2014b) and Turkey Point Units 6 and 7 COL FSAR Appendix 2.5AA, The potential for carbonate dissolution and karst development at the Turkey Point Units 6 and 7 site.

Seismicity Data

The applicant stated that the Florida Peninsula is an area of low seismic activity. The Phase 1 earthquake catalog contains a total of about 700 earthquakes with Rmb greater than or equal to 3.0 or intensity I0 greater than or equal to IV for all years through mid-February 2008. Approximately 66 out of about 700 earthquakes are located within the 320 km (200 mi) radius site region. Most of these earthquakes are concentrated in a zone of seismicity in and near Cuba, which is greater than about 257 km (160 mi) south of the Turkey Point Units 6 and 7 site. The applicant cited Turkey Point Units 6 and 7 COL FSAR Figure 2.5.3-203, which shows that there are no earthquakes from the updated Phase 1 earthquake catalog inside the 40 km (25 mi) radius site vicinity.

The staff examined the seismicity maps in Turkey Point Units 6 and 7 COL FSAR Figures 2.5.3-201 and 2.5.3-203 and agrees with the applicant that there are no earthquakes within 40 km (25 mi) of the site. The staff notes that SER Section 2.5.2 evaluates the regional seismicity and the development of the Turkey Point Units 6 and 7 site's earthquake catalog.

Current Aerial and Field Reconnaissance

The applicant examined various aerial photography, satellite imagery, and topographic maps of varying scales (1:20,000 and 1:40,000) and vintages (from 1940 through 2004) and concluded that no evidence is revealed in these data of geomorphic features indicative of the potential for tectonic surface deformation (e.g., faulting or folding) within the site area.

The applicant referred to an analysis of lineations in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.3. Staff reviewed and evaluated this analysis of lineaments in southern Florida in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.3 and found no evidence of surface faulting or surface deformation. Staff also considered the lineament analysis the applicant provided in its response to RAI 40, Question 02.05.04-1. The staff notes that results documented from area studies such as the USACE report and the lineaments studied at Turkey Point Units 6 and 7 site support the idea that lineaments are associated with near vertical fractures (or joints) in the subsurface.

Staff examined the orientations of the lineaments at the site area and note that they are consistent with large-scale, regional lineament trends identified in other studies, which linked these features to subsurface fracture orientations (Bond et al., 1981). The vertical or near-vertical fracture orientations found in the USACE study (2004) support the assumption that the lineaments identified in the Turkey Point site area are associated with fractures in the subsurface. The staff notes that the results of the inclined boreholes the applicant completed as part of the supplemental field program (Turkey Point Units 6 and 7 COL FSAR Enclosure 8) corroborate this assumption. The staff notes that these sub-vertical fractures or joints in the region and at Turkey Point Units 6 and 7 site are possibly initiation points for the development of

the vegetated surface depressions. The staff also notes that there is no indication in the site data that there are offsets along the joints to suggest faulting.

Based on review of Turkey Point Units 6 and 7 COL FSAR Sections 2.5.3.1 and 2.5.1 and field observations made during the site visits, the staff finds that the applicant presented a complete description of the geologic, seismic, and geophysical investigations performed to assess the potential for tectonic and non-tectonic surface and near-surface deformation within the site vicinity, area and location in compliance with 10 CFR 100.23 and 10 CFR 52.79, and in support of the Turkey Point Units 6 and 7 COL FSAR.

2.5.3.4.2 Geologic Evidence for Surface Deformation

For this area of review, staff consider if the applicant has provided sufficient surface and subsurface information for the site vicinity, area, and location to confirm and characterize the presence or absence of surface deformation features following guidance in RG 1.208 and 4.7, and SRP 2.5.3. This area of review corresponds to Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.2.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.2 originally stated that published geologic mapping results show no bedrock faults mapped within the site vicinity. However, the staff notes that FSAR Figure 2.5.1-253 depicts a strike-slip fault within 40 km (25 mi) of the site; Figure 2.5.3-204 also shows this feature as a high-rank lineament. In RAI 43, Question 02.05.03-3, staff asked the applicant to discuss the high-rank lineament shown on Turkey Point Units 6 and 7 COL FSAR Figure 2.5.3-204, and clarify its relationship with the strike-slip fault north of the Turkey Point Units 6 and 7 site shown on Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-253.

In an October 3, 2014, response to RAI 43, Question 02.05.03-3 (ADAMS Accession No. ML14281A177), the applicant stated that USACE (2004) mapped a variety of lineaments in southern Florida, including the high-rank lineament shown on Turkey Point Units 6 and 7 COL FSAR Figure 2.5.3-204, using Landsat imagery. Although the USACE report suggested that some lineaments could be related to fractures or faults, it did not present evidence for tectonic displacement along the high-rank lineament under discussion, nor did it interpret this feature as a fault. Furthermore, the lineaments were generally not field checked. The applicant assigned the lineament a high rank due to its alignment with a linear portion of the Shark River toward its southwestern end. The applicant stated that field and air photo reconnaissance conducted to support the Turkey Point Units 6 and 7 COL FSAR found no positive evidence for faulting associated with the linear portion of the Shark River.

The applicant clarified the interpretation of a subsurface strike-slip, east-west striking basement fault near the Turkey Point Units 6 and 7 site. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.1-253 shows faults drawn to accommodate potential misfits in plate tectonic reconstruction models and thus, little evidence directly indicates actual displacement occurred on these postulated structures. Barnett (1975) placed the northeast-striking basement fault in order to align magnetic anomalies on Andros Island in the Bahamas with the Peninsular Arch. Barnett states that the evidence for the actual presence of major shear faults in the basement of the Florida-Bahama Platform is interpretive.

Staff considered the USACE study and Barnett (1975) and concludes that there is no specific evidence to link the surficial lineament with the postulated basement fault based on the following reasoning. Staff notes that the north to northeast striking surficial lineament is mapped only on

shore and terminates against the Atlantic coastal ridge. The USACE did not consider this feature tectonic. In contrast, the basement fault extends many kilometers to the east and west of the Florida peninsula, offshore, has a more easterly strike, and is located more than 5 km north of the surficial lineament. In addition Barnett (1977) postulated a structure to accommodate misfits in regional plate tectonic models. There is no real evidence of a basement fault. Therefore, staff considers RAI 43, Question 02.05.03-3 resolved.

Limestone Dissolution Features

Staff notes that within the Turkey Point Units 6 and 7 site vicinity there are several different kinds of limestone dissolution features that developed due to different processes including: dry caves along the Atlantic ridge, peat lined surface dissolution depressions, subsurface zones of secondary porosity due to mixing zones of fresh and salt waters, submarine springs in Biscayne Bay, large submarine sinkholes that are considered to extend very deep into the subsurface (Key Largo and Jewfish creek and others further away from Turkey Point Units 6 and 7 site), subsurface seismic sags (also referred to as structural collapse features) located in Biscayne Bay, and onshore in Miami-Dade and Broward counties. The only dissolution features observed at the surface in the site vicinity are the dry caves along the Atlantic Coastal ridge (west of the Turkey Point Units 6 and 7 site), widely distributed vegetated surface depressions and eroded joints expressed as surface lineaments. Staff concludes in SER Section 2.5.1 that these are not a surface deformation hazard to the Turkey Point Units 6 and 7 site. Staff evaluated and closed several RAIs in its assessment of the potential for limestone dissolution at Turkey Point Units 6 and 7 site in SER Section 2.5.1.4.1, including RAI 41, Questions 02.05.01-1, -2, -17, and -37.

Staff also notes that in response to RAI 82, Question 02.05.04-26, the applicant will develop a grouting program based on its test program for the subsurface beneath the nuclear island, which will grout the zone between -10.7 m and -18.3 m (-35 ft and -60 ft) elevation and constrain any remaining voids not having potential to exceed 6.1 m (20 ft) equivalent diameter between -18.3 m and -33.5 m (-60 ft and -110 ft) elevation. Also, the applicant performed a sensitivity analysis to demonstrate the void size (6.1 m (20 ft)) constrained by the grouting program is not critical to the stability of subsurface materials and the integrity of SSCs. The staff's evaluation of the grouting plan and testing program, the sensitivity analysis and the associated ITAAC are discussed in SER Section 2.5.4.4.4.

Consistent with RG 1.208, RG 4.7, and SRP Section 2.5.3, staff considered the information provided in the Turkey Point Units 6 and 7 COL FSAR related to surface and subsurface information for the site vicinity, area, and location to confirm the applicant's conclusions regarding the absence of surface deformation features. Based on that review, as well as independent review of publications and observations made during site field audits, staff finds that there is no surface faulting evidence within the site vicinity and the applicant will mitigate the potential for subsurface limestone dissolution through the grouting plan.

2.5.3.4.3 Timing of Deformation

Turkey Point Units 6 and 7 COL FSAR Sections 2.5.3.4 and 2.5.3.7 discuss the ages of most recent deformation, particularly Quaternary (2.6 Ma to present) deformation in the Turkey Point Units 6 and 7 site region. Based on information presented in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1 and cross-referenced in Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.7, the applicant concluded that no zones of Quaternary deformation requiring further investigation occur in the site region. Staff also notes that FSAR Section 2.5.3.7 originally

stated that “within the site region, seismicity and potential Quaternary tectonic deformation are restricted to the Cuba areal source zone, approximately 160 mi (258 m) south of the site.”

After reviewing the Turkey Point Units 6 and 7 COL FSAR and independently considering relevant publications, the staff noted that other tectonic features outside the Cuba areal zone were not included in the Turkey Point Units 6 and 7 COL FSAR. These tectonic features are interpreted by the various investigators as being younger than the end of the Cuban orogeny (Eocene 33.9 Ma) and some possibly as young as Pleistocene. Therefore, staff asked the applicant several RAI questions regarding these features including RAI 43, Question 02.05.03-2; RAI 41, Questions 02.05.01-3, 02.05.01-14, 02.05.01-15, 2.5.1-16, and RAI 81, Questions 02.05.01-34, -36, and -38, the latter two RAIs of which are discussed and evaluated by staff in SER Section 2.5.1.

In RAI 43, Question 02.05.03-2, staff asked the applicant to describe the Walkers Cay Fault, the Santaren Anticline, and the Straits of Florida normal faults, which are tectonic features all located outside the Cuba areal source but within the site region. Staff also asked the applicant to provide a figure that reflects all potentially active Quaternary features in the site region.

In an October 3, 2014, response to RAI 43, Question 02.05.03-2 (ADAMS Accession No. ML14281A177), the applicant addressed the specific tectonic features outside the Cuba areal source and within the 320 km (200 mi) radius of the site. The applicant summarized the publications available that identified these features. The applicant also cited previous RAI responses that contain more detail.

The staff reviewed related material provided by the applicant in response to RAI 41, Question 02.05.01-14 (evaluated in SER Section 2.5.1.4.1), regarding Quaternary deformation on the Walkers Cay Fault. The applicant acknowledged that, considering all the data published to date, it cannot preclude the possibility of Quaternary slip on the Walkers Cay Fault by the available data. Therefore, the applicant completed a hazard sensitivity calculation to assess the potential effect of a Walkers Cay Fault source on the PSHA (see SER Section 2.5.1.4.1 and 2.5.2 for details of this seismic hazard sensitivity analysis). The applicant concluded that the hazard sensitivity calculation, based on a conservative seismic source characterization of the Walkers Cay Fault, indicates a total hazard of less than 1 percent of the total site seismic hazard. The applicant further concluded, and staff agrees, that it is an insignificant contributor to site seismic hazard.

The staff reviewed additional related material provided by the applicant in response to RAI 41, Question 02.05.01-15 dated June 17, 2015 (ADAMS Accession No. ML15169A845), and RAI 81, Question 02.05.01-34 dated July 15, 2015 (ADAMS Accession No. ML15198A059) (evaluated in SER Section 2.5.1.4.1), regarding details of Quaternary deformation of the Santaren Anticline. The staff evaluated the sensitivity analysis of the Santaren Anticline fault source completed by the applicant and concludes that these calculated increases from the sensitivity analysis are not significant enough to revise the PSHA (see SER Section 2.5.1.4.1 and 2.5.2 for details of this seismic hazard sensitivity analysis).

The staff reviewed additional related material for the Straits of Florida normal faults provided in response to RAI 41, Questions 02.05.01-3 and -16, as discussed in Section 2.5.1.4 of this SER. Because the Straits of Florida normal faults are overlain by undeformed Miocene and younger strata and detailed seismic data indicate a non-fault origin for these geomorphic features, the applicant concluded that the Straits of Florida normal faults are not Quaternary age. The

applicant provided supporting details to conclude that the undeformed Miocene and younger strata overlying these faults constrain deformation to Eocene. Staff notes that in the seismic reflection profiles provided by the applicant, the youngest faulting is constrained below a middle Miocene unconformity, thus constraining the age to about 13.8 Ma.

Because the applicant completed a hazard sensitivity analysis of the Walkers Cay Fault and the Santaren Anticline, staff concludes that the applicant adequately considered these features with respect to seismic hazard. Furthermore, the staff notes that the Straits of Florida normal faults show no evidence of Quaternary deformation. Accordingly, and in compliance with 10 CFR 100.23 and 10 CFR 52.79, staff considers RAI 43, Question 02.05.03-2, resolved.

In RAI 81, Question 02.05.01-34, staff asked the applicant to provide a discussion of possible Quaternary tectonic faults along the western bank of the northern Santaren Channel (northeast of the Cay Sal Bank), within about 80 km (50 mi) of the Turkey Point Units 6 and 7 site (Kula, 2014) and integrate into the regional tectonic setting for the Turkey Point Units 6 and 7 COLA. In response, the applicant concluded that there are no through-going structures along the eastern margin of Cay Sal Bank capable of producing large crustal earthquakes and that the features in Kula's data are non-tectonic and non-seismogenic. Based on its evaluation (SER Section 2.5.1.4.1), the staff cannot rule out the possibility that some of the features identified in Kula (2014) are tectonic in origin and Quaternary-age, in particular Fault A, therefore, staff conducted a PSHA sensitivity analysis of Fault A using the most recent NRC-endorsed ground motion models (EPRI, 2013). SER Section 2.5.1.4.1 and 2.5.2.4.4 provide the details of this sensitivity analysis. Based on the results, Fault A or a fault cored anticline would not affect the Turkey Point seismic hazard significantly (greater than 1 percent of total hazard). The staff considers the results of the sensitivity analysis to be a sufficient indication that the features as interpreted by Kula (2014) are not a significant contributor to site hazard.

In RAI 85, Question 02.05.01-38 (evaluated in SER Section 2.5.1), staff asked the applicant to provide a discussion of a newly identified tectonic anticline located on the submarine Miami Terrace, about 30 mi from the Turkey Point Units 6 and 7 site, to integrate this structure into the regional tectonic setting for the Turkey Point Units 6 and 7 COL FSAR and, to discuss how this feature might affect the PSHA at the Turkey Point Units 6 and 7 site. The applicant concluded that the anticline is not a capable tectonic source because it is older than 1.8 Ma with no associated seismicity. Therefore, it should not be included in the PSHA for the Turkey Point Units 6 and 7 site. Staff reviewed Cunningham (2015) and notes that he concludes that the folding and the reverse faulting occurred sometime during the Oligocene to early Pleistocene. Because the documented tectonic activity falls within the Quaternary period, in order to assess the potential significance of the Miami Terrace anticline for the site-specific seismic hazard, staff conducted a PSHA sensitivity analysis to show that hazard contribution from this source is negligible. SER Section 2.5.2.4.4 and 2.5.1.4.1 provide the details of this sensitivity analysis. Hence, the staff considers the results of the sensitivity analysis to be a sufficient indication that the Miami Terrace anticline and associated reverse faults are not a contributor to site hazard.

The applicant revised the Turkey Point Units 6 and 7 COL FSAR Figure 02.05.03-205 to include tectonic structures within the site region with potential Quaternary deformation, including the Walkers Cay fault, the Santaren anticline, and faults on Cuba within the site region. The applicant did not include Fault A and the Cay Sal anticline nor the Miami Terrace reverse anticline and reverse faults in this figure.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.4, the applicant stated that results of the surface and subsurface exploration program at the site indicate continuous, horizontal stratigraphy that precludes the presence of faults, folds, or structures related to tectonic deformation in the site vicinity. Therefore, the applicant concluded, there is no correlation of geologic structures to ages of recent deformation. However, in SER Section 2.5.1, staff evaluated the applicant's response to RAI 81, Question 02.05.01-36, regarding a submarine, subsurface strike slip fault in Biscayne Bay (Cunningham et al., 2012 and Cunningham, 2015) that is within 11 km (7 mi) of the site, extends greater than 16 km (10 mi), strikes north to northeast, and projects directly toward the Turkey Point Units 6 and 7 site. Staff examined the earthquake catalog and notes there is no seismic activity associated with the fault in Biscayne Bay. The staff concludes that the fault is older than Quaternary and is not a surface deformation hazard to the Turkey Point Units 6 and 7 site.

The staff focused the review of Turkey Point Units 6 and 7 COL FSAR Sections 2.5.3.4 and 2.5.3.7 on the information provided by the applicant, primarily in Turkey Point Units 6 and 7 COL FSAR Section 2.5.1, to confirm where Quaternary deformation might occur in the site region. Staff asked several RAI questions to clarify submarine structures within the site region, such as the Walkers Cay fault, Santaren anticline and faults, Fault A off of Northeast Cay Sal Bank, and Miami Terrace reverse faults and anticline, where investigators have concluded these structures might be Quaternary tectonic structures. Staff evaluated these structures and concluded that all could be Quaternary age tectonic structures. However, based on the sensitivity analysis that the applicant completed for the Walkers Cay fault and the Santaren anticline, and the staff's seismic hazard sensitivity completed for the Miami Terrace anticline and Fault A and the Cay Sal anticline, none of these structures impact the PSHA greater than 1 percent of the total hazard.

Based on the review of Turkey Point Units 6 and 7 COL FSAR Sections 2.5.3.7, 2.5.3.4, and 2.5.1, the responses to RAI questions, and independent review of relevant publications, the staff finds that the applicant provided a complete characterization of known Quaternary deformation in the site region. Based on the seismic hazard sensitivity analyses completed by the applicant and staff, staff finds that there are no known Quaternary age tectonic features in the site region that will impact Turkey Point Units 6 and 7 Site PSHA.

2.5.3.4.4 Correlation of Earthquakes with Tectonic Features

This area of review combines Turkey Point Units 6 and 7 COL FSAR Sections 2.5.3.3, "Correlation of Earthquakes with Capable Tectonic Sources," and 2.5.3.6, "Characterization of Capable Tectonic sources." The staff notes that acceptance criteria associated with relevant requirements of the NRC regulations for surface deformation as given in Section 2.5.3 of NUREG-0800, no longer contains a section for "characterization of capable tectonic sources" or "correlation of earthquakes with capable tectonic sources."

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.3, the applicant stated that no seismicity or capable tectonic sources exist within the site vicinity or site area; therefore, there is no spatial correlation of earthquake epicenters or capable tectonic sources. The staff examined the earthquake catalog and agrees with the applicant that there are no earthquakes in the site vicinity. The staff finds that there are no Quaternary age tectonic features within the site vicinity based on its review of Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.1.1.3 and independent review of relevant publications. Staff asked and evaluated several RAI questions related to this topic in SER Section 2.5.1.4.1 and 2.5.1.4.2. These are all resolved. Staff finds

that the applicant met the guidance in RG 1.208 and RG 4.7 for this area of review, because the applicant evaluated the earthquake catalog for the Turkey Point Units 6 and 7 site within the site vicinity and with respect to potential correlation to tectonic features.

2.5.3.4.4 *Correlation of Earthquakes with Tectonic Features*

This area of review combines Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.3, “Correlation of Earthquakes with Capable Tectonic Sources,” and Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.6, “Characterization of Capable Tectonic sources.”

2.5.3.4.5 Relationship of Geologic features in the Site Vicinity to Regional Geologic Structures

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.5 discusses the relationships of tectonic structures in the site area to regional tectonic structures. The applicant stated that there is no evidence of tectonic deformation within the site area and therefore there is no correlation of geologic structures in the site area to regional capable tectonic structures.

Staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.5.1 for the identification of geologic features at the regional and site scale to verify the validity of the applicant’s conclusion. Staff also independently reviewed many publications as part of the Turkey Point Units 6 and 7 COL FSAR Section 2.5.1 review. The only tectonic feature within the site vicinity is the Miocene-age strike-slip fault in Biscayne Bay (Cunningham, 2015) but this feature is not structurally linked nor related to any regional tectonic feature, as discussed in SER Sections 2.5.1.4.1 and 2.5.1.4.2. Staff confirms that the applicant considered or evaluated relationships between faults or other deformation features in the site vicinity and the regional framework. Staff finds that there are no Quaternary age tectonic features in the site area.

2.5.3.4.6 Potential for Surface Deformation at the Site

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.8.1 discusses the potential for surface and near-surface tectonic and non-tectonic deformation at the Turkey Point Units 6 and 7 site. The applicant stated that there are no sources for potential tectonic deformation at the site. The applicant evaluated possible Quaternary age tectonic structures outside the site vicinity, including the Miami terrace anticline and reverse faults, Walkers Cay fault, Santaren anticline, and Fault A off of Cay Sal Bank, but concluded that the structures have no significant effect on the Turkey Point Units 6 and 7 site’s PSHA. The only tectonic fault within the site vicinity is a subsurface, strike-slip fault in Biscayne Bay (Cunningham, 2015) but the staff concludes that the fault is older than Quaternary with no associated seismic activity. The only evidence for non-tectonic deformation at the site is the presence of “potholes” that appear to be caused by surficial dissolution (Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.4 and FSAR Appendix 2.5AA).

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.8.2.1 indicates that deformation related to karst is observed in southern Florida and limestone dissolution is evident in stratigraphic units, such as the Miami and Key Largo Limestones, which underlie the site. The applicant stated that this is not expected to pose a significant surface deformation hazard at the Units 6 and 7 site and that no collapse or settlement problems associated with karst-type dissolution of underlying limestones have been associated with Turkey Point Units 3 and 4. Appendix 2.5 AA of the Turkey Point Units 6 and 7 Site FSAR provides details regarding the potential for carbonate

dissolution and karst development at the site. The applicant concluded that although subject to spatial resolution and detection limits inherent in a subsurface investigation, the available borehole and geophysical data indicate there is minimal hazard posed by sinkholes and no evidence for potential surface collapse due to the presence of large underground openings at the site.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.3.8.2.1 originally stated that shallow depressions preserved at the surface and recognized in the site vicinity are formed by gradual top-down, subaerial dissolution and are unlikely to have underlying cavity voids with potential for rapid collapse. The staff notes the presence of similar-sized and -shaped features on the sea floor of Biscayne Bay within 3 km (1.9 mi) to the east of Units 6 and 7 in publically available satellite images. In RAI 43, Question 02.05.03-1, staff asked the applicant to discuss how the apparent semi-circular alignments of offshore depressions may be consistent with incipient collapse into a larger underlying void. Staff also asked the applicant to discuss the time of formation and whether these features have formed at similar elevations below Units 6 and 7, such as the zones of secondary porosity.

In an October 3, 2014, response to RAI 85, Question 02.05.03-1 (ADAMS Accession No. ML14281A177), the applicant stated that the seafloor of Biscayne Bay, east of the Turkey Point Units 6 and 7 site, includes many vegetated patches that appear to be similar to the vegetated patches mapped subaerially at the site. The features at the site are thought to be the result of a subaerial, epigenic, gradual, top-down process of carbonate dissolution caused by downward seepage of slightly acidic meteoric water following fractures, joints and bedding planes. The applicant identified features within 3 km (1.9 mi) of the site in Biscayne Bay, compared them to the subaerial depressions at the site, and concluded that the subaerial depressions at the site are slightly larger than the submarine patches in Biscayne Bay. The applicant further noted that the patches on the floor of Biscayne Bay likely formed during the Wisconsin glacial advance, at which time both the floor of the bay and the area of the Turkey Point Units 6 and 7 site were subject to subaerial weathering and surficial dissolution. However, the site area remained above sea level since the Wisconsin and has been subject to weathering and surficial dissolution for several thousand years longer than the floor of the bay.

The applicant explained that the upper zone of secondary porosity beneath the site is located near the contact of the Miami and Key Largo Limestones at an approximate elevation of -8.5 m (-28 ft). Because the stratigraphic units are relatively flat, it appears that the upper zone of secondary porosity at the site corresponds to the same stratigraphic interval where the submarine vegetated patches are in Biscayne Bay. However, the site subsurface investigations show an absence of large solution features at this stratigraphic interval beneath the site. In addition, the dissolution features such as the vugs in the upper zone of secondary porosity likely developed in a subsurface freshwater/saltwater mixing zone, whereas, the vegetated patches on the floor of the bay appear to be subaerial, paleo-dissolution features that formed during the Pleistocene when sea level was approximately 100 m (328 ft) lower than the present day sea level.

Staff notes that during the Quaternary, multiple glacial periods affected eustatic sea levels that would have exposed the limestone strata in Biscayne Bay to subaerial weathering and erosion. Staff agrees with the applicant that the patches in Biscayne Bay have similar physical characteristics to the vegetated surface depressions on site and in the general southern Florida area around the site that would suggest a similar origin of formation. Accordingly, and in

compliance with 10 CFR 100.23 and 10 CFR 52.79, staff considers RAI 85, Question 02.05.03-1, resolved.

Staff notes that within the Turkey Point Units 6 and 7 site vicinity there are several types of limestone dissolution features that developed due to different processes including: dry caves along the Atlantic ridge, peat lined surface dissolution depressions, subsurface zones of secondary porosity due to mixing zones of fresh and salt waters, submarine springs in Biscayne Bay, large submarine sinkholes that are considered to extend very deep into the subsurface (Key Largo and Jewfish creek and others further away from the Turkey Point Units 6 and 7 site), subsurface seismic sags (also referred to as structural collapse features) located in Biscayne Bay and onshore in Miami-Dade and Broward counties. SER Section 2.5.1.4.1 evaluates and resolves several RAIs related to the applicant's assessment of the potential for limestone dissolution at the Turkey Point Units 6 and 7 site and vicinity.

Staff also notes that in response to RAI 82, Question 02.05.04-26, the applicant developed a drilling and grouting plan for the subsurface beneath the nuclear island, and also performed analyses to confirm that any remaining potential voids would not impact the safety of any Category I structure. The staff's evaluation of this plan and the associated ITAAC are in SER Section 2.5.4.4.4. For the depth of the subsurface explorations for safety related foundations, RG 1.132, Appendix D, states that, "Where soils are very thick, the maximum required depth for engineering purposes, denoted d_{max} , may be taken as the depth at which the change in the vertical stress during or after construction for the combined foundation loadings is less than 10 percent of the effective in situ overburden stress." Staff further noted that in response to RAI 6006, Question 02.05.04-19, the applicant provided a PLAXIS 3D finite element analysis that incorporates advance constitutive models (stress vs. strain relationship) that simulates the response of soils to external loading for construction sequence. The applicant used an analysis depth of El. -450 feet, which is greater than 2B (B is equal to the least dimension of the foundation), and assumed it to be adequate to meet the aforementioned RG 1.132 criterion. The applicant results indicated that the changes in effective vertical stresses are less than 10 percent of the effective in situ stress for each phase of the construction sequence, demonstrating that the model depth is appropriate and in compliance with RG 1.132 criterion. The staff's evaluation of this RAI response is in SER Section 2.5.4.4.10.

Based on the staff's finding about limestone dissolution features and processes in SER Section 2.5.1.4.1, and staff's evaluation of the applicant's response to RAI 82, Question 02.05.04-26, regarding the void size, location and depth that needs to be considered for integrity of Category I structures, staff concludes that the potential for tectonic and non-tectonic surface deformation at Turkey Point Units 6 and 7 site has been adequately addressed in compliance with 10 CFR 100.23 and 10 CFR 52.79.

2.5.3.5 *Post-Combined License Activities*

Staff identifies the following geologic mapping License Condition as the responsibility of the COL licensee:

- License Condition (2-1) – The licensee shall perform detailed geologic mapping of the excavation for Turkey Point Units 6 and 7 Site safety-related structures; examine and evaluate geologic features discovered in excavations for safety-related structures other than those for the Units 6 and 7 nuclear islands; and notify the Director of the Office of

New Reactors, or the Director's designee, once excavations for Turkey Point Units 6 and 7 safety-related structures are open for examination by NRC staff.

2.5.3.6 Conclusion

Staff reviewed the Turkey Point Units 6 and 7 Site COL FSAR and the referenced DCD. Based on these reviews, staff confirmed that the applicant addressed the required information related to surface and near-surface tectonic (i.e., due to faulting) and non-tectonic deformation and that no additional outstanding information must be discussed in the Turkey Point Units 6 and 7 COL FSAR in regard to tectonic and non-tectonic surface or near-surface deformation. NUREG-1793 and associated supplements document the results of the staff's technical evaluation of information incorporated by reference into the Turkey Point Units 6 and 7 Site COL FSAR.

As set forth above, staff has reviewed the information in PTN COL 2.5-4 and PTN SUP 2.5-1 and concludes that the applicant thoroughly characterized the potential for surface and near-surface tectonic and non-tectonic deformation at the Turkey Point Units 6 and 7 Site, as required by 10 CFR 100.23 and 10 CFR 52.79 (a)(1)(iii). Based on the applicant's geologic investigations performed for the site vicinity, site area, and site location, the staff also concludes that the applicant properly addressed information related to the following specific topics for the Turkey Point Units 6 and 7 Site: Geologic, seismic, and geophysical investigations; geologic evidence, or absence of evidence, for surface deformation; correlation of earthquakes with capable tectonic sources; ages of most recent deformations; relationships between tectonic structures in the site area and regional tectonic structures; characterization of capable tectonic sources; designation of zones of Quaternary (2.6 Ma to present) deformation in the site region; and the potential for surface tectonic and non-tectonic deformation at the site. In addition, staff concludes that the applicant performed all investigations in accordance with 10 CFR 100.23 and 10 CFR 52.79(a)(1)(iii) and followed guidance provided in RG 1.208. Finally, staff concludes that the applicant established an adequate basis to state that no known capable tectonic sources exist that would cause surface or near-surface tectonic deformation at the Turkey Point Units 6 and 7 Site and no known sources exist for non-tectonic deformation at the site. Therefore, the staff finds that the Turkey Point Units 6 and 7 site is acceptable in regard to surface and near-surface tectonic and non-tectonic deformation and meets the requirements of 10 CFR 100.23 and 10 CFR 52.79(a)(1)(iii).

2.5.4 Stability of Subsurface Materials and Foundations

2.5.4.1 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4 presents the applicant's evaluation of the stability of subsurface materials and foundations that relate to the Turkey Point Units 6 and 7 site. The properties and stability of the soil and rock underlying the site are important to the safe design and siting of the plant. The information provided by the applicant in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4 addresses: (1) geologic features in the site vicinity, (2) static and dynamic engineering properties of soil and rock strata underlying the site, (3) the relationship of the foundations for safety-related facilities and the engineering properties of underlying materials, (4) results of seismic refraction and reflection surveys, including in-hole and cross-hole explorations, (5) safety-related excavation and backfill plans and engineered earthwork analysis and criteria, (6) groundwater conditions and piezometric pressure in all critical strata as to affect the loading and stability of foundation materials, (7) responses of site

soils or rocks to dynamic loading, (8) liquefaction potential and consequences of liquefaction of all subsurface soils, including the settlement of foundations, (9) earthquake design bases, (10) results of investigations and analyses conducted to determine foundation material stability, deformation and settlement under static conditions, (11) criteria, references, and design methods used in static and seismic analyses of foundation materials, and (12) techniques and specifications to improve subsurface conditions, which are to be used at the site to provide suitable foundation conditions, and any additional information deemed necessary in accordance with 10 CFR Part 52.

2.5.4.2 *Summary of Application*

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4, the applicant describes the subsurface materials and foundation. In particular, the site-specific information provided in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4 addresses the following COL-specific information identified in Section 2.5 of the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4, the applicant provided the following:

AP1000 COL Information Items

- PTN COL 2.5-1

The applicant provided additional information in PTN COL 2.5-1 to address COL Information Item 2.5-1. PTN COL 2.5-1 addresses the provision of regional and site-specific geologic, seismic, and geophysical information, as well as conditions caused by human activities. This information includes: structural geology; seismicity of the site; geologic history; evidence of paleo-seismicity; site stratigraphy and lithology; engineering significance of geologic features; site groundwater conditions; dynamic behavior during prior earthquakes; zones of alteration, irregular weathering, or structural weakness; unrelieved residual stresses in bedrock; materials that could be unstable because of mineralogy or unstable physical properties; and the effects of human activities in the area.

- PTN COL 2.5-2

The applicant provided additional information in PTN COL 2.5-2 to address COL Information Item 2.5-2. PTN COL 2.5-2 addresses the provision for site-specific information related to vibratory ground motion aspects of the site including: seismicity, geologic and tectonic characteristics, correlation of earthquake activity with seismic sources, PSHA, seismic wave transmission characteristics and the SSE ground motion.

- PTN COL 2.5-3

The applicant provided additional information in PTN COL 2.5-3 to resolve COL Information Item 2.5-3, which addresses the provision for performing site-specific evaluations, if the site-specific GMRS at foundation level exceed the response spectra in DCD Figures 3.7.1-1 and 3.7.1-2 at any frequency, or if soil conditions are outside the range evaluated for the AP1000 DCD.

- PTN COL 2.5-5

The applicant provided additional information in PTN COL 2.5-5 to address COL Information Item 2.5-5 (COL Action Item 2.5.1-1). PTN COL 2.5-5 addresses the provision of site-specific information regarding the underlying site conditions and geologic features, including site topographical features and the locations of seismic Category I structures.

- PTN COL 2.5-6

The applicant provided additional information in PTN COL 2.5-6 to resolve COL Information Item 2.5-6 (COL Action Item 2.6-3). PTN COL 2.5-6 addresses the properties of the foundation soils to be within the range considered for design of the nuclear island basemat.

- PTN COL 2.5-7

The applicant provided additional information in PTN COL 2.5-7 to resolve COL Information Item 2.5-7 (COL Action Item 2.5.4-1). PTN COL 2.5-7 addresses the information concerning the extent (horizontal and vertical) of Seismic Category I excavations, fills, and slopes.

- PTN COL 2.5-8

The applicant provided additional information in PTN COL 2.5-8 to resolve COL Information Item 2.5-8 (COL Action Item 2.4.1-1). PTN COL 2.5-8 addresses the groundwater conditions relative to the foundation stability of the safety-related structures at the site.

- PTN COL 2.5-9

The applicant provided additional information in PTN COL 2.5-9 to resolve COL Information Item 2.5-9 (COL Action Item 2.5.4.3-1). PTN COL 2.5-9 addresses the provision of demonstration that the potential for liquefaction is negligible.

- PTN COL 2.5-10

The applicant provided additional information in PTN COL 2.5-10 to resolve COL Information Item 2.5-10 (COL Action Item 2.6-4). PTN COL 2.5-10 addresses the verification that the site-specific allowable soil bearing capacities are equal to or greater than the values documented in the standard design, or will provide a site-specific evaluation as described in the AP1000 DCD Section 2.5.4.2 under all combined loads, including the safe shutdown earthquake, for static and dynamic loads.

- PTN COL 2.5-11

The applicant provided additional information in PTN COL 2.5-11 to resolve COL Information Item 2.5-11 (COL Action Item 2.5.2-2). PTN COL 2.5-11 addresses the methodology used in determination of static and dynamic lateral earth pressures and hydrostatic groundwater pressures acting on plant safety-related facilities using soil parameters as evaluated in previous subsections.

- PTN COL 2.5-12

The applicant provided additional information in PTN COL 2.5-12 to resolve COL Information Item 2.5-12 (COL Action Item 2.5.5-1). PTN COL 2.5-12 addresses soil characteristics affecting the stability of the nuclear island including foundation rebound, settlement, and differential settlement.

- PTN COL 2.5-13

The applicant provided additional information in PTN COL 2.5-13 to resolve COL Information Item 2.5-13 (COL Action Item 2.6-5). PTN COL 2.5-13 addresses the provision for instrumentation for monitoring the performance of the foundations of the nuclear island, along with the location for benchmarks and markers for monitoring the settlement.

- PTN COL 2.5-16

The applicant provided additional information in PTN COL 2.5-16 to resolve COL Information Item 2.5-16. PTN COL 2.5-16 addresses the provision of data on short-term (elastic) and long-term (heave and consolidation) settlement for soil sites for the history of loads imposed on the foundation consistent with the construction sequence. In addition, Turkey Point Units 6 and 7 COL FSAR Section 2.5.4 addresses Interface Item 2.12 related to peak ground acceleration, response spectra, shear wave velocity (V_s) and Interface Item 2.13 related to the required bearing capacity of foundation materials.

- PTN COL 2.5-17

The applicant provided additional information in PTN COL 2.5-17 to resolve COL Information Item 2.5-17. PTN COL 2.5-17 addresses the provision of information regarding waterproofing system used for the foundation mat (mudmat) and below grade exterior walls exposed to flood and groundwater under seismic Category I structures. The applicant referred to Turkey Point Units 6 and 7 COL FSAR Sections 3.8.5.1 and 14.3.3.4 where this COL information item is addressed.

Supplemental Information

- PTN SUP 2.5-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.5, "Geology, Seismology, and Geotechnical Engineering," which provides summary information of detailed information in Turkey Point Units 6 and 7 FSAR Section 2.5.4, "Stability of Subsurface Materials and Foundations," for the Turkey Point Units 6 and 7 site.

2.5.4.2.1 Geologic Features

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.1 presents a synopsis of the subsurface conditions on Turkey Point Units 6 and 7, followed by descriptions of the foundations soil and rock properties and the stability of these materials. This section also summarizes the non-tectonic processes and geologic features that could relate, if present, to permanent ground deformations or foundation instability at the Turkey Point Units 6 and 7 safety-related facilities.

Subsurface Conditions

Turkey Point Units 6 and 7 COL FSAR Figures 2.5.4-201 and 2.5.4-202 present the locations of Turkey Point Units 6 and 7 on the east coast of the Florida platform and the drilling locations of the two subsurface investigation programs performed by the applicant. The applicant stated that it drilled and sampled a total of 88 geotechnical borings and 2 geophysical borings during the initial investigation. During the supplemental investigation, the applicant drilled 9 additional borings, three of which were inclined toward surface depressions to study potential fractures. The applicant collected surficial muck samples at nine locations. The applicant also referred to Turkey Point Units 6 and 7 COL FSAR Figures 2.5.4-203 through 2.5.4-209 for geologic cross sections and their locations relative to the units.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.1.1.1 describes the surficial soil and rock at the site. The applicant stated that the dominant surface cover is organic muck although the Miami Limestone is present in the northwestern portion of the site. The applicant stated that the site is at or near sea level and that, other than berms and vegetative depressions, the site is flat and uniform. The applicant indicated that the site is within the Southern Slope sub-province of the Atlantic Coastal Plain in a geologic setting characterized by broad bands of swamps and marshes flooded by tides or freshwater runoff.

Subsidence, Dissolution Activity, Uplift, or Collapse

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.1.2, the applicant indicated that it did not identify any geologic hazards within the site or site area, nor any geomorphic disturbances or fault-related features within the site vicinity.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.1.2.1 evaluates the dissolution activity present in the limestone rock near-surface geologic units. The applicant observed outside the vegetated depressions and drainages a total of 6.1 m (20.1 ft) of rod drops during approximately 2,413.5 m (7,918.4 ft) of rock coring, ranging in magnitude from 0.1 to 1.2 m (0.4 to 4.0 ft), with a maximum of 0.5 m (1.5 ft) within the Turkey Point Units 6 and 7 building footprints. While performing the three inclined borings, the applicant noted a total of 4.6 m (15.2 ft) rod drops during 108.6 m (356.4 ft) of rock coring, ranging in magnitude from 0.1 to 0.8 m (0.3 to 2.5 ft). The applicant indicated that the downhole geophysical data obtained from the caliper and acoustic logs do not indicate the presence of large voids and support the interpretation of two preferential secondary porosity flow zones.

The applicant stated that it does not anticipate any uplift due to natural forces or human development and noted that there is no evidence of tectonic surface deformation and/or karst related collapse.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.1.2.3 describes the history of deposition and erosion of the site. The applicant described the site area as flat and planar bedding of late Pleistocene age (10,000 to 2.8 million years ago). The applicant stated that, during the Pleistocene, erosion increased resulting in clastic deposition; while the warm interglacial periods produced an increase in the sea level leading to an increase in the carbonate buildup.

2.5.4.2.2 Properties of Subsurface Materials

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2 presents the static and dynamic engineering properties of subsurface materials based on the applicant's field investigation, sampling program, and the laboratory testing.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.1, the applicant provided an overview of the subsurface profile and materials. The applicant indicated that the natural ground surface at and around the power block, at the time of the subsurface investigation, had an average of El. -0.3 m (-1.0 ft) North American Vertical Datum of 1988 (NAVD88). The applicant stated that the power block finish grade elevation will be at 7.8 m (25.5 ft) NAVD88.

The applicant derived the shear strength parameters and rock mass modulus for two separate masses at the site: the fractured density (FD) 1 zone (very slightly fractured) and the FD4 zone (slightly to moderately fractured).

Soil and Rock Strata

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.2 describes each soil stratum encountered in the subsurface investigation. The applicant investigated to a maximum depth of 187.8 m (616 ft) below ground surface (bgs) in the power block area and 45.7 m (150 ft) bgs in the makeup water reservoir and perimeter areas. The applicant identified and categorized eight stratum at the Turkey Point Units 6 and 7 site: Stratum 1 is surficial muck, Stratum 2, 3, 4 and 8 are predominantly rock and Stratum 5, 6, and 7 are predominantly soil. The applicant further identified the eight strata as Muck (Stratum 1), Miami Limestone (Stratum 2), Key Largo Limestone (Stratum 3), Fort Thompson Formation (Stratum 4), Upper Tamiami Formation (Stratum 5), Lower Tamiami Formation (Stratum 6), Peace River Formation (Stratum 7), and Arcadia Formation (Stratum 8).

The applicant indicated that the Muck ranges in thickness from 0.6 to 3.4 m (2 to 11 ft) and consists of elastic silt, organic-rich elastic silt, or peat sediments. The applicant indicated that the muck has a very soft to medium stiffness consistency. The applicant described plans to remove this stratum from the plant area at the beginning of construction.

The applicant described the Miami Limestone as a soft rock consisting of pale yellow, light brownish gray and white limestone with a soft to very hard consistency depending on the degree of cementation. The thickness of the Miami Limestone ranges from 4.0 to 9.1 m (13 to 30 ft).

The applicant described the Key Largo Limestone as a coralline, porous formation with recrystallized calcite infill resulting in a rock of medium hardness and strength. The thickness of the Key Largo Limestone varies between 4.5 to 8.2 m (14.6 and 26.9 ft).

The applicant described the Fort Thompson Formation as white limestone with varying amounts of vugs, shells, and some sand, resulting in a varying consistency, medium to hard above El. -18.3 m (-60.0 ft) and medium hard to soft below El. -18.3 m (-60.0 ft). The applicant indicated that the thickness of the stratum varies between 15.6 to 23.5 m (51.3 to 77.0 ft).

The applicant characterized the Upper Tamiami Formation as light gray to greenish gray silty sands, with varying amounts of gravel and a dense to very dense consistency. The applicant encountered the top of the Upper Tamiami Formation between El. -31.0 and -38.0 m (-101.6 and -124.7 ft).

The applicant described the Lower Tamiami Formation as light gray to greenish gray silty sands, with minor amounts of silty clay resulting in a very stiff to hard consistency. The applicant indicated that the Lower Tamiami Formation starts at approximately El. -51.1 m (-167.6 ft).

The applicant described the Peace River Formation as a very dense light gray to olive gray silty sand. The applicant indicated that the stratum thickness is 73.7 m (241.7 ft), based on three fully penetrated borings.

The applicant described the Arcadia Formation as different types of limestone with occasional dolostone and thin silty sand layers resulting in hardness from soft to hard. The applicant indicated that the Arcadia Formation starts at approximately El. -138.6 m (-454.8 ft). The applicant stated that the formation was not fully penetrated by the borings, which ended at El. -188.1 m (-617.0 ft).

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.2.9 describes the compacted limerock fill, which will replace the muck layer underneath the power block area.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.2.10, the applicant used published data from the Gas Division of the Florida Geological Survey (FGS) and from USGS to evaluate the properties of the subsurface material below 183 m (600 ft). The applicant indicated that the compression wave velocity (V_p) data was incomplete between El. -549 m (-1,800 ft) and El. -610 m (-2,000 ft), and between El. -716 m (-2,350 ft) and El. -1,082 m (-3,550 ft). The applicant overcame this situation by estimating and converting V_p to V_s using a Poisson ratio of 0.3. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-211 shows the subsurface average V_s in the southern Florida region. Initially, the applicant observed a high average V_s , of 3,048 m/s (10,000 feet per second (fps)) occurring at a depth of 183 m (600 ft), before decreasing to 2,134 m/s (7,000 fps) at 2,057 m (6,750 ft) and; thereafter fluctuating between 2,591 and 3,048 m/s (8,500 and 10,000 fps).

Evaluation of Properties of In Situ Materials

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3 presents the properties of in situ materials of the site evaluated using the field and laboratory testing. FSAR Table 2.5.4-209 presents the recommended geotechnical engineering parameters in each stratum.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.2 indicates that the applicant took standard penetration test (SPT) samples at 0.8 m (2.5 ft), 1.5 m (5.0 ft), and 3.0 m (10.0 ft) intervals depending on the depth. Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-202 presents a summary of all uncorrected N-values measured in the field. During the initial investigation, the applicant encountered very low SPT N-values in the Upper and Lower Tamiami and Peace River Formations. The applicant obtained additional SPT N-values from its supplemental investigation. The applicant stated that the values from its supplemental investigation were consistently higher than those obtained during the initial investigation. The applicant indicated that the difference between the initial and supplemental field investigation can be attributed to the drilling and sampling requirements and to the fact that the supplemental investigation target was to reduce disturbance effects. The applicant considered overwashing as the cause of the lower N-values in its initial investigation. The applicant stated that it used the SPT N-values from investigations to develop engineering parameters such as friction angle and modulus of deformation, and also for input into the liquefaction assessment.

The applicant adjusted the SPT N-values for SPT hammer energy, borehole diameter, sampler, and rod length. Turkey Point Units 6 and 7 COL FSAR Tables 2.5.4-204 and 2.5.4-209 present a summary of all the corrected N-values defined as N₆₀ and the N₆₀ values selected for the design of each stratum, respectively.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.3 indicates that the applicant performed six CPTs; three in the power block areas. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-214 summarizes the tip resistance, sleeve friction and friction ratio. The applicant performed rock sampling using HQ3 and PQ3 core barrel equipment. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-215 shows a rock quality designation (RQD) by elevation. The RQD provides an index of rock strength for a general characteristic of a rock mass. The applicant stated that the rock quality appears to be at its maximum in the Key Largo formation. Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-206 summarizes the recovery and RQD for the three rock strata cored. Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-205 shows the testing results of natural moisture content and Atterberg limits on samples.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.6 describes the grain size distribution. The applicant recognized a difference in fines content between the Upper and Lower Tamiami Formations. Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-205 presents all of the results for the grain size distribution tests. The applicant recorded the unit weight for each rock sample tested for unconfined compressive strength, Resonant Column Torsional Shear (RCTS) and triaxial shear strength. Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-209 shows the recommended unit weights for use in each stratum.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.8 describes selection of the shear strength parameters for the soil formations. The applicant conducted triaxial testing on five samples from the Lower Tamiami, one sample from the Upper Tamiami and 15 samples from the Peace River Formation. The applicant considered the amount of triaxial tests sufficient to characterize the shear strength of the Lower Tamiami and Peace River Formations. For the Upper Tamiami Formation, the applicant established the parameters by analyses and correlations using SPT and CPT results. The applicant used the equation $S_u = N_{60}/8$ (in kips per square foot (ksf)) to obtain the undrained shear strength. The applicant performed rock unconfined strength testing on 31 samples from the Key Largo Limestone, 50 samples from the Fort Thompson Formation, and three samples from the Arcadia Formation.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.11 describes the relationship used for the evaluation of the elastic modulus (E) and shear modulus (G) high strain. The applicant used data from pressuremeter tests as well as SPT, CPT, compressional and shear (P-S) suspension logging and triaxial tests, and also used several different methods to address natural variability and the variability involved in the conversion of measured parameters to stiffness.

The applicant related the shear modulus (G) to the elastic modulus (E) as follows:

$$G = E / (2[1 + \mu])$$

where

μ = Poisson's ratio
E=static elastic modulus
G=static shear modulus

The applicant used Poisson (μ) values for the rock strata of 0.37, 0.31, and 0.34, and a value of 0.35 for the soil strata. The applicant concluded that the shear and elastic modulus values based on V_s , and an E of 18,600 megapascals (MPa; 2,700 kips per square inch (ksi)) for the

Key Largo sample and 20,000 MPa (2,900 ksi) for the Fort Thompson sample, are more representative than the laboratory results because the laboratory results were derived from samples with higher than average RQD values.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.12, the applicant used the Rankine theory (Coduto, 2001) to estimate the active, passive, and at-rest static earth pressure coefficients. Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-209 presents the calculated coefficients. The applicant indicated that it will not construct foundations below the Fort Thompson Formation. The applicant defined the coefficient of sliding as the tangent of the friction angle between the soil and the concrete. The applicant selected 0.6 as the coefficient of sliding for the Miami Limestone Formation, and 0.7 for the Key Largo Limestone and Fort Thompson Formations.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.14 refers to Turkey Point Units 6 and 7 COL FSAR Sections 2.5.4.4 and 2.5.4.7 in order to address the measurement and interpretation of V_s . The applicant measured the V_s and V_p with suspension logging in six boring hole locations for each unit, and with downhole velocity logging at one borehole location for each unit. Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-209 provides the V_s values for each stratum recommended by the applicant.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.15 discusses elastic modulus and low strain shear modulus. Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-209 shows the recommended value of low strain shear modulus for each stratum derived from the recommended V_s .

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.16 presents an overview for the shear modulus degradation and damping ratio; Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7 provides a more detailed description. The applicant obtained the measured values of shear modulus at increasing shear strain by performing 14 RCTS test on intact samples from the Key Largo, Fort Thompson, and Upper and Lower Tamiami formations.

The applicant conducted in situ testing including P-S suspension soundings and pressuremeter tests to investigate the high strain rock stiffness. The applicant used P-S suspension testing to produce the shear wave velocity profile, and converted it to low strain and high strain stiffness. The applicant stated that the pressuremeter test produces two types of stiffness: the initial modulus and the unload/reload modulus. The applicant calculated the stiffness for the moderately fractured zones using the Rock Mass Rating (RMR), and for the slightly fractured zones using RMR, P-S suspension, Unconfined Compressive Strength (UCS) and pressuremeter tests. The applicant provided the design stiffness values in Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-209.

The applicant indicated that the low strains represent the levels corresponding to the site response analysis or seismic soil-structure interaction analysis. The applicant stated that the median strain profile obtained from the site response analysis indicates that the maximum strain are less than 0.005 percent shear strain for the Key Largo and Fort Thompson formations, indicating that for this strain range, stiffness degradation is negligible.

Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-221 provides the lower bound soil/rock parameters used for sensitivity analyses regarding settlement, bearing capacity, and bearing pressure uniformity.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.20 describes the use of the rock mass classification system to estimate properties of the bearing strata as a whole from characteristics of individual rock, cores, core samples, and boring logs.

The applicant used the Hoek-Brown (Hoek, 2006) criterion to define the shear strength of a rock mass.

Chemical Properties of Soils and Rock

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.4 evaluates the chemistry of the soil and rock strata in order to consider corrosion and aggression effects toward buried steel and buried concrete. The applicant analyzed 23 sets of samples from the power block area for pH, as well as chloride and sulfate content. The applicant measured an average pH of 8.5, indicating a mildly corrosive soil; and a chloride content of 1,833 to 70,400 parts per million (ppm), indicating very corrosive soils. The applicant measured a sulfate content of 198 to 7,590 ppm (0.034 to 0.76 percent), indicating mild to moderate aggression toward concrete. The applicant will remove the muck stratum, which exhibited severe aggression toward exposed concrete. In addition, the applicant indicated that any potential sulfate or chlorine attack on the concrete will be minimized by complying with AP1000 DCD Tier 1, Table 3.3-6, which provides ITAAC to ensure that the exterior walls and the basemat of the nuclear island have a water barrier up to the site grade. The applicant also conducted tests for calcium carbonate content and concluded that the rock strata have higher calcite content than the soil strata.

Field and Laboratory Testing Program

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.5 refers to Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.2 for details on the field testing program. The applicant performed the initial field subsurface investigation from February 2008 through June 2008 and a supplemental field subsurface investigation from July 2013 to October 2013. Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.6 refers to Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.3 for details on the laboratory testing program.

Subsurface Investigation/Exploration

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.2, the applicant, following the guidance in RG 1.132, adjusted the subsurface investigation program in order to tailor it to site-specific conditions. The applicant conducted 88 geotechnical borings, 22 groundwater wells, 4 cone penetrometer tests and 2 test pits as part of the initial subsurface investigation. The applicant conducted a supplemental site investigation, including nine additional borings with: geophysical testing performed in two borings, pressuremeter testing performed in three borings to obtain in situ deformation, two inclined borings toward the center of vegetated surface depressions to study potential fractures or potential karstic features and two additional CPTs performed in the footprint of safety-related structures. In addition, the applicant collected surficial muck deposits to provide additional information related to recent geologic history at the site. Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.2 refers to two reports (MACTEC Engineering and Consulting Inc., 2008; Rizzo Associates Inc., 2014) for the complete results of the subsurface investigation. During the initial investigation, the applicant used 11 drill rigs, 10 for SPT sampling, and one for CPT at the site. The applicant used three drill rigs and one CPT truck during its supplemental investigation. The applicant logged each sample into an inventory system and followed the guidance of ASTM D 4220 (ASTM, 1995) for material storage and handling.

The applicant stated that it followed the guidance RG 1.132 on spacing and depth of borings, sampling, in situ testing and geophysical investigation methods. The applicant extended borings beneath each building up to a depth of 38.1 m (125 ft), borings beneath the reactor and other key structures up to a depth of 76.2 m (250 ft), and two borings beneath each reactor, one to at least 122 m (400 ft) and other to at least 137 m (450 ft). The applicant extended the deepest boring, B-701(DH), to a maximum depth of 188 m (616 ft).

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.2.3 describes the boring and sampling methods used by the applicant. During the initial investigation, the applicant drilled 88 geotechnical borings, ranging in depth from 30.5 to 88.4 m (100 to 290 ft). The applicant drilled two deeper borings: one to 128 m (420 ft) in the Turkey Point Unit 6 power block and the other to 188 m (616 ft) in the Turkey Point Unit 7 power block. The applicant advanced the borings using mud rotary drilling techniques until SPT refusal was found, and then used triple tube wire-line rock coring equipment and followed the ASTM D 2113 (ASTM, 2008) procedure. When the subsurface material transitioned from the Fort Thompson Formation limestone to the Upper Tamiami Formation sand, the applicant used SPT sampling at 3.1 m (10 ft) intervals. The applicant changed the sampling method to rock coring as the stratum progressed from the Peace River Formation to the Arcadia Formation.

During the supplemental investigation, the applicant drilled nine additional borings. For boring R-6-1b, the applicant conducted PQ (85 mm (3.35 in.) inside diameter) coring in the shallow limestone layer up to a depth of 36.7 m (120.5 ft) and conducted SPT and sampling in the Tamiami and Peace River formations to a depth of 141.5 m (464.1 ft). For boring R-7-1, the applicant conducted PQ coring in the shallow limestone layer up to a depth of 36.2 m (118.7 ft) and conducted SPT in the Tamiami and Peace River formations to a depth of 140.0 m (459.4 ft). For the additional borings, the applicant performed PQ coring and destructive drilling up to a depth of 38.1 m (125 ft).

The applicant collected intact samples for testing according to ASTM D1587 (ASTM, 2012). Turkey Point Units 6 and 7 COL FSAR Appendix A of Rizzo Associates Inc. (2014) and Appendix B of MACTEC Engineering and Consulting Inc. (2008) include the boring logs, core photographs, and test pit logs for the initial and supplemental subsurface investigations.

The applicant conducted a total of six CPTs, three in each of the unit power block areas. The applicant also used the CPTs to perform 29 pore pressure dissipation tests at varying depth intervals ranging from 1.5 to 15.2 m (5 to 50 ft) and 41.2 to 88.4 m (135 to 290 ft) based on the encountered stratum. FSAR Appendix C of Rizzo Associates Inc. (2014) and Appendix E of MACTEC Engineering and Consulting Inc. (2008) include the results of the CPT testing.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.2.5 describes the exploratory test pits. The applicant excavated two test pits two feet into Miami limestone rock in order to collect bulk samples and to test for laboratory compaction.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.2.6 refers to Turkey Point Units 6 and 7 COL FSAR Section 2.4.12 for a detailed description of groundwater well installation, observation, and in situ hydraulic conductivity testing. The applicant installed a total of 22 observation wells, which it developed using a submersible pump until the pumped water was relatively clear and free of suspended sediment. Additionally, the applicant installed data loggers and telemetry units at each of the observation well locations in order to measure the

depth to the water table. In the Turkey Point Units 6 and 7 COL Appendix G, includes the well development and sampling records collected by Rizzo Associates Inc. (2014).

The applicant collected soft, surficial soil and sediment layers (muck/peat deposits) to develop additional information related to the recent geologic history at the site. FSAR Reference 291 provides results of the muck and peat sampling. In addition, Turkey Point Units 6 and 7 COL FSAR Section 2.5.1.2.2 provides detailed information about the recent geologic history.

Laboratory Testing

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.2, the applicant indicated that it followed the guidance provided in RG 1.138, "Laboratory Investigations of Soils And Rocks for Engineering Analysis and Design of Nuclear Power Plants," to plan its laboratory testing. Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.3 describes the laboratory tests that the applicant performed at the Turkey Point Units 6 and 7 site. During the initial investigation, the applicant conducted soil laboratory testing on 178 disturbed, 7 intact and 2 bulk samples. In the supplemental investigation, the applicant conducted laboratory tests on 4 special care rock samples, 14 muck samples and 48 Shelby tube samples. The applicant stated that due to the fragility of the rock and the porosity of the limestone, it was not possible to attach strain gages to most of the samples for determination of stress-strain characteristics. During the initial investigation, the applicant attached strain gages to only two samples. The applicant performed the laboratory tests for identification, compaction, shear strength, modulus and damping, and chemical testing of soil. Appendix E to FSAR Reference 257 contains the geotechnical laboratory test reports from the initial investigation and Appendix C to FSAR Reference 290 contains the results of the supplemental investigation.

2.5.4.2.3 *Foundation Interfaces*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.3 describes the foundation interface conditions at the Turkey Point Units 6 and 7 site. Turkey Point Units 6 and 7 COL FSAR Figures 2.5.4-203 through 2.5.4-208 show the subsurface profiles illustrating the stratigraphy at each power block area. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-22 illustrates the power block foundation excavation geometries, and locations and depth of the units' Seismic Category I structures, as well as the relationship of the structure foundations to the subsurface strata.

2.5.4.2.4 *Geophysical Surveys*

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4, the applicant summarized the geophysical survey methods and analyses performed. In the initial investigation, the applicant performed downhole geophysical testing and logging in 12 boreholes in the power block areas. In the supplemental investigation, the applicant performed P-S suspension and acoustic televiewer testing in two borings in the power block areas.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.1 presents the three types of geophysical borehole logging performed by the applicant, which are Natural Gamma (N-Gamma), normal resistivity, and three-arm caliper logging. The applicant performed the natural gamma testing following the guidelines of ASTM D6274 (ASTM, 2004). The applicant collected N-Gamma data using the caliper probe system and used the resulting data to identify strata changes. The applicant conducted normal-resistivity logs with a spacing of 41 cm (16 in.) for short-normal resistivity and 163 cm (64 in.) for long-normal resistivity in order to record the electrical

resistivity of the borehole environment and surroundings. The applicant indicated that this method provided poor demarcation of different lithological units at the site due to the influence of saltwater intrusion. The applicant used the three-arm caliper logs to measure borehole diameters with depth, which generally showed diameters of less than 15 cm (6 in.) below 9.1 m (30 ft).

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.2 describes the P-S velocity and downhole velocity suspension logging. The applicant performed P-S suspension logging tests in twelve boreholes, and downhole testing in two P-S holes, in order to obtain the V_p and V_s as a function of depth at the Turkey Point Units 6 and 7 site. The applicant stated that it followed GeoVision procedures for both logging methods. The applicant stated that the P-S velocity logging determines the average velocity of a 1.0 m (3.3 ft) high segment of the soil column surrounding the boring of interest by measuring the elapsed time between arrivals of a wave propagating upward to the soil column. Turkey Point Units 6 and 7 COL FSAR Figures 2.5.4-218 and 2.5.4-219 show the measured shear and compression wave velocity profiles. Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.2.2 provides an overview for the downhole testing and compares those results to the P-S suspension logging results, which show that both V_s and V_p were consistent with depth; and refers to Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7 for a detailed discussion of the results.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.3 describes the 12 borehole acoustic televiewer logging tests the applicant performed at the Turkey Point Units 6 and 7 site. The applicant measured borehole wall features using a high resolution acoustic televiewer probe that produces images of the boring wall based on the amplitude and travel time of an ultrasonic beam reflected from the formation wall. The applicant found many borings exhibiting zebra striping caused by rapidly reaming down the boring with new core bits, which may conceal small dikes but does not conceal fractures. The applicant stated that it did not observe any large vugs or cavities in the logs.

The applicant used the suspension logging results summarized in Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-215 to develop the V_s profiles shown in Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-220. The applicant collected the Turkey Point Unit 6 data to a depth of 137.2m (450 ft), and the Turkey Point Unit 7 V_s data to a depth of 182.9 m (600 ft).

Geophysical Exploration for Possible Dissolution Features

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5 describes the geophysical survey conducted to evaluate the potential for carbonate dissolution features at the site. The applicant applied three non-invasive geophysical techniques including: microgravity, seismic refraction and Multi-channel Analysis of Surfaces Waves (MASW).

The applicant conducted microgravity surveys to develop profiles that identify lateral variation in subsurface density. The applicant measured each station along 11 survey lines as part of the microgravity survey, excluding an existing data gap between stations 500 through 640 along line 2. The applicant indicated that the data gap is due to localized flooding.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5.2 describes the seismic refraction survey encompassing twenty-three arrays and covering a total length of 70.1 m (230 ft). The applicant developed two-dimensional cross sections using a modeled average V_p for the contact between the muck and Miami Limestone of 1,305 m/s (4,280 fps) and between the Miami

Limestone and Key Largo Limestone of 2,917 m/s (9,570 fps). The applicant used a vertical resolution of 20 percent and a lateral resolution of 6.1 m (20 ft).

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5.3 describes the MASW survey as one producing Rayleigh surface waves. Rayleigh surface waves are produced by the interaction of V_p and V_s waves with the earth's surface, which involves both vertical and horizontal particle motion. The applicant collected data along each of the eleven survey lines, excluding the existing data gap between station 460 and 640 along line 2. The applicant developed two-dimensional cross sections using a modeled average P-wave velocity for the contact between the muck and Miami Limestone of 134 m/s (440 fps) and between the Miami Limestone and Key Largo Limestone of 1,116 m/s (3,660 fps). The applicant concluded that the MASW surveys are not accurate at capturing the absolute V_s of the rock, but velocity models are accurate to within 15 percent compared to the borehole measurements.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5.4, the applicant indicated that the three largest low gravity anomalies are centered on the surface depressions containing vegetation outside the Units 6 and 7 power block areas. The applicant concluded that the low density measurements are associated with the presence of peat in shallower depressions and density variations within more weathered Miami Limestone. The applicant also concluded that the site does not present sinkhole hazards and underground openings that could result in surface collapse.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5.5 the applicant committed to conduct a subsurface grouting program to constrain the potential sizes of subsurface voids. The applicant stated that the zone between El. -10.7 m (-35 ft) and El. -18.3 m (-60 ft) within the diaphragm walls (the grouted zone) will be grouted in accordance with the closure criteria that will be developed as part of the grout test program. In addition, for the zone between El. -18.3 m (-60 ft) and El. -33.5 m (-110 ft) within the diaphragm walls, (the extended grouted zone), the applicant will perform grouting in every primary grout borehole. The applicant will space primary grout holes less than or equal to 6.1 m (20 ft) on center as shown on Figure 2.5.4-1. The applicant stated that this configuration constrains the maximum void size to approximately 6.1 m (20 ft). In Part 10 of the Turkey Point Units 6 and 7 COL FSAR, Appendix B, Table 3.8-6, the applicant provided a grouting ITAAC, which establishes a set of actions and criteria for the grouting activity necessary to provide assurance that, when met, the stability of Category I structures are in conformance with the combined license. The applicant indicated that successful grouting ITAAC execution results in any remaining voids in the grouted zone being structurally insignificant and any remaining voids in the extended grouted zone having a maximum equivalent spherical diameter of equal or less than 6.1m (20 ft). Turkey Point Units 6 and 7 COL FSAR Sections 2.5.4.10.3.2 and 2.5.4.10.8 and SER Section 2.5.4.2.10 describes the sensitivity analysis performed in PLAXIS 3D to consider the stability of Category I structures with postulated voids in the subsurface.

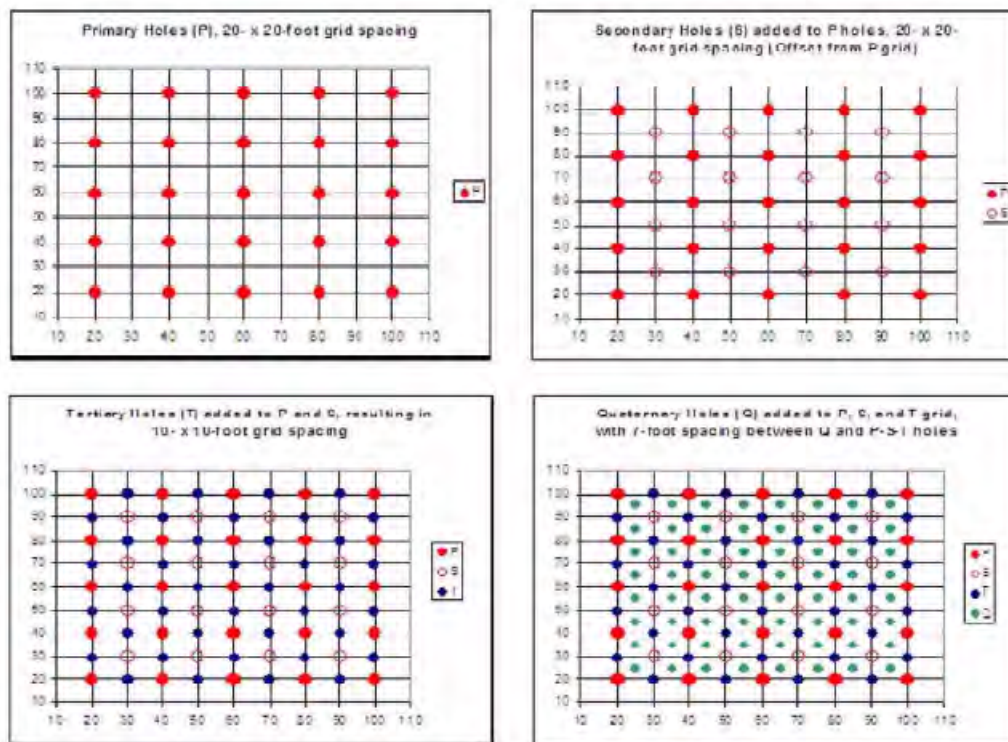


Figure 2.5.4-1. Grouting holes spacing and frequency during proposed grouting method (Source: Turkey Point Units 6 and 7 COL FSAR Appendix 2CC Figure 2CC-239)

Pressuremeter Testing

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.6 describes the procedure and instruments used for the pressuremeter testing performed at the site. During the supplemental investigation, the applicant performed pressuremeter testing in three boreholes at the site to obtain large strain shear modulus for the subsurface materials of the Key Largo, Fort Thompson, Upper and Lower Tamiami and Peace River formations. The applicant attempted a total of 96 pressuremeter tests; however, only approximately 64 tests produced useful data for stiffness characterization. The applicant stated that the remaining tests resulted in oversized test pockets due to the combination of drilling conditions and the deformation limit of the pressuremeter. Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-220 presents the pressuremeter test results.

2.5.4.2.5 Excavations and Backfill

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5.1 describes the earthwork required in order to establish finish grades at the Turkey Point Units 6 and 7 site areas. The applicant stated that it plans to completely remove Stratum F1 (muck) because of its poor soil properties. After removing the muck, the applicant described plans to raise the grade to El. 0 m (0 ft) through the placement and compaction of Miami Limestone fill material and limerock material from other sources. In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5.1.2 the applicant stated that approximately 7.6 million cubic meters (m^3) (10 million cubic yards (yd^3)) of structural fill will be necessary to fill the site to finish grade. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-201 illustrates the finish grade.

The applicant stated that it will construct a mechanically stabilized earth (MSE) retaining wall around the perimeter of the plant area to establish finish grades and to provide for backfilling. The applicant stated that the distance from the retaining wall to any seismic Category I structures of Turkey Point Units 6 and 7 is greater than 152.4 m (500 ft) and thus failure of the wall would not affect the seismic Category I structures. The applicant described plans to excavate into the Key Largo Limestone formation to approximately El. -10.7 m (-35 ft) and place structural fill around the power block area and lean concrete between the bottom of the mudmat and the bottom of the excavation. The applicant indicated the lean concrete fill between the mudmat and the Key Largo Limestone will have a compressive strength of 10.3 MPa (1.5 ksi). The applicant stated that the first lift of concrete fill (bottom lift) will follow American Concrete Institute (ACI) 201.2R-08, "Guide to Durable Concrete," (2008) to improve concrete fill resistance to sulfate attack from groundwater. The applicant developed a thermal control plan to minimize thermal cracking of the 5.9 m (19 ft) thick lean concrete. The applicant stated that will follow ACI 207, "Guide to Mass Concrete" and Nuclear Quality Assurance-1 for construction of lean concrete. In Part 10 of the Turkey Point Units 6 and 7 COL FSAR, Appendix B, Table 3.8-5, the applicant provided a concrete fill ITAAC, which establishes a set of actions and criteria for the concrete fill compressive strength, methods to control thermal cracking and sulfate attack resistance, necessary to provide assurance that, when met, the stability of Category I structures are in conformance with the combined license. The applicant indicated that successful concrete fill ITAAC execution ensures that the concrete fill placed underneath seismic Category I structures meets the specifications in ACI 207.1R-05 and that the first lift of concrete placed underneath Seismic Category I structures meets the ACI 201.2R-08 durability requirements.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5.2 presents foundation data for the reactor and auxiliary building. The applicant identified the foundation dimensions as 26.8 m to 48.5 m (88 to 159 ft) by 77.4 m (254 ft) with the deepest excavation at an El. -10.7 m (-35 ft). The applicant stated that it will place the base of the makeup water reservoir at El. -0.6 m (-2 ft) and the excavation bottom at El. -1.2 m (-4 ft). Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-222 presents the extent of excavation, filling, and limits of temporary ground support for major structures. The applicant stated that it will not create any permanent or temporary safety-related excavation or fill slopes in the power block area.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5.3 describes the compaction criteria applied. The applicant indicated that structural fill used as backfill around the nuclear island structures and beneath nonsafety-related power block structures will be compacted to a minimum of 95 percent of the modified Proctor maximum dry density. The applicant indicated that the general fill at power block non-structure areas will be compacted to a minimum of 92 percent of the modified Proctor maximum dry density. The applicant stated that it will address the fill placement and compaction control procedures during the detailed design stage.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5.4 specifies that, because the deepest excavation level extends 10.7 m (35 ft) below the groundwater level, a complete construction dewatering level system will be required. The applicant stated that it will conduct the power block excavations as open cuts with a reinforced concrete diaphragm wall surrounding the excavation area. The applicant stated its intentions of conducting inspection, geologic mapping, and surveying during excavation to ensure the complete removal of the Miami Limestone and that the required depth is reached. The applicant stated that it plans to develop a detailed excavation and foundation preparation plan prior to the construction stage.

The applicant indicated that seepage will be controlled using sumps and discharge pumps. The applicant does not anticipate subgrade rebound at the Key Largo Limestone, either at the base of the excavation or in the underlying Fort Thompson Formation.

2.5.4.2.6 *Groundwater Conditions*

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.6, the applicant described the periodic measurements of groundwater levels it conducted to provide a basis for engineering design and for the conceptual construction design for dewatering.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.6.1 describes the amount and types of instruments installed by the applicant to help define the aquifer parameters. The applicant installed four pumping wells and 50 observations wells in order to accurately perform an aquifer pumping test. In addition, the applicant installed two pumping wells and five well clusters at each reactor site. Turkey Point Units 6 and 7 COL FSAR Section 2.4.12 provides descriptions and locations of the aquifer pumping test wells and observation wells and describes the results for hydraulic conductivity testing and the groundwater elevation gradients.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.6.2 describes the construction dewatering method and the grout test program. The applicant indicated that will surround the excavation with a reinforced concrete diaphragm wall that will act as a cut-off for horizontal groundwater flow into the excavation. The applicant stated that the bottom of the wall will be at El. -18.3 m (-60 ft), just below a limestone layer encountered between the Key Largo limestone and the Fort Thompson Formation. The applicant indicated that geologic features such as zones of secondary porosity, fractures, bedding planes and voids can provide potential pathways for water to flow. The applicant stated that zones of secondary porosity contain vugs on the order of centimeter scale. The applicant indicated that within the slightly to moderate fractures zones, the openness discontinuities vary from tight, which indicates no visible separation, to moderately wide, which indicates 9 mm (0.03 ft) to 30 mm (0.1 ft), all with an average of less than 1 mm (0.003 ft). Based on the field information described above, the applicant defined a void being as equal to or greater than 0.15 m (0.5 ft) in diameter. The applicant indicated that potential voids or sediment infills that were found are limited in size and extent. The applicant stated that for construction groundwater control, a grouted zone will be constructed via grout injections into the rock mass between the bottom of the excavation at El. -10.7 m (-35 ft) and the bottom of the diaphragm wall. In Part 10 of the Turkey Point Units 6 and 7 COL FSAR, Appendix B Table 3.8-6, the applicant provided a grouting ITAAC, which establishes a set of actions and criteria for the grouting activity necessary to provide assurance that, when met, the stability of Category I structures are in conformance with the combined license. The applicant conducted a groundwater model sensitivity simulation assuming various hydraulic conductivities for the grout plug and concluded that grouting can significantly reduce the amount of discharged water generated during excavation. The applicant indicated that a grout test program will be performed to validate the grout design and grouting techniques. The applicant stated that the grouting is not classified as safety related and is to be performed to facilitate construction dewatering.

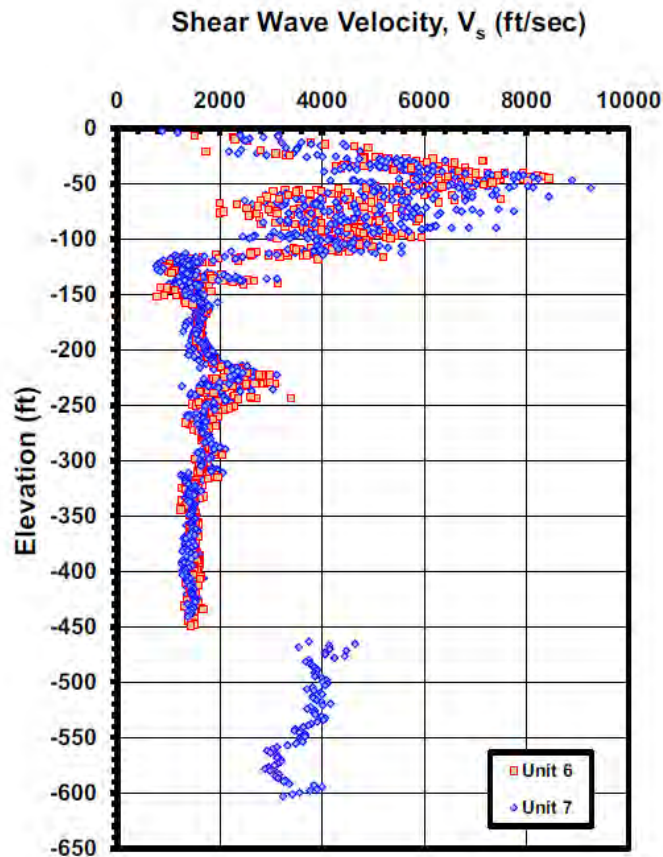
The applicant did not anticipate adverse conditions due to seepage or piping through earthwork structures because it does not plan to use such structures during construction of Turkey Point Units 6 and 7.

2.5.4.2.7 Response of Soil and Rock to Dynamic Loading

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7 presents the site subsurface profile characterization with respect to the properties of strata pertinent for dynamic loading. The applicant referred to Turkey Point Units 6 and 7 COL FSAR Section 2.5.2 for a detailed description of the development of the ground motion response spectrum (GMRS) and the PSHA, as well as for the seismic history of the site area.

P and S Wave Velocity Profiles

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7.2, the applicant stated that it measured the V_s and V_p at the site in the upper 183 m (600 ft) and obtained the velocities deeper than 183 m (600 ft) from Arthur (1988) and Reese and Richardson (2008) to complete the velocity profile for seismic ground response analyses with consideration of the significant depth of unconsolidated sediments at the site. Figure 2.5.4-2 shows a plot of all of the measured shear wave velocities to depths of 137 m (450 ft) and 183 m (600 ft) at Turkey Point Unit 6 and Unit 7, respectively.



**Figure 2.5.4-2. Plot of shear wave velocity measurements with elevation
(Source: Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-218)**

For the seismic velocities in the upper 183 m (600 ft), the applicant stated that it obtained geophysical measurements by performing P-S logging in 12 dedicated boreholes, 6 in each of

the 2 power blocks, and downhole geophysical testing up to 121.9 m (400 ft) deep. The applicant observed a variation of V_s and V_p within the Miami Limestone, Key Largo Limestone, and Fort Thompson formations and attributed this variation to the different degrees of degradation of these materials. The applicant concluded that the velocities measured in the Upper Tamiami Formation, Lower Tamiami Formation and Peace River Formation are more consistent than the overlying formations. The applicant compared results between the two power block areas and noted that the velocities are similar. Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.4 summarizes the design/average V_s .

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7.2.2, the applicant described the seismic velocities deeper than 183 m (600 ft). The applicant stated, following Arthur (1988), that the Cenozoic bedrock occurs at a depth of at least 4,570 m (15,000 ft) and that eight sonic logs previously performed within the site region for oil field exploration contain data ranging in elevation from approximately -152 to -3,627 m (-500 to -11,900 ft) in elevation. The applicant calculated the average V_s for the eight sonic logs. The applicant noted that the sonic data shows that the V_s of strata deeper than 183 m (600 ft) below the finish grade increased from approximately 1,220 m/s (4,000 fps) at 183 m (600 ft) to between 2,590 m/s (8,500 fps) and 3,048 m/s (10,000 fps) below 3,048 m (10,000 ft).

Static and Dynamic Laboratory Testing

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7.3 states that the applicant conducted RCTS testing on 14 samples on the power block area from the Key Largo, Fort Thompson, Upper and Lower Tamiami, and Peace River Formations to obtain data on shear modulus degradation (G/G_{\max}) and damping characteristics of site soils. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-233 presents the selected values of G/G_{\max} versus shear strain for the five strata tested in the power block area.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7.3.1, the applicant stated that because it will remove the muck stratum, the shear modulus degradation properties are not relevant. The applicant also obtained values of damping ratio (D) for soils at increasing shear strain levels from the RCTS tests. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-249 presents the damping data for tests performed on natural soils.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7.3.3 describes the shear modulus and damping curves for rock. The applicant stated that it considered the Key Largo and Fort Thompson Formations (Stratum 3 and 4) to have non-strain dependent shear modulus based on the competency of the rock. The applicant considered the Miami Limestone (Stratum 2) weak and to have a strain dependent shear modulus. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-235 presents the selected values of damping versus the shear strain for the tested data, to include the rock curve for the Key Largo Limestone and Fort Thompson Formation and the natural soil curve used for the Upper and Lower Tamiami and Peace River formations (Stratum 5, 6 and 7).

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7.3.4 describes the dynamic properties of the compacted structural fill. The applicant stated that will replace the muck layer with compacted limerock fill. The applicant estimated the V_s for structural limerock fill using a coefficient of variation of 1.5 applied to the shear modulus. As part of a nonsafety-related investigation of the compacted limerock fill at existing Turkey Point Unit 5, the applicant measured V_s values in the top 3.6 m (12 ft) of the fill, which average between 442 m/s and 457 m/s (1,450 and 1,500 fps). Therefore, the applicant concluded that the increase in V_s due

to cementation of the fill is more pronounced on the surface, and that the increase in confining pressure with depth in the fill results in a higher V_s with depth.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7.4, the applicant stated that it could calculate the small strain shear modulus values using V_s and other established parameters. The applicant referred to Section 2.5.4.2 for a stratum by stratum description of the derivation of shear modulus and other design parameters.

2.5.4.2.8 *Liquefaction Potential*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.8 provides an overview of the liquefaction potential at the Turkey Point Units 6 and 7 site and discusses the geologically based and state-of-the-art methodology assessments (Youd et al., 2001), such as liquefaction analyses using CPT, V_s and SPT data.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.8.1 states that the Upper and Lower Tamiami Formation and Peace River Formation (Strata 5, 6, 7) are the soil strata considered for liquefaction potential analyses. The applicant stated that liquefaction is unlikely due to the depth of the unconsolidated deposits. The applicant estimated peak ground acceleration at the site of 0.1 g.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.8.2 presents the liquefaction resistance based on SPT data. The applicant stated that due to the effect of overwashing, the SPT N- values from the initial investigation are too low and not representative of the actual soil conditions. The applicant based its liquefaction analysis on results from the supplemental investigation. For the supplemental investigation, the applicant used a 24-inch sampler to allow observation of the second and third (2+3) blow counts and the third and fourth (3+4) blow counts. The applicant stated that the summation of the 3+4 blow count is consistently higher than the summation of the 2+3 blow count. The applicant considered the soil zone penetrated by the 3+4 blow count less influenced by overwashing and more representative of the in situ soil conditions. The applicant considered both blow counts for the liquefaction analysis and reported nine points with factors of safety ranging between 1.06 and 3.21 for the analysis performed for 3+4 blow counts. The applicant stated that the value of 1.06 is the only value under 1.4 and that it corresponds to the transition between the Fort Thompson and Upper Tamiami formations. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-250 presents a comparison between the liquefaction analysis results using the SPT N-values (blow counts 2+3) and the results using the sum of the 3+4 blow counts, both from the supplemental investigation.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.8.3 presents results of the calculated factor of safety (FOS) for the potentially liquefiable materials based on measured cone penetration parameters such as tip resistance sleeve friction. The applicant stated that the deepest CPT soundings penetrated 88.1 m (289 ft) below the ground surface, encountering refusal at that depth. The applicant performed 2 cm (0.79 in) interval tip resistance measurements during the initial investigation and 5 cm (2 in) interval measurements during the supplemental investigation. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-238 presents the FOS results against liquefaction using CPT data. The applicant stated that FOS are consistently higher than 1.1 across the full depth of the testing at the site.

The applicant also calculated the FOS against liquefaction based on V_s data collected from P-S logging and downhole measurements. The applicant stated that it performed P-S velocity measurements at 0.5 m (1.64 ft) intervals and that the deepest measurement extended to 182.9

m (600 ft) below ground surface. Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-251 shows results for the FOS against liquefaction using shear wave velocity data. The applicant reported two values between 1.1 and 1.4 and one value below 1.1. The applicant stated that the 1.07 value corresponds to a tributary thickness to its measured point equal to 0.5 m (1.64 ft) and that it is a localized exception and does not represent a weak zone.

The applicant stated that a negligible portion of the data at isolated locations indicate the potential for liquefaction, but that factors that tend to increase the liquefaction resistance, such as the effects of age, overconsolidation and cementation are ignored in the analysis, and that the earthquake acceleration and the magnitude levels adopted for liquefaction analysis are conservative. Therefore, the applicant concluded the soils at the site are not likely to liquefy and that liquefaction is not a concern for the Turkey Point Units 6 and 7 site.

2.5.4.2.9 Earthquake Site Characteristics

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.9 refers to FSAR Sections 2.5.2 for a description of possible earthquake site characteristics.

2.5.4.2.10 Static Stability

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10 addresses the stability of foundations for the nuclear islands to include the reactor and auxiliary buildings.

Table 2.5.4-1 summarizes the properties for the site Seismic Category I Structures.

Table 2.5.4.1. Site Properties for Seismic Category I Structures
(Source: Turkey Point Units 6 and 7 COL FSAR Section 2.5.10.1)

Structure	Approximate Foundation Dimensions m(ft)	Approximate Foundation El. m(ft)	Average Required Bearing Capacity (Static) kPa (ksf)	Maximum Required Dynamic Bearing Capacity kPa (ksf)
Reactor and auxiliary buildings (Units 6 and 7)	26.8 to 48.5 by 77.4 (88 to 159 by 254) [irregular]	-4.3 (-14.0)	426.1 kPa (8.9)	1675.8 kPa (35)

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10.2 refers to Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2 for a description of the power block subsurface conditions and the geotechnical engineering parameters.

Bearing Capacity Evaluation

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10.2, the applicant calculated the local shear failure ultimate bearing capacity (q_{ult}) for a footing on weak rocks with little fracturing with the following formula:

$$q_{ult} = cN_cC_{f1} + 0.5\gamma BN_\gamma C_{f2}$$

and calculated the q_{ult} for a foundation on soils with Vesic's formula:

$$q_{ult} = cN_c\zeta_c + 0.5\gamma BN_\gamma\zeta_\gamma$$

where,

c = rock mass cohesion

γ = effective unit weight rock

B = width of foundation

N_c and N_γ = bearing capacity factors for rock

C_{f1} , C_{f2} , ζ_c and ζ_γ = shape factors

In addition to local shear failure, the applicant evaluated bearing capacity using the Hoek-Brown methodology for punching failure and performed a SLOPE/W analysis. The applicant presented a summary of cases evaluated and the allowable bearing capacities in Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-217. The applicant used a FOS of 3 for the allowable bearing capacities for the Seismic Category I structures. The applicant concluded that the minimum allowable static bearing capacity is 1870 kPa (39 ksf), which exceeds the average required in the AP1000 DCD, Tier 2, Table 2-1. The applicant stated that, using normal loading plus seismic conditions with 0.3 g peak ground acceleration, the maximum dynamic bearing capacity required by the AP1000 DCD of 1680 kPa (35 ksf) is satisfied.

Settlement

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10.3 discusses the settlement analyses employed at the Turkey Point Units 6 and 7 site. The applicant estimated settlement of the foundations through hand calculations using stress distributions appropriate for layered systems, and by a three-dimensional finite element model using PLAXIS 3D Foundation (PLAXIS 3D). For the hand calculation, the applicant considered two cases: the best estimate using the design stiffness for each layer and a sensitivity analysis using the lower-bound stiffness for the two layers that impact settlement the most, Upper Tamiami and Peace River Formations. Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-219 presents the results for the hand calculation. For the three-dimensional model, PLAXIS 3D calculates displacements with the use of numerical integration methods and incorporates advanced constitutive models that are capable of simulating the response of soil to external loading. The applicant stated that the PLAXIS 3D model included the following phases: initial conditions, dewatering, excavation and lean concrete placement, construction of power block structures, construction of the nuclear island and re-watering. Table 2.5.4-2 compares the settlements estimated by the hand calculation and the PLAXIS 3D model to the DCD requirements. The applicant indicated that the lower bound and best estimate cases for the hand calculation and the PLAXIS 3D model are within the acceptable limits provided by the DCD.

Table 2.5.4-2. Comparison of Limits of Acceptable Settlement without Additional Evaluation (Source: Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-224)

		Differential Across Nuclear Island Foundation Mat (inch per 50 feet)	Total for Nuclear Island Foundation Mat (inch)	Differential Between Nuclear Island and Turbine Building ^(a) (inch)	Differential Between Nuclear Island and Other Buildings ^{(a) (b)} (inch)
DCD Requirement		0.5	6	3	3
Best Estimate ^(c)	PLAXIS 3D	0.20	2.5	0.8	1.6
	Hand Calculation	0.22	2.4	0.6	2.0
Lower Bound ^(c)	PLAXIS 3D	0.23	3.4	1.2	2.2
	Hand Calculation	0.26	3.2	0.9	2.7

- (a) Differential settlement is measured at the center of the nuclear island and the center of adjacent structures.
(b) Maximum differential settlement occurs between nuclear island and radwaste buildings.
(c) Settlements presented exclude the rewatering phase.

Earth Pressures

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10.4 describes the static and seismic active and at-rest lateral earth pressures acting on the underground structure below grade walls. The applicant stated that vertical ground accelerations are negligible for seismic active and at rest earth pressure cases, but accounted for horizontal ground acceleration by employing a factor of $k_h g$, where $k_h = 0.1$ and g = acceleration.

The applicant calculated the static active earth pressure as the product of the Rankine coefficient of static active lateral earth pressure, unit weight of the structural fill and general fill, and the depth.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10.4.2 describes how the applicant calculated the active seismic pressures. The applicant used the Mononobe-Okabe equation as defined in Seed and Whitman (1970).

The applicant calculated the lateral earth pressure due to surcharge using the relationship between earth pressure coefficient and uniform surcharge pressure. The applicant developed sample earth diagrams with uniform surcharge loads of 24 kPa (500 psf) and 190 kPa (4,000 psf), a unit weight for compacted limerock fill of 2080 kilograms per cubic meter (kg/m^3 ; 130 pounds per cubic foot (pcf)) and a drained friction angle of 33° .

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10.6, the applicant stated that the results of the investigation indicate that the site is underlain by rock overlying unconsolidated deposits, and that the risk of subsidence due to karst and the risk associated with settlement are insignificant.

Lateral Variability

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7 describes the applicant's evaluations for stratigraphic uniformity and bearing pressure uniformity. The applicant correlated the geologic and stratigraphic features at depths less than 36.6 m (120 ft) below grade from one boring to another with relatively smooth variation in thickness. The applicant developed a

two-dimensional plane-strain PLAXIS 2D model to evaluate the bearing pressures for site-specific conditions. The applicant indicated that for all cases, the maximum bearing pressure difference is less than 20 percent. The applicant stated that the AP1000 DCD criterion for lateral uniformity is satisfied.

Sensitivity Analysis with Postulated Voids in the Subsurface

Turkey Point Units 6 and 7 COL FSAR 2.5.4.10.8 describes the sensitivity analysis performed in PLAXIS 3D to consider the stability of Category I structures with postulated voids in the subsurface. The applicant indicated that the void size of 6.1 m (20 ft) constrained by the grouting program is much larger than the estimated void sizes present on the site. The applicant modeled a postulated tunnel-shaped void with a 6.1 m (20 ft) diameter circular cross section where the void extends east-west across the nuclear island and with the top of the void below the grout plug, which is at El. -60 ft. The applicant stated that it selected this direction because the maximum dynamic bearing demand occurs under the west edge of the shield building primarily because of the east-west component of the earthquake. The applicant modeled the postulated water-filled void and performed static and dynamic analyses. For the static stability analysis results, the applicant stated that the presence of a 6.1 m (20 ft) wide tunnel does not present stability concerns, that the total and differential settlements from the PLAXIS 3D model indicated that the presence of the void has no impact on settlement, and that the AP1000 DCD criteria are still met. In addition, the applicant stated that the factor of safety for bearing capacity is greater than 3, that no plastic points or tension cut off points were observed during the loading phase and that the tensile capacity of concrete fill was not reached. For the pseudo-dynamic analysis results, the applicant stated that subsurface collapse is not anticipated under the combination of seismic and static nuclear island loads, indicating that no plastic points or tension cut off points were observed during the pseudo dynamic loading conditions, the effective vertical compressive stresses were smaller than the ultimate bearing capacity of concrete and that the tensile capacity of concrete fill was not reached.

2.5.4.2.11 Design Criteria and References

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.11 summarizes the geotechnical-related design criteria that pertain to the design. The applicant selected a factor of safety against liquefaction of 1.25. The applicant stated that it computed an allowable bearing capacity of 1870 kPa (39 ksf) using a FOS of 3, which exceeds the AP1000 DCD maximum static loading of 430 kPa (8.9 ksf). Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-219 presents the estimated settlements of Turkey Point Units 6 and 7. The applicant stated that it complies with the threshold in the AP1000 DCD. The applicant calculated the lateral earth pressures with a FOS of 1.0 and recommended FOS of 1.10 for sliding and overturning due to lateral loads when the seismic component is included.

2.5.4.2.12 Techniques to Improve Subsurface Conditions

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.12, the applicant stated that it will limit its ground treatment to over-excavation of unsuitable materials, and their replacement with compacted limerock fill and lean concrete fill. The applicant stated that the muck of Stratum 1 will be removed and replaced with compacted limerock fill. The applicant stated that groundwater control is required as part of the over-excavation of unsuitable materials and that it will be achieved by grouting. The applicant stated that grouting will also be used to constrain the sizes of potential voids. The applicant stated that because the zone between El. -10.7 m (-35 ft) and El. -18.3 m (-60 ft) will be grouted in accordance with the closure criteria that will

be developed as part of the grout test program, any remaining voids in this zone that will remain would be structurally insignificant. In addition, for the zone between El. -18.3 m (-60 ft) and El. -33.5 m (-110 ft), the applicant will perform grouting in every primary grout borehole. The applicant stated that the primary grout boreholes will be spaced less than or equal to 6.1 m (20 ft) on center, constraining the maximum undetected void size to approximately 6.1 m (20 ft). In Part 10 of the Turkey Point Units 6 and 7 COL FSAR, Appendix B, Table 3.8-6, the applicant provided a grouting ITAAC, which establishes a set of actions and criteria for the grouting activity necessary to provide assurance that, when met, the stability of Category I structures are in conformance with the combined license. The applicant indicated that successful grouting ITAAC execution results in any remaining voids in the grouted zone being structurally insignificant and any remaining voids in the extended grouted zone having a maximum equivalent spherical diameter of equal or less than 6.1 m (20 ft).

The applicant stated that it will prepare a thermal control plan, following ACI 207 (2006) guidelines, to minimize thermal cracking of the lean concrete to be placed under the nuclear island.

2.5.4.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the stability of subsurface materials and foundations are given in Section 2.5.4 of NUREG-0800.

The applicable regulatory requirements for reviewing the applicant's discussion of stability of subsurface materials and foundations are as follows:

- 10 CFR Part 50, Appendix A, GDC 1, "Quality Standards and Records," as it relates to the requirement that SSCs important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. It also requires that appropriate records of the design, fabrication, erection, and testing of SSCs important to safety be maintained by or under the control of the nuclear power unit licensee throughout the life of the unit.
- 10 CFR Part 50, Appendix A, GDC 2, "Design Bases for Protection Against Natural Phenomena," as it relates to consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.
- 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants," as it relates to quality assurance requirements for the design, fabrication, construction, and testing of those SSCs of nuclear power plants that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public.
- 10 CFR Part 50, Appendix S, "Earthquake Engineering Criteria for Nuclear Power Plants," as it applies to the design of nuclear power plant SSCs important to safety to

withstand the effects of earthquakes without loss of capability to perform their safety functions.

- 10 CFR 100 provides the criteria that guide the evaluation of the suitability of proposed sites for nuclear power and testing reactors.
- 10 CFR 100.23 provides the nature of the investigations required to obtain the geologic and seismic data necessary to determine site suitability, and identify geologic and seismic factors required to be taken into account in the siting and design of nuclear power plants.

The related acceptance criteria from Section 2.5.4 of NUREG-0800 are as follows:

- **Geologic Features:** To meet the requirements of 10 CFR Parts 50 and 10 CFR Part 100, the section defining geologic features is acceptable if the discussions, maps, and profiles of the site stratigraphy, lithology, structural geology, geologic history, and engineering geology are complete and are supported by site investigations sufficiently detailed to obtain an unambiguous representation of the geology.
- **Properties of Subsurface Materials:** To meet the requirements of 10 CFR Parts 50 and 10 CFR Part 100, the description of properties of underlying materials is considered acceptable if state-of-the-art methods are used to determine the static and dynamic engineering properties of all foundation soils and rocks in the site area to sufficient depth that impact behavior during construction and over the life of the facility, including during postulated seismic events.
- **Foundation Interfaces:** To meet the requirements of 10 CFR Parts 50 and 10 CFR Part 100, the discussion of the relationship of foundations and underlying materials is acceptable if it includes (1) a plot plan or plans showing the locations of all site explorations, such as borings, trenches, seismic lines, piezometers, geologic profiles, and excavations with the locations of the safety-related facilities superimposed thereon, (2) profiles illustrating the detailed relationship of the foundations of all seismic Category I and other safety-related facilities to the subsurface materials, (3) logs of core borings and test pits, and (4) logs and maps of exploratory trenches in the application for an early site permit or COL.
- **Geophysical Surveys.** To meet the requirements of 10 CFR 100.23, the presentation of the dynamic characteristics of soil or rock is acceptable if geophysical investigations have been performed at the site and the results obtained there from are presented in detail.
- **Excavation and Backfill:** To meet the requirements of 10 CFR Part 50, the presentation of the data concerning excavation, backfill, and earthwork analyses is acceptable if:
 - (1) The sources and quantities of backfill and borrow are identified and are shown to have been adequately investigated by borings, pits, and laboratory property and strength testing (dynamic and static); long term solubility properties and dissolution behavior during the life of the facility have been determined; and these data are included, interpreted, and summarized.

- (2) The extent (horizontally and vertically) of all seismic Category I excavations, fills, and slopes are clearly shown on plot plans and profiles.
 - (3) Compaction specifications and embankment and foundation designs are justified by field and laboratory tests and analyses to ensure stability and reliable performance over the life of the plant.
 - (4) The impact of compaction methods are incorporated into the structural design of the plant facilities.
 - (5) Quality control methods are discussed and the quality assurance program described and referenced. If backfill is to be placed under safety-related structures, proper ITAAC should be specified in the applicant's technical submittal to ensure that the static and dynamic properties of in-place backfill material will be the same as, or better than the design parameters. In case cementitious construction material is to be placed under safety-related structures, proper ITAAC should be specified in the applicant technical submittal to ensure that the cementitious backfill placed underneath any seismic Category I structures to a thickness greater than five ft, meets the design, construction and testing of applicable ACI standards.
 - (6) Control of groundwater during excavation to preclude degradation of foundation materials and properties is described and referenced. In addition, the long-term behavior of the backfill subjected to any aggressive groundwater characteristics is evaluated.
 - (7) For sites where deeply embedded structures are involved, deep excavation techniques will likely utilize wall retaining systems rather than a sloped excavation of the soil. A description of the planned excavation technique(s) and design of the wall retention system with sufficient details is provided and it should be able to demonstrate that the excavation technique used will not significantly affect the surrounding soil properties that are relied upon in the analysis and design of the foundation and plant structures.
- Groundwater Conditions: To meet the requirements of 10 CFR Parts 50 and 100, the analysis of groundwater conditions is acceptable if the following are included in this subsection or cross-referenced to the appropriate subsections in Section 2.4 of the applicant's technical submittal:
 - (1) Discussion of critical cases of groundwater conditions relative to the foundation settlement and stability of the safety-related facilities of the nuclear power plant.
 - (2) Plans for dewatering during construction and the impact of the dewatering on temporary and permanent structures. This includes consideration of the potential for substantial head and volume of water due to the deep excavation for the plant structures.
 - (3) Analysis and interpretation of seepage and potential piping conditions during construction.

- (4) Records of field and laboratory permeability tests as well as dewatering induced settlements.
 - (5) History of groundwater fluctuations as determined by periodic monitoring of an adequate number of local wells and piezometers. Flood conditions should also be considered.
 - (6) Evaluation of chemical properties of the groundwater that may impact long-term behavior of the rock/soil/fill materials as well as structural elements (concrete and steel materials).
- Response of Soil and Rock to Dynamic Loading: To meet the requirements of 10 CFR Parts 50 and 10 CFR Part 100, descriptions of the response of soil and rock to dynamic loading are acceptable if: (1) an investigation has been conducted and discussed to determine the effects of prior earthquakes on the soils and rocks at the site. Evidence of liquefaction and sand cone formation should be included, (2) field seismic surveys (surface refraction and reflection and in-hole and cross-hole seismic explorations) have been accomplished and the data presented and interpreted to develop bounding P and S wave velocity profiles, (3) dynamic tests have been performed in the laboratory on undisturbed samples of the foundation soil and rock sufficient to develop strain-dependent modulus-reduction and hysteretic damping properties of the soils and the results included. If generic soil degradation properties are used in the related preliminary analyses (e.g., site seismic response and soil structure interaction analyses), then reconciliation of the generic properties and laboratory testing results should be performed. The section should be cross-referenced with Section 2.5.2.5.
 - Liquefaction Potential: To meet the requirements of 10 CFR Parts 50 and 10 CFR Part 100, if the foundation materials at the site adjacent to and under Category I structures and facilities are saturated soils and the water table is above bedrock, then an analysis of the liquefaction potential at the site is required.
 - Static and Dynamic Stability: To meet the requirements of 10 CFR Parts 50 and 10 CFR Parts 100, the discussions of static and dynamic analyses are acceptable if the stability of all safety-related facilities has been analyzed from a static and dynamic stability standpoint including bearing capacity, rebound, settlement, and differential settlements under dead loads of fills and plant facilities, dynamic loads including “live” and seismic loads with consideration of loading sequences and combinations.
 - Design Criteria: To meet the requirements of 10 CFR Part 50, the discussion of criteria and design methods is acceptable if the criteria used for the design, the design methods employed, and the factors of safety obtained in the design analyses are described and a list of references presented.
 - Techniques to Improve Subsurface Conditions: To meet the requirements of 10 CFR Part 50, the discussion of techniques to improve subsurface conditions is acceptable if plans, summaries of specifications, and methods of quality control are described for all techniques to be used to improve foundation conditions (such as grouting, vibroflotation, bridging mats, dental work, rock bolting, or anchors).

In addition, the geotechnical characteristics should be consistent with appropriate sections from: RG 1.27; RG 1.28, "Quality Assurance Program Requirements (Design and Construction)"; RG 1.132, "Site Investigations for Foundations of Nuclear Power Plants", RG 1.138, "Laboratory Investigations of Soils And Rocks for Engineering Analysis and Design of Nuclear Power Plants," RG 1.198, "Procedures and Criteria for Assessing Seismic Soil Liquefaction at Nuclear Power Plant Sites," and RG 1.206.

2.5.4.4 Technical Evaluation

The staff reviewed Section 2.5.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the stability of subsurface materials and foundations. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

AP1000 COL Information Items

- PTN COL 2.5-1, PTN COL 2.5-2, PTN COL 2.5-3, PTN 2.5-5, PTN COL 2.5-6, PTN COL 2.5-7, PTN COL 2.5-8, PTN COL 2.5-9, PTN COL 2.5-10, PTN COL 2.5-11, PTN COL 2.5-12, PTN COL 2.5-13, PTN COL 2.5-16, and PTN COL 2.5-17

The staff reviewed all of the information presented in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4 related to the PTN COL Information Items 2.5-1, 2.5-2, 2.5-3, 2.5-3, 2.5-5, 2.5-6, 2.5-7, 2.5-8, 2.5-9, 2.5-10, 2.5-11, 2.5-12, 2.5-13, 2.5-16, and 2.5-17. Based on the discussion related to the stability of subsurface materials and foundation presented in Turkey Point Unit 6 and 7 COL FSAR Section 2.5.4, the staff's detailed review and evaluation of the information, and the staff's independent analyses, the staff concludes that the applicant provided the information required satisfying PTN COL Information Items 2.5-1, 2.5-1, 2.5-3, 2.5-5, 2.5-6, 2.5-7, 2.5-8, 2.5-9, 2.5-10, 2.5-11, 2.5-12, 2.5-13, 2.5-16, and 2.5-17. The staff's detailed review of this information is presented below.

2.5.4.4.1 Geologic Features

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.1 refers to Turkey Point Units 6 and 7 COL FSAR Section 2.5.1 and 2.5.3 for a complete description of the regional and site geology and surface faulting. Section 2.5.1.4 and 2.5.3.4 of this SER presents the staff's evaluation of the site geology and surface faulting. The staff's review of Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.1.1 focused on the applicant's description of the subsurface conditions, foundation soil, and rock properties and stability of materials, along with non-tectonic processes and geologic features that could relate, if present, to permanent ground deformation or foundation instability. Turkey Point Units 6 and 7 COL FSAR Sections 2.5.4.1.2 and 2.5.4.4.5 describe the dissolution activity in the limestone formation, including potential cavities at depths. The staff reviewed the microgravity data presented by the applicant and issued several RAIs regarding the subject. Section 2.5.4.4.4 of this SER presents the staff's evaluation of the applicant's responses to related RAIs.

2.5.4.4.2 *Properties of Subsurface Materials*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2 describes the field investigation and subsurface material properties at the Turkey Point Units 6 and 7 site. Section 2.5.4.2.2 of this report provides a summary of the information presented in the Turkey Point Units 6 and 7 COL FSAR. The staff reviewed the geotechnical data presented and evaluated the Turkey Point Units 6 and 7 site's exploration and laboratory testing programs in accordance with the guidelines presented in RG 1.132 and RG 1.138. The main focus of the review was to ensure that the applicant adequately characterized the soil and rock profile in order to evaluate the ability of the subsurface to support the nuclear island statically and dynamically.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2 describes the static and dynamic engineering properties of subsurface materials as well as the methods the applicant used to determine the site engineering properties including field investigation and laboratory testing. The applicant performed two field subsurface investigations: the initial field subsurface investigation from February through June 2008 and a supplemental field subsurface investigation from July to October 2013. The staff conducted a site visit and regulatory audit of the applicant's initial and supplemental field investigations, from May 24 to May 25, 2011, and August 21 to August 23, 2013, as documented in ADAMS Accession Nos. ML111881052 and ML13248A297, respectively. During the 2011 site visit, the staff visually examined drill cores from selected intervals in the Key Largo Formation and Fort Thompson Formation cores and reviewed the geotechnical engineering calculation packages. During the 2013 site audit, the staff examined core samples, the sample storage facility, and sample storage procedure, examined the field test data storage and transfer procedure, interviewed the Paul C. Rizzo Associates, Inc. personnel in charge of the field investigation and evaluation, and reviewed the on-site documentation to include resumes, qualifications, and training records. The staff concludes that applicant collected the samples in accordance with RG 1.132 and industrial standards, adequately stored the soil and rock samples, effectively preserved the test data for future use, and the site personnel have adequate knowledge in their specific field and meet the qualification criteria specified in relevant procedures.

The staff observed site investigation activities, including: Cone Penetration Tests (CPT); PQ drilling with core sample collection; and the standard penetration test (SPT) testing procedure and sampling in the top of the Tamiami formation. During the observations, the staff asked technical personnel to explain the field test purpose and procedures for each site investigation activity. The staff confirmed that the applicant conducted all observed field testing following the industrial standards procedures.

During the Turkey Point Unit 6 and 7 application review, the staff issued several RAIs addressing specific technical issues related to the Turkey Point Unit 6 and 7 site investigations. The staff's evaluations of the applicant's responses to these RAIs are discussed below. The staff also issued a number of editorial RAIs and clarification RAIs, which are not discussed in this SER.

Soil and Rock Strata

The staff reviewed the applicant's description of each soil and rock strata encountered during the subsurface investigation. The staff noted that Stratum 1 is surficial muck to be removed and replaced with compacted limerock fill; Strata 2, 3, 4 and 8 are predominantly rock; and Strata 5, 6, and 7 are predominantly soil. The staff focused its review on the identification and characterization of the soil and rock strata based on physical and engineering methods

conducted by the applicant. The staff's technical evaluation of the methods the applicant used in identification and characterization of the investigated soil and rock strata is further discussed in the subsequent "Subsurface Investigation/Exploration" and "Geophysical Surveys" sections of this SER.

Evaluation of Properties of In Situ Materials

The staff reviewed the applicant's results of field and laboratory testing for Turkey Point Units 6 and 7. The staff noted, while reviewing the information regarding the SPT blow counts, that the applicant obtained the N_{60} by applying a correction factor, C_ϵ , to the energy ratio. Since field SPT N-values are generally adjusted to be standardized to a specific energy level by applying correction factors, including energy correction (C_ϵ), borehole diameter (C_B), sampler type (C_S), rod length (C_R), and overburden pressure (C_n), in RAI 6006, Question 02.05.04-2, the staff asked the applicant to clarify if it included other correction factors (e.g., overburden pressure, borehole diameter, rod length and sampling method) in the N-value correction process. In addition, the staff asked the applicant to describe how it obtained the recommended SPT design values and how each single value for each stratum could properly and statistically reflect the entire layer variations.

In its response to RAI 6006, Question 02.05.04-2, dated October 3, 2014, the applicant clarified that corrections for the SPT N-values included energy correction (C_ϵ), borehole diameter (C_B), sampler type (C_S), and rod length (C_R) for N_{60} values that are typically used in correlations to derive friction angle and other engineering properties. The applicant further clarified that one additional N-value correction, which is only used for the liquefaction analysis, is the overburden pressure correction factor (C_n) that converts N_{60} to $(N_1)_{60}$. To explain why blow counts obtained from the initial site investigation turned out to be lower than anticipated, the applicant examined the blow counts by using the 61-cm (24-in.) sampler in the supplemental investigation, rather than the 46-cm (18-in) sampler used in the initial site investigation. In the response, the applicant compared the blow counts obtained from the initial and supplemental investigations, and noted that the SPT N-values from the supplemental investigation at R-6-1b and R-7-1 are consistently higher than those from the initial investigation at B-601 (DH) and B-701 (DH). Furthermore, for the supplemental investigation the applicant observed that the summations of the 3rd and 4th blow counts obtained at R-6-1b and R-7-1 are consistently higher than the summation of the 2nd and 3rd blow counts (SPT N-values). Accordingly, the applicant attributed the lower SPT N-values to overwashing and concluded that the overall SPT N-values are conservative. The applicant also clarified that it accounted for variation within each layer by using conservative SPT N-values in conjunction with other in situ and laboratory tests to determine engineering parameters. Therefore, the applicant concluded that the average SPT blow count per layer is a conservative representation of the value for that layer.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-2, and the applicant's results of SPT blow counts from both initial and supplemental site investigation reports. The staff concludes that the applicant corrected the SPT N-values to N_{60} -values and $(N_1)_{60}$ -values in accordance with ASTM D 1586 (ASTM International, 2011). The staff agrees that overwashing is attributed to lower N-values based on the applicant's demonstration of the soil zone penetrated by the 3rd and 4th blow counts influenced less by the washing and drilling conditions in its supplemental investigation. The staff also agrees that the SPT N-values are conservative. The staff noted that the applicant derived the associated engineering parameters by combination of average SPT N-values per stratum and other tests/measurements. The staff concludes that variation within each layer is statistically reflected by combination of conservative SPT N-value and other conservative test results and measurements.

However, comparing test results of SPT N-values between initial and supplemental investigations, it was not clear to the staff why the SPT N-values from the supplemental investigation are consistently higher than those from the initial investigation, given the similar condition of overwashing ahead of casing for both 457 mm (18 in.) sampler and 610 mm (24 in.) sampler. In RAI 7811, Question 02.05.04-28, the staff asked the applicant to discuss the difference between the original and supplemental SPT N-values.

In its response to RAI 7811, Question 02.05.04-28, dated April 10, 2015 (ADAMS Accession No. ML15103A544), the applicant stated that SPT N-values from the initial investigation associated with the soil formations were lower than the expected values based on their depth (greater than 30.5 m [100 ft]) and high shear wave velocity (greater than 45.7 m/s [1,500 ft/s]). The applicant attributed that exposure to the effects of overwashing and disturbance due to stress relief effects for the depths ranging from 35.1 m (115 ft) to 140.2 m (460 ft). The applicant stated that it used a longer split barrel (610 mm [24 in.]) sampler during the supplemental investigation with special attention paid to the overwashing effect, and controlled bentonite-water mix to provide a heavy mud to reduce the effect of stress relief. The applicant observed that a discontinuous sampling method, as compared to a continuous sampling method, will have lower blow counts because of its longer exposure to the effects of overwashing.

The staff reviewed the applicant's response to RAI 7811, Question 02.05.04-28. The staff notes that disturbance of the soils can be gradually mitigated depending on drilling/sampling requirements and approach; however, the degree of disturbance due to overwashing and stress relief cannot be fully eliminated. The staff also notes that the applicant used a targeted approach during the supplemental investigation to mitigate the degree of disturbance, which in general resulted in higher SPT N-values. The staff agreed that the continuous sampling method has less influence on the blow counts because of a shorter duration to overwashing exposure. Based on shear wave velocity measured at the site and the demonstration of higher summation of 3rd and 4th blow counts than SPT N-values (summation of 2nd and 3rd blow counts), the staff agrees that SPT N-values are lower than the expected values. The staff concludes that the applicant's explanation of the difference between the original SPT N-values and the supplemental SPT N-values is appropriate. Accordingly, the staff considers RAI 6006, Question 02.05.04-2, and RAI 7811, Question 02.05.04-28, resolved.

The staff also concentrated its review on the elastic modulus of subsurface materials, an important parameter in the subsurface stability evaluation. In RAI 6006, Question 02.05.04-5, the staff asked the applicant to describe the test methods, results and correlations used to develop the high strain elastic modulus for fine and coarse grained soils.

In an October 3, 2014, response to RAI 6006, Question 02.05.04-5 (ADAMS Accession No. ML14283A311), the applicant stated that for the supplemental field investigation program conducted in 2013, the determination of the high strain elastic modulus of the soil formations took into account all available data from five different test methods including pressuremeter tests, SPT, CPT, shear wave velocity from P-S suspension, and triaxial tests. The applicant provided five empirical correlations between test data and high strain elastic modulus of soil and calculated the corresponding modulus for the Upper Tamiami, Lower Tamiami, and Peace River Formations. Additionally, the applicant presented statistical parameters (minimum, maximum, median, average, standard deviation, and coefficient of variation) for each method. The applicant demonstrated that the total mean modulus and total median modulus are similar.

Based on the above, the applicant selected the design high strain elastic modulus of the soil formations.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-5. The staff acknowledged that the empirical correlations applied by the applicant to develop the high strain elastic modulus for fine and coarse grained soils are state-of-the-practice. The modulus for the Upper Tamiami Formation by SPT method reasonably agreed with the values by other methods but the modulus for Peace River Formation by SPT method is relatively higher than the values by other methods. The staff also acknowledges that the data and methods used by the applicant are adequate for deriving the soil high strain elastic modulus. However, the staff noted that the SPT based modulus for the Lower Tamiami Formation was not included in the assessment. In RAI 7811, Question 02.05.04-29, the staff asked the applicant to provide the calculation of the SPT based modulus for the Lower Tamiami Formation and explain why it ignored the SPT based modulus for the Lower Tamiami Formation. In addition, since the applicant indicated in its response to RAI 6006, Question 02.05.04-2, and in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.1.3.2.1 that it used the overall pool of SPT N-values from both the initial and supplemental investigations in the development of engineering parameters or engineering analyses, the staff asked the applicant to clarify the engineering parameters or engineering analyses it developed based on the overall pool of SPT N-values.

In its response to RAI 7811, Question 02.05.04-29, dated April 17, 2015, the applicant provided the calculation of SPT based stiffness for the Lower Tamiami Formation with both overall data pool and supplemental test data to demonstrate that the average values are about 6 to 15 percent of the average stiffness obtained from the CPT, pressuremeter, shear wave velocity, and CU triaxial methods. The applicant noted that it did not consider the suggested correlations it used to obtain the stiffness based on SPT data for silty soil applicable for the site-specific conditions of the Lower Tamiami Formation. The applicant further clarified that it based the engineering parameters or engineering analyses on SPT results.

The staff reviewed the applicant's response to RAI 7811, Question 02.05.04-29. The staff noted that SPT based stiffness for the Lower Tamiami Formation is approximately an order of magnitude less than the average stiffness obtained from other methodologies. The staff also notes that the suggested correlations the applicant used to obtain the stiffness based on SPT data are empirically based on nonspecific data, therefore, there is considerable uncertainty associated with these correlations. The staff agrees that these correlations should be checked and confirmed based on site-specific data. The staff further agrees that four methodologies other than SPT are more reliable for stiffness characterization because these methodologies lead to similar stiffness results and are adequate to estimate the stiffness for the Lower Tamiami Formation. Accordingly, the staff considers RAI 6006, Question 02.05.04-5, and RAI 7811, Question 02.05.04-29 resolved.

During its review of the shear strength parameters of the soil, the staff noted that before the supplemental field investigation program was conducted in 2013, only one triaxial test was completed on an intact soil sample from Tamiami Formation sandy silt, and the recommended effective cohesion and effective friction value for the Lower Tamiami was based solely on the result of this sample. For the computation of effective friction angle in each sand stratum, the SPT N-values from the initial investigation were questionable due to difficulties of sampling; only four CPT profiles were available for use and no direct shear testing results were provided. In RAI 6006, Question 02.05.04-7, the staff asked the applicant to justify why additional triaxial tests are not needed to characterize the shear strength parameters of these soils. Furthermore,

in RAI 6006, Question 02.05.04-8, the staff specifically asked the applicant to justify the adequacy of the friction angle determination.

In its response to RAI 6006, Question 02.05.04-7, and RAI 6006, Question 02.05.04-8 dated October 3, 2014, the applicant stated that it performed additional triaxial tests on intact soil samples from the Upper and Lower Tamiami and Peace River formations. The applicant indicated that it performed triaxial testing on a total of five samples from the Lower Tamiami Formation, one sample from the Upper Tamiami Formation, and fifteen samples from the Peace River Formation. Since the quantity of triaxial samples tested for the Upper Tamiami was insufficient to characterize the shear strength parameters of the soil, the applicant established the shear strength parameters for this stratum by analyzing and corroborating data including: Atterberg testing, SPT and CPT. The applicant also presented the effective friction angles for the Upper Tamiami Formation based on triaxial testing of one sample, CPT testing, and SPT testing and demonstrated that the effective friction angles obtained from correlations of SPT and CPT are in agreement with the result of one triaxial test. For the Lower Tamiami and Peace River Formations, the applicant considered the number of triaxial tests for these formations sufficient to estimate the effective friction angle.

The staff reviewed the applicant's responses to RAI 6006, Question 02.05.04-7, and RAI 6006, Question 02.05.04-8, and concludes that the applicant's use of Atterberg testing, SPT and CPT to characterize the shear strength parameters, including friction angle, of the Upper Tamiami Formation in the absence of additional triaxial test data is acceptable. The staff also agrees with the applicant that there are sufficient triaxial test data for the Lower Tamiami and Peace River Formations to estimate the effective friction angle. Based on the review of the geotechnical information the applicant obtained from both the initial and supplemental investigations, the staff concludes that the soil shear strength parameters are adequately and reasonably characterized. Consequently, the staff considers RAI 6006, Question 02.05.04-7, and RAI 6006, Question 02.05.04-8 resolved.

The staff reviewed the dynamic backfill properties selected by the applicant to ensure that the material used for backfill will have equivalent or better properties as assumed in the analysis. For the dynamic properties of the crushed limestone backfill, the staff noted that the applicant selected the generic shear modulus degradation and damping curves from Seed et al. (1984). Since the nature of this material is unique and potentially not conducive to dynamic testing, in RAI 6006, Question 02.05.04-15, the staff asked the applicant to provide additional evaluations to justify the use of these generic curves.

In its response to RAI 6006, Question 02.05.04-15, dated October 3, 2014, the applicant conducted a further literature review using curves proposed by Menq (2003) to evaluate the assumptions made for the dynamic properties and assigned uncertainty through randomization. The applicant concluded that the shear modulus degradation and damping curves for backfill, as provided in Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-216, are appropriate based on its additional literature review.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-15, and Menq's method cited by the applicant. The staff acknowledges that Menq's method represents the state-of-the-art knowledge on dynamic properties of sandy and gravelly soils, and therefore, the staff notes that it is appropriate to use Menq's method to validate the structural fill curve developed from the generic curves by Seed et al. (1984). The staff notes that the applicant selected reasonable soil parameters, the curves by Menq's equations are in good agreement with the structural fill curve at low strains and at higher strains, and these curves are enveloped

by the randomization boundaries of the structural fill curve up to the strain at 0.02 percent. The staff further observes that the applicant reported the highest strain in the structural fill to be less than 0.02 percent as obtained from the site response analysis. Because the applicant provided additional acceptable evaluations to validate the use of the generic curves from Seed et al. (1984), the staff considers RAI 6006, Question 02.05.04-15, resolved.

Chemical Properties of Soils and Rock

The staff's review of Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.4 focused on the applicant's evaluation of the chemistry of the soil and rock strata for consideration of corrosive effects on buried steel and aggressiveness toward buried concrete. During its review, the staff noted that the applicant did not provide any general physical and chemical property laboratory testing results for the Fort Thompson Formation in Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-205. In RAI 6006, Question 02.05.04-4, the staff asked the applicant to provide these results or to justify why these results are not needed.

In its response to RAI 6006, Question 02.05.04-4, dated October 3, 2014, the applicant updated Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-205 with the testing results obtained from both the initial and supplemental investigation, including the laboratory test results of the Fort Thompson Formation.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-4, and confirmed that the applicant revised the general physical and chemical properties test results in the updated Turkey Point Units 6 and 7 COL FSAR and provided the testing results for the Fort Thompson Formation in Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-205. In addition, the staff noted and confirmed that the applicant updated Turkey Point Units 6 and 7 COL FSAR Tables 2.5.4-207 and 2.5.4-209, and Turkey Point Units 6 and 7 COL FSAR Figures 2.5.4-216 and 2.5.4-217 in accordance with the supplemental laboratory testing results. Consequently, the staff considers RAI 6006, Question 02.05.04-4, resolved.

Field and Laboratory Testing Program

The staff reviewed the field and laboratory testing program and participated in a site visit on May 24 and May 25, 2011, to observe the results of the initial field subsurface investigation performed by the applicant from February 2008 through June 2008. In addition, the staff participated in a regulatory audit from August 21 to August 23, 2013, of the supplemental site investigation performed from July 2013 through October 2013 at the Turkey Point Units 6 and 7 site. The staff focused its review on results from laboratory tests conducted on soil and rock samples recovered during the field investigation. The following sections of this SER address the staff technical evaluation of the field and laboratory testing program.

Subsurface Investigation/Exploration

The staff reviewed the applicant's site investigation and exploration of subsurface materials for providing data to define the static and dynamic engineering properties of soil and rock materials at the site and their spatial distribution, in accordance with RG 1.132. During its review, the staff noted that Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.2 indicates that the applicant made adjustments to the subsurface investigation including changes to the locations and types of field testing. In RAI 6006, Question 02.05.04-3, the staff asked the applicant to provide further information on how and to what extent these adjustments vary from the

recommendations provided in RG 1.132 and to justify its acceptance for characterizing site subsurface conditions.

In its response to RAI 6006, Question 02.05.04-3, dated October 3, 2014, the applicant explained that some adjustments were required to tailor the subsurface investigation to the site-specific conditions as outlined in RG 1.132. The applicant described the necessary adjustments and clarified that none of the adjustments made to the field testing locations, test methods, testing frequencies, and test depths varied from the recommendations in RG 1.132. The applicant stated that it met the guidelines of RG 1.132, with the exception that it continuously sampled only one boring for the site, instead of one per unit, in the deeper soils. The applicant considered the variation in field testing to be acceptable because it found the soil and rock strata to be uniform in depth and thickness across the site.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-3, and its site investigation programs including both initial and supplemental site investigations. The staff notes that the adjustments are mainly to comply with environmental regulations related to the difficulties in access to the drilling or sampling locations, or adopting more suitable methods for the conditions encountered in situ. The staff also agrees with the applicant's conclusion that the adjustments made to the field testing locations, test methods, testing frequencies, and test depths meet the guideline of RG 1.132. The staff notes that although RG 1.132 suggests that at least one continuously sampled boring should be used for each unit, continuous sampling was only conducted in the Turkey Point Unit 6 footprint during the supplemental site investigation, not in the Turkey Point Unit 7 footprint. For the discontinuously sampled boreholes conducted during the initial site investigation for both units, the staff noted that the applicant continuously cored the Key Largo and Fort Thompson limestone formations and sampled the soil at an increased interval at greater depths. Based on the review and comparison of the material descriptions from field and laboratory classifications for soil layers in the continuously sampled borehole and the discontinuously sampled boreholes, the staff agrees that the materials encountered in the former are generally consistent with the materials encountered in the latter with reasonable minor variations in the material descriptions. Therefore, the staff agrees with the applicant that there is no impact on quality due to continuous sampling at one location instead of two or more as suggested in RG 1.132. Because the applicant's exploration program met the intent of RG 1.132, the staff considers RAI 6006, Question 02.05.04-3, resolved.

Laboratory Testing

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.2.3 related to the laboratory testing program the applicant performed to identify, classify, and evaluate the physical and engineering properties of the soil and rock. Before the applicant conducted the supplemental field investigation program in 2013, it tested only two rock core samples in a laboratory for stress-strain characteristics. The applicant stated that due to the fragility and the porosity of the subsurface materials it was not possible to attach strain gages to most of the samples for determination of stress-strain characteristics. In RAI 6006, Question 02.05.04-6, the staff asked the applicant to justify why two samples are sufficient to characterize the Fort Thompson and Key Largo Formations, especially since the Key Largo will be the bearing layer. In addition, the staff asked the applicant to validate the assumption that for rocks the elastic and shear modulus values generally remain constant at both small and large strains.

In its response to RAI 6006, Question 02.05.04-6, dated October 3, 2014, the applicant stated that the data collected during the supplemental investigation contributed additional information to more adequately characterize the Fort Thompson and Key Largo Formations. In addition to

the two rock core samples tested for stress-strain characteristics in initial field investigation, the applicant performed the additional tests on the Key Largo and Fort Thompson Formations during its supplemental field investigation to assess small strain and large strain rock behavior. Specifically, four UCS tests with stress-strain measurements, four RCTS tests to assess the low strain behavior and the potential for strain dependency within the materials, 26 pressuremeter tests, 9 on the Key Largo Formation and 17 on the Fort Thompson Formation, and 2 P-S suspension loggings to determine the shear wave velocity and small strain modulus for these rock formations.

The applicant validated its linear assumptions previously made for both the Key Largo and Fort Thompson Formations by demonstrating the behavior as obtained from RCTS tests for the small strain range (less than 0.005 percent). For this strain range, the applicant concluded that stiffness degradation is negligible. The applicant also assessed the large strain rock stiffness based on in situ tests including P-S suspension tests, reduced to account for large strain using RQD, and pressuremeter tests, and laboratory tests including UCS test results. To estimate the rock mass stiffness, the applicant used the RMR and the Geological Strength Index (GSI) classifications. The applicant demonstrated that it evaluated the potential fractures in the drainage and vegetated depression areas based on the observation within the three inclined boreholes from the supplemental investigation.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-6. The staff noted that strain degradation for the Key Largo and Fort Thompson Formations is minor within the small strain range (less than 0.005 percent) from RCTS test results, which confirmed linear assumptions for the limestone formations for small strain range. Since small strains represent the levels corresponding to the site response analysis or seismic soil-structure interaction (SSI) analysis, and shear wave measurements characterize the nature of low strain and dynamicity, the staff agrees that the small strain rock stiffness values calculated from shear wave velocities are reasonable and justifiable. For the large strain rock stiffness assessment, the staff agrees with the applicant's description in the revised Turkey Point Units 6 and 7 COL FSAR that the small strain rock stiffness is not the same as the large strain rock stiffness previously assumed. The staff also acknowledges that the data from in situ and laboratory tests and methods used by the applicant are reasonably adequate for deriving the large strain rock stiffness. The staff further notes that the applicant accounted for rock mass conditions including rock quality, fracture and discontinuities and orientation of fracture in evaluating the large strain rock stiffness. The staff reviewed the design rock stiffness selected by the applicant and agrees that these values are rational since the rock stiffness from different methods are comprehensively considered. Consequently, the staff considers RAI 6006, Question 02.05.04-6, resolved.

Staff's Conclusions Regarding the Properties of Subsurface Materials

The staff finds the applicant's description of the subsurface materials acceptable in that the applicant followed the guidance provided in RG 1.132, Revision 2, and RG 1.138, Revision 2. The applicant investigated and tested the subsurface materials to determine the geotechnical engineering properties of the soil and rock at the planned Turkey Point Units 6 and 7 site. The staff concludes that the applicant obtained sufficient undisturbed samples to allow for the adequate characterization of each of these soil/rock groups and determined the extent, thickness, hardness, density, consistency, strength, and engineering and static design properties. Furthermore, the staff also concludes that the applicant provided sufficient information in the form of plots, plans, boring logs, and laboratory test results that enabled the staff to determine that the applicant adequately characterized the subsurface soil and rock materials and adequately determined the engineering and design properties. Therefore, the

staff concludes that the applicant's description of the subsurface materials and properties at the proposed Turkey Point Units 6 and 7 site is acceptable and meets the requirements of 10 CFR 100.23.

2.5.4.4.3 *Foundation Interfaces*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Figures 2.5.4-201 and 2.5.4-221, which show the final plant grade plan and profile, respectively, Figures 2.5.4-203 through 2.5.4-208, which show the subsurface profiles illustrating the stratigraphy at each power block area, Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-209, which shows the subsurface profile locations and Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-222, which illustrates the power block foundation excavation geometries, locations, and depth of the units Seismic Category I structures as well as the relationship of the structure foundation to the subsurface strata.

The staff concludes that the applicant adequately investigated the subsurface materials beneath the nuclear island construction zone for the Turkey Point Units 6 and 7 site. In reaching this conclusion, the staff reviewed and evaluated: (1) the plot plans showing the locations of all site explorations, such as borings, seismic and non-seismic geophysical explorations, piezometers, geologic profiles, and the locations of the safety-related facilities, (2) the profiles the applicant presented, illustrating the detailed relationship of the foundations of all Seismic Category I and other safety-related facilities to the subsurface materials, and (3) core borings, SPT borings, V_s profiles and non-seismic geophysical logging results. Accordingly, the staff concludes that plot plans, subsurface profiles and results of subsurface investigations, as described in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.3, form an adequate basis for the characterization of the foundation interfaces at the

2.5.4.4.4 *Geophysical Survey*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4 focusing on the applicant's description of the geophysical surveys performed to identify the dynamic characteristics of soils and rocks. The staff concentrated its review on the shear and compressive wave velocities which are important dynamic parameters of soil and rock. Before the applicant conducted the supplemental field investigation program in 2013, it performed only two borings over the deeper portion of the profile. In RAI 6006, Question 02.05.04-10, the staff asked the applicant to justify its estimated variations in shear wave velocity based on only two boring readings over the deeper portion of the soil profile.

In its response to RAI 6006, Question 02.05.04-10, dated October 3, 2014, the applicant stated that it performed two additional P-S suspension borings during the supplemental field investigation program; one boring (R-7-1) to a depth of 134.1 m (440 ft), and the other (R-6-1b) to 137.2 m (450 ft). The staff reviewed the information, and concludes that the applicant's estimate of the mean shear wave velocity and its variation for the deeper portion of the soil profile within the Peace River Formation based on four V_s profiles is reasonable and acceptable. Accordingly, the staff considers RAI 6006, Question 02.05.04-10, resolved.

In RAI 6006, Question 02.05.04-9, the staff requested the applicant to describe how it selected shear and compressive wave velocity values for design, and explain how the selected single value for each stratum statistically reflects the entire layer given the large deviations, especially in the Key Largo and Fort Thompson Formations. In RAI 6006, Question 02.05.04-11, the staff

asked the applicant to explain the uniformity in shear wave velocity below the Fort Thompson Formation considering the varied descriptions as silty sands or silts and clays.

In its responses to RAI 6006, Questions 02.05.04-9 and 02.05.04-11, dated October 3, 2014, the applicant stated that, based on data obtained during the initial and supplemental investigations, the recommended shear wave velocities reflect the average velocity associated with each layer. The applicant's investigations demonstrated small V_s variations for the Upper Tamiami, Lower Tamiami, and Peace River Formations. The applicant clarified that it developed 60 randomized V_s profiles for the site response analysis, and as such, the site response analysis does not use a single V_s value within each layer. The applicant also stated that in addition to direct wave velocity measurements, it used other methods to determine the rock and soil stiffness. The applicant discussed the methodology to obtain recommended shear wave velocities in detail. The applicant further discussed uniformity requirements for an AP1000 design plant by providing in-depth site-specific evaluations of stratigraphic uniformity, bearing pressure uniformity, and shear wave velocity variability.

The staff reviewed the applicant's responses to RAI 6006, Questions 02.05.04-9 and 02.05.04-11, and noted that the recommended V_s reflect the average velocity associated with each layer based on data obtained during the initial and supplemental investigations. The staff notes that the applicant conducted the site response analysis on a set of 60 randomized profiles to account for the variability in the dynamic soil properties. The staff also notes that the applicant's methodology to obtain recommended wave velocities is the state-of-the-practice. During the review of the site uniformity, the staff reviewed the applicant's sensitivity study on bearing pressure uniformity. For the laterally variable case, the staff notes the applicant assumed a scenario, in which, half of the foundation rests on the softer soil/rock column with lower bound (LB) parameters and half of the foundation rests on the stiffer soil/rock column with the best estimated (BE) parameters. In RAI 7811, Question 02.05.04-30, the staff asked the applicant to justify why it did not consider upper bound (UB) parameters for the stiffer soil/rock column in the evaluation for the worst-case scenario.

In its response to RAI 7811, Question 02.05.04-30, dated April 17, 2015, the applicant evaluated the worst-case scenario using a two-dimensional finite element PLAXIS model and assuming half of the foundation on a softer soil/rock column with LB properties and half of the foundation on a stiffer soil/rock column with UB properties. The applicant demonstrated that even for this conservative case, the maximum difference in bearing pressures is less than 20 percent, which indicates that soils supporting the nuclear island do not have extreme variations in subgrade stiffness, as required by the DCD criterion

The staff reviewed the applicant's response to RAI 7811, Question 02.05.04-30, and its calculation and assumptions for the worst-case scenario. The staff confirms that the applicant's evaluation of site uniformity is sufficient and conservative based on the cases and conditions selected. Because the applicant demonstrated that the bearing pressures for the laterally variable ground models do not differ more than 15 percent, the staff further confirms that therefore the criterion in the AP1000 DCD for lateral uniformity of bearing pressures to be less than 20 percent different is satisfied. Consequently, the staff considers RAI 6006, Questions 02.05.04-9 and 02.05.04-11, and RAI 7811, Question 02.05.04-30, resolved.

Geophysical Exploration for Possible Dissolution Features

The staff reviewed the applicant's evaluation of the potential for carbonate dissolution features at the Turkey Point Units 6 and 7 site. The applicant used three non-invasive geophysical

techniques (microgravity, seismic refraction, and MASW) to investigate the site. While reviewing the microgravity data, which provide insights into the existence of potential cavities at the site, the staff notes that the applicant based its conclusion that there are no large cavities underneath the site on gravity data analyses. The staff further notes that these measurements may not be sufficient to determine that there are no large cavities, because the applicant only made profile measurements and large gaps remain between profiles throughout the site area. Accordingly, in RAI 6006, Question 02.05.04-1, the staff asked the applicant to justify the assumption that no large cavities exist throughout the site and provide additional references and data sources used to reach this conclusion.

In its response to RAI 6006, Question 02.05.04-1 dated October 3, 2014, the applicant stated that the 6.1-m (20-ft) station spacing along the survey lines was chosen to provide a high-degree of lateral resolution to map gravity anomalies related to potential karst features beneath the survey lines, which include the footprints of the Turkey Point Units 6 and 7 power blocks. The applicant monitored the data quality by re-acquiring data at stations throughout the survey and checking the repeatability of the measurements to assure that the quality of the gravity data was appropriate to use based on the level of repeatability, which indicates a low level of noise. The applicant also described the supplemental subsurface investigations and reevaluation of geophysical data to assess the potential for subsurface voids, and performed a lineament analysis to evaluate fracture density and distribution at the Turkey Point Units 6 and 7 site.

The staff reviewed the result of the original microgravity survey and the remodeled microgravity survey and its data analyses. The staff also reviewed related information presented in the response from initial and supplemental field investigation to support the microgravity assessment. Based on the staff's interpretations of the existing gravity survey anomalies discussed in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5.1, the staff notes that the applicant will remove shallow soil layers with uncertainties related to significant lateral variations prior to construction of Turkey Point Units 6 and 7. The staff further notes that in Revision 6 of FSAR Section 2.5.4.4.5.5, the applicant had planned to perform microgravity surveys on the excavation surfaces of the proposed Turkey Point Units 6 and 7 to detect the presence, or verify the absence, of potential water-filled dissolution features (or voids) beneath the power block. An earlier version of Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5.5 states that the planned microgravity survey would be designed to detect 7.6-m (25-ft) diameter spherical voids and cylindrical voids as small as 3.7 m (12 ft) in diameter at the base of the 7.6 m (25 ft) thick grout plug at an elevation of approximately -18.3 m (-60 ft) NAVD88. In RAI 7811, Question 02.05.04-26, the staff further asked the applicant to provide additional details of the planned microgravity gravity survey, the information on potential void size, location and depth in the limestone layers that need to be considered and detected, and a description of the type of inspection and test program to be followed to reasonably ensure that gravity anomalies resulting from potential underground voids (both within the grouted zones and deeper levels) that are critical to the stability of subsurface materials and the integrity of SSCs are to be appropriately detected, investigated, evaluated, and, if necessary, remediated.

In its response to RAI 7811, Question 02.05.04-26, dated October 29, 2015, the applicant indicated that utilization of microgravity methods to determine the critical void size may not be feasible because microgravity methods can only detect large voids at depth. Instead of microgravity methods, the applicant decided that the subsurface grouting program, which was planned only for dewatering purposes, would be revised such that void sizes will be physically filled and constrained. The applicant committed through an ITAAC to ensure that the Grouted Zone will be grouted, which will result in any remaining voids in the Grouted Zone between EI.

10.7 m (-35 ft) to -18.3 m (-60 ft) being structurally insignificant, according to the grout closure criteria that will be developed as part of the grout test program. The applicant also committed through the ITAAC that for the Extended Grouted Zone between El. -18.3 m (-60 ft) to -33.5 m (-110 ft), grouting will be performed in every primary grout borehole, which will result in any remaining voids being less than 6.1 m (20 ft) in diameter, which is not large enough to be critical to the stability of safety-related structures.

The applicant provided a detailed discussion of its grouting plans. In its response to the RAI, the applicant stated that the grout closure criteria described in the ITAAC will be developed based on results of the grout test program. For the Grouted Zone, grouting will be performed in a series of split spaced borings starting with primary order grout boreholes, and continuing through secondary order grout boreholes at a minimum. The water pressure test results from verification borings and grout takes from the primary and secondary grout boreholes will be evaluated to determine the need for tertiary and higher order grout boreholes. The applicant also stated that higher-order grout boreholes will be assigned until the grout takes in the highest order grout boreholes drilled and grouted are acceptably low. The applicant further stated that for the Extended Grouted Zone, primary grout boreholes will be extended above the interface between the Fort Thompson Formation and Upper Tamiami formation. Primary grout boreholes will be spaced less than or equal to 6.1 m (20 ft) on center. This configuration, with a conservative grout radius of influence of 4 ft, as shown in Figure 2.5.4-1 constrains the maximum undetected void size to approximately 6.1 m (20 ft) in diameter.

The applicant justified that the 6.1 m (20 ft) void size constrained by the grouting program is conservatively much larger than the estimated void sizes present on site. The applicant emphasized the geological conclusion (Turkey Point Units 6 and 7 COL FSAR Appendix 2.5AA) that large voids and karst features are considered unlikely to be present at the site. The geological evaluation of the site based on all boring data from both the initial and supplemental site investigations reveals that the maximum length of interpreted tool drop (due to voids or voids filled with soft sediments) is limited to 0.5 m (1.5 ft) within the Unit 6 and 7 building footprints, and the frequency of encountering an interpreted tool drop is less than 0.5 percent site-wide.

Furthermore, the applicant provided the sensitivity analysis through a 3D finite element model using software PLAXIS 3D foundation for a postulated cylindrical void with a 6.1 m (20 ft) diameter extending east-west across the nuclear island with the top of the void just below the Grouted Zone. This direction was selected because the maximum dynamic bearing demand occurs under the west edge of the shield building and is primarily due to the response to the east-west component of the earthquake. The applicant stated that the sensitivity analysis considers extremely unlikely and conservative cases that are only assessed to show the safety margin provided by the rock mass. The applicant discussed the modeling approach by considering a construction sequence, model size, and boundary. The applicant evaluated the effects of the postulated void on settlement, bearing capacity, and potential tension in the concrete fill. The applicant also evaluated the impact of the potential voids on stability of concrete fill under dynamic conditions using pseudo-dynamic method to simulate dynamic conditions. The applicant therefore concluded that the presence of a 6.1 m (20 ft) diameter cylindrical tunnel does not present stability concerns to the subsurface material at the site, and therefore is not critical to the stability of safety-related structures.

The applicant proposed a grouting ITAAC, which is accomplished through drilling and pressure grouting of grout boreholes in accordance with the grout closure criteria and grout borehole spacing. The applicant stated that the that execution of ITAAC will result in any remaining voids

in the Grouted Zone being structurally insignificant and any remaining voids in the Extended Zone having a maximum equivalent spherical diameter of equal to or less than 20 ft.

During the process of the review, staff conducted several public meetings and conference calls to discuss with the applicant its grouting plans, methods, and grout closure criteria. During a staff audit on seismic design parameters and seismic subsystem analysis and stability of materials and foundations held during June 22 to 25, 2015, the staff discussed comprehensively with the applicant the grouting ITAAC, grouting plan, and finite element modeling and stability analysis for a postulated void.

The staff reviewed the applicant's responses to RAI 7811, Question 02.05.04-26, particularly the geotechnical investigation, the grouting methodology, the grout test program, the sensitivity analysis, and the ITAAC. The staff also reviewed related information presented in the response from the initial and supplemental field investigation to support the microgravity assessment. The staff notes from the geotechnical investigation that the maximum individual drops in the borings are 1.2 m (4 ft) at the site and 0.5 m (1.5 ft) within the Unit 6 and 7 building footprints. The staff also notes that in a total of 2,522.2 m (8,275 ft) cored in 96 borings, the frequency of encountering an interpreted tool drop is less than 0.5 percent site-wide including the tool drops under vegetated depressions and drainages. Based on above finding from geotechnical investigation at the site, the staff agrees that large voids are not expected.

The staff also reviewed the applicant's grout plan. The staff acknowledges that with current grouting technology, the purposes of dewatering and constraining voids are achievable through this plan. The staff notes that before Seismic Category I Structure foundation grouting, a grout test program will be developed and implemented for the purpose of validating the grout design and grouting techniques, determining the approximate grout takes for the Key Largo Limestone and Fort Thompson Formations, and determining the grout closure criteria for individual grout stages and for completed areas of the Grouted and Extended Grouted Zones. The staff also notes that spacing for primary and secondary grout boreholes, suitability of the formation for grouting via downstages, upstages, or a combination of upstages and downstages, inclination of grout boreholes to best intercept the dominant features in the treatment area, effective grout mixes, drilling and flushing of grout boreholes, injection rates and pressure, and monitoring grouting conditions will be carefully tested and studied through the grout test program. The staff acknowledges that the grout test program will be used to optimize and finalize grouting program with the grout closure criteria and dewatering specifications.

The staff notes that the applicant proposed the ITAAC for Seismic Category I Structure foundation grouting. The staff also notes that primary grout boreholes will be spaced less than or equal to 6.1 m (20 ft) on center, and spacing of primary and secondary grout boreholes may be reduced based on results from the grout test program. For the Grouted Zone, the grout test program will identify and define grout closure criteria for identifying when each grout borehole has been filled and pressurized with grout and filling may cease or tertiary or quaternary grout boreholes are necessary. For the Extended Grouted zone, grouting will be performed in every primary grout borehole. The grout test program will identify and define grout closure criteria for identifying when each grout borehole has been filled and pressurized with grout and filling may cease or secondary grout boreholes are necessary. The applicant further noted that inspections and analysis will be performed of the as-built locations, depth and spacing of all grout boreholes, both with respect to the Grouted Zone and the Extended Grouted Zone, and the grout data associated with each grout borehole and zone. The staff agrees with the applicant that with successful implementation of the ITAAC will ensure that any voids

remaining in the Grouted Zone are structurally insignificant and ensure that any voids remaining in the Extended Grouted Zone are equal to or less than 20 ft.

The staff reviewed the applicant's sensitivity analysis and assessed its potential effect on the stability of the overlying soils and the structure foundations. SER Section 3.7.1.4 presents the staff evaluation on the effect of the postulated presence of 20 foot diameter void beneath the NI and assessment on its potential impact on the structure foundations. Based on the geological and geotechnical findings, the staff agrees that it is conservative to assume a cylindrical void with a 6.1 m (20 ft) diameter extending east-west across the nuclear island with the top of the void just below the Grouted Zone. The staff notes that computational simulation considers a loading sequence including the activities of initial gravity loading without the void, gravity loading with the void, dewatering, excavation and fill placement, loading, and rewatering. The staff acknowledges that this loading sequence reflects a real construction order and progression. The staff also notes that the model size is adequate. For vertical extent, it meets the criterion of the maximum required depth d_{max} defined by RG 1.132, Appendix D; for lateral extent, the sufficiency is confirmed by settlement computations by demonstrating that maximum settlement predicted for the buildings does not vary with the extended boundaries. The staff further notes from the sensitivity analysis that the effects of the postulated void on stability of concrete fill including settlement, bearing capacity, and potential tension in the concrete fill are not critical to the static and dynamic stability of the concrete fill. The staff therefore agrees with the applicant that the presence of a 6.1 m (20 ft) diameter cylindrical tunnel under the Grouted Zone does not present stability concerns to the subsurface material at the site.

In summary, the staff concludes that with a careful development of the grout test program including grout closure criteria and the specified borehole spacing, and implementation of the ITAAC, the limestone (Key Largo and Fort Thompson formations) under the concrete fill will be grouted to fill or constrain voids so that the stability of subsurface materials will not be a concern. Consequently, the staff considers RAI 6006, Questions 02.05.04-1 and RAI 7811, Question 02.05.04-26 resolved. The incorporation of the grouting information in RAI 7811, Question 02.05.04-26, into the FSAR is being tracked as a Confirmatory Item 2.5.4-1 pending the applicant's update of the FSAR.

Resolution of Turkey Point Confirmatory Item 2.5.4-1

Confirmatory Item 2.5.4-1 is an applicant commitment to include the grouting information and the ITAACs for grouting and concrete fill in the Turkey Point Units 6 and 7 COL FSAR Section 2.5.4. The staff verified that the Turkey Point Units 6 and 7 COL FSAR, Revision 8, was revised in accordance with the applicant's response to RAI 7811, Question 02.05.04-26. As a result, Confirmatory Item 2.5.4-1 is now closed.

Pressuremeter Testing

The staff reviewed the pressuremeter testing program and evaluated the results presented by the applicant, specifically Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-220 and Figures 2.5.4-220 and 2.5.4-245, which present initial shear modulus and unload/reload shear modulus results. The staff concludes that the applicant adequately applied the pressuremeter program and obtained reasonable values for the high strain shear modulus for the subsurface materials of the Key Largo, Fort Thompson, Upper Tamiami, Lower Tamiami, and Peace River formations.

Staff's Conclusions Regarding Geophysical Surveys

Based on the staff's review of the geophysical surveys that the applicant conducted at the Turkey Point Unit 6 and 7 site, as part of the applicant's overall subsurface investigation program to identify dynamic characteristic of the soil and rocks, and the applicant's responses to several questions related to RAIs 6006 and 7811, the staff concludes that the applicant's geophysical surveys are acceptable and in accordance with the guidance provided in RG 1.132.

2.5.4.4.5 Excavation and Backfill

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5 related to the engineering granular backfill requirements, the extent of excavation fills and slopes, excavation methods, and stability at the Turkey Point Units 6 and 7 site.

The applicant stated in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5.2 that it will found the Turkey Point Units 6 and 7 nuclear islands directly on a 5.8 m (19 ft) thick lean concrete layer above the Key Largo Formation. In Part (a) of RAI 02.05.04-12, the staff asked the applicant to define "lean concrete" with the ACI standard(s) it plans to follow.

In its response to RAI 6006, Question 02.05.04-12, dated October 3, 2014 (ADAMS Accession No. ML14282A311), the applicant defined lean concrete as unreinforced concrete with a lower cement to aggregate ratio than typical concrete. The applicant clarified that Controlled Low Strength Material (CLSM) will not be used. The applicant stated that it will follow ACI 207 standard, "Guide to Mass Concrete." The staff reviewed the applicant response and applicable changes in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5.1. The staff acknowledge that the applicant plans to follow industry guidance for construction and placement methods of the lean concrete fill, such that the mechanical properties of the lean concrete fill are consistent with the properties used for the design analyses.

In Part (b) of RAI 6006, Question 02.05.04-12, the staff asked the applicant to evaluate the potential for cracking of the lean concrete due to loading/overstressing and thermal conditions. In its response to RAI 6006, Question 02.05.04-12, the applicant stated that the concrete fill will have an estimated compressive strength of 10.3 MPa (1,500 psi or 216 ksf). The applicant further explained that the design bearing capacity of this strength of concrete is over 4.8 MPa (100 ksf), while the maximum applied bearing pressure is 0.4 MPa (8.9 ksf) according to the AP1000 DCD. The applicant indicated that it will develop a thermal control plan following ACI 207 during detailed design to minimize thermal cracking of the concrete fill. Because the bearing demand is less than 9 percent of the bearing capacity of the concrete and ACI 207 will be followed to address to the issue of thermal cracking of the concrete fill, the applicant concluded that the cracking of the concrete fill due to loading/overstressing is not expected, and thermal cracking of the concrete fill will be controlled and minimized. The staff reviewed the applicant's responses to Part (b) of RAI 6006, Question 02.05.04-12. The staff performed a confirmatory calculation based on ACI standard to ensure the bearing capacity for concrete fill is sufficient. The staff also notes that the thermal control plan will follow ACI 207 to include elements of controls on cementitious material content, precooling, and construction management. Based on its review, the staff agreed that the cracking due to due to loading/overstressing and heat generated from mass concrete is not an issue.

In Part (c) of RAI 6006, Question 02.05.04-12, the staff asked the applicant to describe the load transfer mechanism between the base of the nuclear island structures and the concrete fill as well as the load transfer between the concrete fill and the surrounding supporting soils. In its

response to RAI 6006, Question 02.05.04-12, the applicant stated that stress levels will remain low and within the elastic range for transfer of vertical load from the foundation to the concrete fill and from the concrete fill to the underlying rock because of the strength of the concrete fill and the underlying rock. The applicant also stated that for transfer of lateral loading, the frictions against sliding between the foundation mat and mudmat, between the mudmat and concrete fill, and between the concrete fill and rock give the resistance to sliding among the materials. The staff reviewed the applicant's responses to Part (c) of RAI 6006, Question 02.05.04-12. The staff agrees that vertical stress levels for concrete fill and underlying rock remain low and elastic based on their material properties. The staff also checked the coefficient of friction against sliding between concrete and rock and between concrete and concrete to ensure these values generate enough force to prevent sliding. Based on its review, the staff finds that load transfer from the foundation to subsurface materials will not cause overstressing and sliding concerns.

Since the chemical tests of soil and rock indicated that the chemistry of soil and rock is considered to be aggressive toward cementitious materials, in Part (d) of RAI 6006, Question 02.05.04-12, the staff asked the applicant to provide test results on groundwater chemistry including pH, chlorides, and sulfates, to evaluate the potential aging effects, and to address the concrete durability for lean concrete backfill and sub-foundation due to aggressive soil and/or groundwater conditions. In its response to RAI 6006, Question 02.05.04-12, the applicant provided its measured values of chemical tests on groundwater samples from observation wells, indicating that the pH values measured were essentially neutral, the measured chloride concentration level can affect the reinforcing steel of concrete, and the sulfate values measured classify the concrete exposure to sulfate attack as severe according to ACI codes. However, the applicant stated that since the concrete fill is non-structural and unreinforced, the chloride concentration will not affect the concrete fill at the Turkey Point Units 6 and 7 site. The applicant also proposed to use sulfate resisting Type V cement with a maximum C3A content of 5 percent as specified in ACI 318-05/318R-05 (ACI, 2005) in combination with fly ash to improve the sulfate resistance and the thermal control to make the first, bottom lift of concrete fill. The applicant further stated that the extensively grouted Key Largo Limestone layer under the concrete fill, permanent diaphragm cut-off walls surrounding the concrete fill, and the nuclear island and structural fill covering the surface of the concrete fill will help to reduce groundwater incursions to concrete fill. The applicant also concluded that the effects of high sulfate content, erosion, or leaching of the cement will have no effect on total or differential settlement.

The staff reviewed the applicant's responses to Part (d) of RAI 6006, Question 02.05.04-12, particularly the test results on groundwater chemistry including pH, chlorides, and sulfates, and agrees that the chloride concentration will not affect the concrete fill because the concrete fill is not reinforced. However, for concrete to resist a sulfate attack, the staff notes, that in addition to the type of cement, ACI 318-05 and ACI 318R-05 also specify the maximum water-cementitious material ratio and the minimum concrete strength. In RAI 7811, Question 02.05.04-31, the staff asked the applicant to specify the water-cementitious material ratio and the concrete strength it will use for the first lift of concrete fill, and to provide corresponding updates in the Turkey Point Units 6 and 7 COL FSAR to reflect the evaluation and prevention of groundwater chemicals attacking concrete fill.

In its response to RAI 7811, Question 02.05.04-31, dated July 13, 2015, the applicant committed that the concrete mix for the first lift will contain a maximum water-cementitious material ratio by mass of 0.45 and a sulfate resisting Type V cement or equivalent as defined in Sections 6.2.5, 6.2.7, and 6.2.9 of ACI 201.2R-08 (ACI, 2008). The applicant committed to prepare the delivery tickets in accordance with ACI 311.5 (ACI, 2004) and inspect to ensure that

the water cementitious material ratio and the type of cementitious materials for the first lift of concrete mix meet durability requirements of ACI 201.2R-08 for Class 2 sulfate exposure. The applicant voluntarily indicated that for additional protection it will use Type V cement or its equivalent, according to ACI 201.2R-08, for all the lifts. The applicant proposed an ITAAC that will be used to ensure that the first lift of concrete fill with minimum thickness of 0.8 m (2.5 ft) meets the ACI 201.2R-08 durability requirements.

The staff reviewed the applicant's response to RAI 7811, Question 02.05.04-31. The staff acknowledges that ACI 201.2R-08 is a code that addresses issues specific to concrete durability, including the concrete exposure to sulfate attack; while ACI 318-05/318R-05 is a design code for reinforced concrete in general. The staff reviewed ACI 201.2R-08 and confirms that the applicant classified the severity of potential exposure to groundwater as Class 2 exposure for concrete exposure to sulfate attack. The staff also reviewed ACI 311.5-04, which is a guide for concrete plant inspection and testing of ready-mixed concrete. The staff notes that the requirements in ACI 201.2R-08 to protect against damage to concrete by sulfate attack from external sources of sulfate exposure, and the requirements by ACI 311.5-04 for inspection at the concrete plant when such inspections are required by specifications or the owner are followed, and committed through the ITAAC to ensure the first lift of concrete fill meets the ACI 201.2R-08 durability requirements. The staff found that the related information is properly documented in the Turkey Point Units 6 and 7 FSAR. Accordingly, the staff considers RAI 6006, Question 02.05.04-12, and RAI 7811, Question 02.05.04-31, resolved.

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5.1.2 and the response to RAI 6006, Question 0.2.05.04-12, indicated that the applicant will place a 19-foot thick layer of concrete fill beneath the nuclear islands. In RAI 7811, Question 02.05.04-33, the staff asked the applicant to provide the ITAAC it will use to ensure that the concrete fill placed underneath any Category I structures meet the design, construction and testing of applicable ACI standards.

In its response to RAI 7811, Question 02.05.04-33, dated July 13, 2015, the applicant committed through an ITAAC that the design and construction of the concrete fill will follow ACI 207 (ACI, 2006) to control thermal cracking, and testing of the strength of concrete, and ACI 311.5 to ensure that the compressive strength is equal to or greater than 10.3 MPa (1,500 psi).

The staff reviewed the applicant's response to RAI 7811, Question 02.05.04-33. The staff acknowledges that ACI 207 is a code that addresses measures to be taken for mass concrete to cope with the generation of heat from hydration of the cement and the attendant volume change to minimize cracking. The staff also acknowledges that ACI 311.5 recommends requirements for field and laboratory testing of concrete. The staff notes that the measures to be taken for mass concrete in ACI 207 to minimize cracking of concrete fill due to its heat from hydration of the cement and the attendant volume change, and testing by ACI 311.5-04 to ensure the mean 28-day compressive strength of the concrete fill is equal to, or greater than, 10.3 MPa (1,500 psi) are followed, and committed through the ITAAC to ensure the concrete fill meets the ACI 207.1R-05 thermal cracking controlling methods and ACI 311.5-04 testing requirements. The staff found that the related information is properly documented in the Turkey Point Units 6 and 7 FSAR. Accordingly, the staff considers RAI 02.05.04-33 resolved.

The applicant stated in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5.1 that it will place the structural fill consisting of excavated fill material around but not below any of the nuclear island structures, and that the replacement material below the nuclear islands consists of lean concrete fill. In RAI 4975, Question 03.07.01-2, the staff asked the applicant to describe the fill to be placed above the concrete supporting the foundation (referred by the applicant as Part (1)

in its response to the RAI), as well as to provide information on whether any long-term serviceability issues should be considered when judging the adequacy of this material for use in providing support to the nuclear power plant (referred by the applicant as Part (2) in its response to the RAI), and to also provide information on the development of the best estimate, lower bound, and upper bound shear and compression wave velocities for the NEAR and FAR site soils given in Appendix 3KK (referred by the applicant as Part (3) in its response to the RAI). The applicant's response to Part (3) of RAI 4975, Question 03.07.01-2, and the staff's evaluation are discussed and documented in Section 3.7.1.4 of this SER.

In response to RAI 4975, Question 03.07.01-2, dated December 11, 2014, the applicant described the limerock fill placed around the nuclear island structures as crushed limestone that has particle gradations from small to large in granular form and is used in the Florida aggregate industry as a compacted base layer beneath roads and buildings as well as in other structural earth fill applications. The applicant indicated that the limerock material intended for Turkey Point Units 6 and 7 is granular in nature, and is derived from the excavated portions of the onsite Miami Limestone and/or obtained from offsite sources. The applicant committed that structural fill used to backfill against the nuclear island is compacted to a minimum of 95 percent modified Proctor maximum dry density. The applicant also discussed the long-term serviceability of fill from major factors such as suitability of material aggregates and minerals, control during material production, and/or placement and compaction control, indicating that there are no long term serviceability issues.

The staff reviewed the applicant's response to Part (1) and Part (2) of RAI 4975, Question 03.07.01-2, as well as Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5. The staff notes that the limerock fill placed around the nuclear island structures is crushed limestone that has particle gradations from small to large in granular form. The staff also notes that structural fill used as backfill around the nuclear island structures and beneath nonsafety-related power block structures will be compacted to a minimum of 95 percent of modified Proctor maximum dry density. The staff further notes that the limerock fill will be from onsite excavated Miami Limestone and offsite sources qualified by testing for index properties, chemical properties, and engineering properties, especially: grain size and plasticity characteristics; soil pH, sulfate content, chloride content characteristics; and moisture-density relationships. For long-term serviceability of crushed limestone, the staff notes that approximately 55 million tons of rock from the Lake Belt Region (area between the Everglades and the urbanized Miami-Dade County) is processed into aggregate products each year and is a major supplier for the construction industry, and that the Florida Department of Transportation (FDOT) establishes requirements for hardness, durability, and chemical content. In addition, the staff notes that quality control is an integral part of material verification and acceptance at its source in the Lake Belt Region of Miami-Dade County, and its practice is well-developed and regulated by the FDOT for state-owned projects. Based on the above information and measures, the staff concludes that the applicant provided reasonable assurance that it will place a quality structural fill around the nuclear island structures. However, it is possible that the properties of offsite sources of limerock may differ from those of onsite excavated limestone. In RAI 7811, Question 02.05.04-32, the staff asked the applicant to clarify material tests for offsite structural fill sources, to discuss similarities and differences of offsite limerock with onsite Miami Limestone, and to evaluate the adequacy of fill material to borrow for Category I engineered fill.

In its response to RAI 7811, Question 02.05.04-32, dated July 13, 2015, the applicant reiterated that borrow sources are qualified before earthwork operations by testing for index properties, chemical properties, and engineering properties. The applicant reconfirmed that it will obtain any offsite backfill material, or limerock, necessary for Category I engineered fill from local

quarries. The applicant indicated that the quarries identified as likely offsite structural fill sources are all located within Miami-Dade County, and will be crushed and graded into a variety of grain size distributions. As for adequacy of on-site fill material, the applicant stated that approximately 51,200 m³ (67,000 yd³) of limestone or limerock will be excavated for each unit, and 49,500 m³ (64,700 yd³) of Category I fill is required for each unit. The applicant stated that onsite limerock is likely adequate in terms of amount, but that offsite sources may be necessary for Category I fill. Because the limerock from both onsite and offsite sources may contain chemicals including chloride and sulfate that may adversely impact the safety-related concrete, the applicant stated that the AP1000 DCD Tier 1, Table 3.3-6 provides ITAAC to ensure that the exterior walls and the basemat of the nuclear island have a water barrier up to site grade, and therefore, the water barrier will eliminate contact between the fill and the nuclear island exterior walls and basemat, any potential sulfate or chloride attack on the concrete will be minimized.

The staff reviewed the applicant's response to RAI 7811, Question 02.05.04-32. The staff notes that the applicant will qualify the backfill material from both onsite and offsite sources by testing of index properties, chemical properties, and engineering properties for Category I engineered fill. The staff also notes that a dense backfill material adjacent to the Seismic Category I structure is assured by the expected compaction specifications of backfill material. The staff further notes that the safety-related concrete is not in contact with the limerock backfill because of installation of a sheet-type HDPE waterproofing material on the vertical surfaces under Seismic Category I structures; therefore, the staff concludes that the chloride and sulfate contents in the backfilling limerock will not be a concern for concrete durability.

Since the applicant suitably described the sources, quantities, and static and dynamic engineering properties of borrow materials and specified the compaction requirement for Category I engineered fill, the staff concludes that the applicant met the intent of backfill in the AP1000 DCD described in Tier 2 Section 2.5.4.6.3. The staff also confirms that the related information is properly documented in the revised version of the Turkey Point Units 6 and 7 COL FSAR. Therefore, the staff considers Part (1) and Part (2) of RAI 4975, Question 03.07.01-2 resolved.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5.1, the applicant stated that it will construct a mechanically stabilized earth (MSE) retaining wall around the perimeter of the plant area that it will design to retain the soil mass and resist loading resulting from the probable maximum hurricane. In RAI 6006, Question 02.05.04-13, the staff asked the applicant to indicate whether the safety of any Seismic Category I structure is dependent on the MSE retaining wall, and describe this wall's design in the Turkey Point Units 6 and 7 COL FSAR.

In its response to RAI 6006, Question 02.05.04-13, dated October 3, 2014, the applicant provided a general description of the MSE retaining wall. The applicant clarified that the MSE retaining wall is not required to maintain the function of any Seismic Category I structure. The applicant further clarified that the distance from the MSE wall to SSCs of interest for Turkey Point Units 6 and 7 is greater than 152.4 m (500 ft), and thus a failure of the wall could not affect the SSCs of interest.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-13. The staff noted that the MSE wall is not required to maintain the function of any Seismic Category I structures and that the distance from the retaining wall to SSCs of interest is greater than 152.4 m (500 ft) and thus a failure of the wall could not affect the SSCs of interest. However, the staff noted these statements were not included as part of the proposed FSAR revisions. In RAI 7811, Question 02.05.04-34, the staff requested the applicant to document these statements in the

FSAR. In its response to RAI 7811, Question 02.05.04-34, dated March 20, 2015, the applicant clarified that it would include these statements in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4, and identified changes that it would make in a future revision of the Turkey Point Units 6 and 7 COL FSAR. The staff reviewed the applicant's response to RAI 02.05.04-34 and confirmed these statements were documented in the Turkey Point Units 6 and 7 COL FSAR. Accordingly, the staff considers RAI 6006, Question 02.05.04-13, and RAI 7811, Question 02.05.04-34 resolved.

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-222, which shows a general concept of the excavation cross-section. In RAI 6006, Question 02.05.04-14, the staff asked the applicant to describe the procedures that will be followed during site excavation and construction activities to ensure that the appropriate strata for the proposed foundation locations are confirmed through objective measures and the exposed foundation laying surface is uniform. In addition, the staff asked the applicant to provide the vertical and horizontal extent of all Seismic Category I excavations, fills, and slopes, including the locations and limits of excavations, fills, and backfills on plot plans and geologic sections and profiles.

In its response to RAI 6006, Question 02.05.04-14, dated October 3, 2014, the applicant provided general descriptions of the upper three strata at the Turkey Point Units 6 and 7 site including muck, the Miami Limestone, and the Key Largo Limestone based on its subsurface investigation for the power block areas. The applicant expected to directly observe these near-surface strata during the excavation process. The applicant also stated that during the excavation process, onsite geotechnical engineers and geologists will visually inspect and verify complete removal of the Miami Limestone to the Key Largo Limestone. In regards to the Key Largo Formation, the applicant stated that the onsite geotechnical engineers and geologists will identify and excavate the zones that are softer than moderately hard. The applicant updated Turkey Point Units 6 and 7 COL FSAR Figures 2.5.4-203 through 2.5.4-209 to show the vertical and horizontal extent of all Seismic Category I excavations, fills, and slopes, including the locations and limits of excavations, fills, and backfills. In addition the applicant revised Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-222 to show the extent of excavation in plain view.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-14. The staff notes that the applicant clearly described the procedures to confirm the appropriate strata during site excavation and construction activity. The staff examined updated Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-203 through Figure 2.5.4-209 and Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-222, and finds that these figures adequately provide the vertical and horizontal extent of all Seismic Category I excavations, fills, and slopes, including the locations and limits of excavations, fills, and backfills. The staff also confirms that the applicant updated these figures on the revised Turkey Point Units 6 and 7 COL FSAR. Accordingly, the staff considers RAI 6006, Question 02.05.04-14, resolved.

Staff's Conclusions Regarding Excavation and Backfill

The staff concludes that the applicant has (1) provided detailed information on engineered granular backfill and fill concrete properties and compaction requirements, (2) provided applicable methods and procedures used for the verification and quality control of engineered granular backfill and concrete fill, (3) described concrete fill properties that will ensure that the proposed fill concrete meet the strength and stability requirements, and (4) provided detailed information and applicable methods and procedures for Seismic Category I structure foundation grouting. In addition the applicant provided two site-specific ITAAC. One is concrete fill ITAAC that will ensure that the first lift off concrete fill material placed under Seismic Category I

structures is resistant to sulfate attack and that the static and dynamic properties of the material will be the same as, or better than the design parameters. Therefore, the proposed concrete fills for this site are adequate for meeting design and engineering standards. The other ITAAC is for Category I Structure foundation grouting that will ensure that any voids remaining in the Grouted Zone are structurally insignificant and ensure that any voids remaining in the Extended Grouted Zone are equal to or less than 20 ft and therefore would not result in any structural instabilities. The staff concludes that the supporting foundation materials, qualified fill concrete, and/or foundation grouting will result in a solid foundation for the nuclear island that meets the requirements specified in AP1000 DCD Tier 1, Table 5.0-1 and 10 CFR Part 50.

2.5.4.4.6 Groundwater Conditions

The staff focused its review of Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.6, groundwater conditions at the Turkey Point Units 6 and 7 site relative to foundation stability for the safety-related structures. The applicant indicated that a reinforced concrete diaphragm wall will surround the excavation and act as a cut-off for horizontal groundwater flow into the excavation. The applicant also stated that a construction groundwater control will form a grouted zone between the bottom of the excavation at El. -10.7 m (-35 ft) and the bottom of the diaphragm wall at El. -18.3 m (-60 ft). The applicant further stated that primary grout boreholes will be extended from El. -18.3 m (-60 ft) to -33.5 m (-110 ft) to form “the extended grouted zone.” The staff reviewed the groundwater model simulation sensitivity analysis that assumes various hydraulic conductivities for the grout plug and agrees with the applicant that grouting can significantly reduce the amount of discharged water generated during the excavation.

The staff reviewed the groundwater information in the Turkey Point Units 6 and 7 COL FSAR including the conditions before, during, and after excavation and the associated groundwater control. The staff concludes that the applicant’s assessment of groundwater conditions satisfies the relevant requirements of 10 CFR Part 50 and 10 CFR Part 100 and is acceptable.

2.5.4.4.7 Response of Soil and Rock to Dynamic Loading

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.7 presents the site subsurface profile characterization with respect to the properties of the strata pertinent for dynamic loading. Turkey Point Units 6 and 7 COL FSAR Sections 2.5.4.7.3.3, Revision 5, states that the damping for rock is 1 percent, while Turkey Point Units 6 and 7 COL FSAR Figure 2.5.2-249 indicates that the applicant used a damping value of 0.5 percent to develop the GMRS. In RAI 6006, Question 02.05.04-16, and RAI 6432, Question 03.07.01-19, the staff asked the applicant to clarify the actual level of damping used in the analyses and to provide a basis for its selection. In RAI 4975, Question 03.07.01-10, the staff asked the applicant to provide information on the selection of the best estimate profile and associated sigma variation of both shear wave velocity and hysteretic damping used in the randomization process for the calculation of the surface and Foundation Input Response Spectra (FIRS).

In its response to RAI 4975, Question 03.07.01-10, dated December 11, 2014, the applicant stated that it used the base case shear wave velocity profile as the best estimate profile for the randomization process. The applicant clarified that it developed the base case profile and its associated sigma variation for the top 183 m (600 ft) of in situ soils and rock using seismic velocity data generated from the site-specific subsurface investigation. However, the applicant noted that for structural fill and concrete fill layers, it developed the base case shear wave velocity profile and its sigma variation from the dynamic properties using other available geotechnical information and not determined by direct measurements. For deep soil layers

below 183 m (600 ft) depth, the applicant stated that sonic logs obtained from borings made in the vicinity of the site provided the necessary data. In its responses to RAI 6006, Question 02.05.04-16, dated May 6, 2016 (ADAMS Accession No. ML16131A673) and RAI 6432, Question 03.07.01-19, dated December 11, 2014 (ADAMS Accession No. ML14349A372), the applicant clarified the actual levels of damping used for the existing site response analysis. The applicant adopted a damping ratio of 1 percent in the analysis for both the Key Largo and Fort Thompson Formations. The applicant further stated that the measured damping ratio from four resonant column torsional shear tests (RCTS), which were conducted on the Key Largo and Fort Thompson Formations as part of the supplemental field investigation in 2013, is first constant around 0.8 percent, and then increases toward 1 percent as the shear strain approaches 0.005 percent. The applicant also took into account the uncertainties and variation in the damping ratios (reflected in the variations in parameters such as RQD) in the randomization process. As a result of supplement investigation, the applicant revealed that dynamic soil and rock properties changed slightly by displaying Figures 6 through 13 in the applicant's response to RAI 02.05.04-16. Based on its sensitivity analysis presented in Turkey Point Units 6 and 7 COL FSAR Appendix 3JJ.7, the applicant demonstrated that the newly acquired RCTS data has a small effect on the site amplification results. The applicant also demonstrated that the increase in seismic response due to the change in material properties is enveloped by the safe-shutdown earthquake (SSE) at all frequencies for the FIRS near nuclear island site conditions. Accordingly, the applicant concluded that the Turkey Point Units 6 and 7 SSE is not impacted by the new data, and the existing site response analysis in Turkey Point Units 6 and 7 COL FSAR Section 2.5.2 is still valid.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-16, RAI 4975, Question 03.07.01-10, and RAI 6432, Question 03.07.01-19, as well as the sensitivity assessment presented in Turkey Point Units 6 and 7 COL FSAR Appendix 3JJ.7. The staff notes that the applicant conducted four RCTS tests on the Key Largo and Fort Thompson Formations as part of the supplemental field investigation. The staff also notes that the applicant updated Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-235 to include the best fit damping curve labeled as "Key Largo and Fort Thompson" based on the RCTS results. The staff agrees that even though the assumed damping ratio of 1 percent is slightly higher than the measured values of 0.8 to 1 percent, the test results are in good agreement with the assumptions made for layers and the difference is within the uncertainty involved in determining the damping ratio from the test results. The staff acknowledges that the applicant's selection of the best estimate profile and associated sigma variation of both shear wave velocity and damping used in the randomization process meet the intent of Standard Review Plan (NUREG-0800) Section 3.7.2. For the sensitivity analysis, the staff notes that two site column locations and characterization were considered and studied: 1) near nuclear island site conditions, and 2) far from nuclear island conditions. The staff also notes the first profile used in the initial (existing) SSI evaluations is referred to as the "initial" analysis that services as the reference condition to which the changes are compared; and the second profile set considered is referred to as "updated" based on data collected by the initial and supplemental site investigation. From Figure 3JJ-262 (Figure 2.5.4-3) in Turkey Point Units 6 and 7 COL FSAR Appendix 3JJ, the staff further notes that the applicant calculated the design response spectrum level motion for the "initial" and "updated" response to estimate the potential effect of the new strain-dependent property curves from the newly acquired RCTS tests by supplemental field investigation on the design level earthquake. Based on the sensitivity analysis demonstrated on Figure 3JJ-262 in Turkey Point Units 6 and 7 COL FSAR Appendix 3JJ, the staff agrees with the applicant that new RCTS data has a small effect on the site amplification results, and a large margin exists between the site-specific motions and the adopted broadband SSE response spectrum. Therefore, the staff concludes that the Turkey Point Units 6 and 7 SSE is not affected by the

new data, and no further analyses are required. Accordingly, the staff considers RAI 6006, Question 02.05.04-16, RAI 4975, Question 03.07.01-10, and RAI 6432, Question 03.07.01-19, resolved.

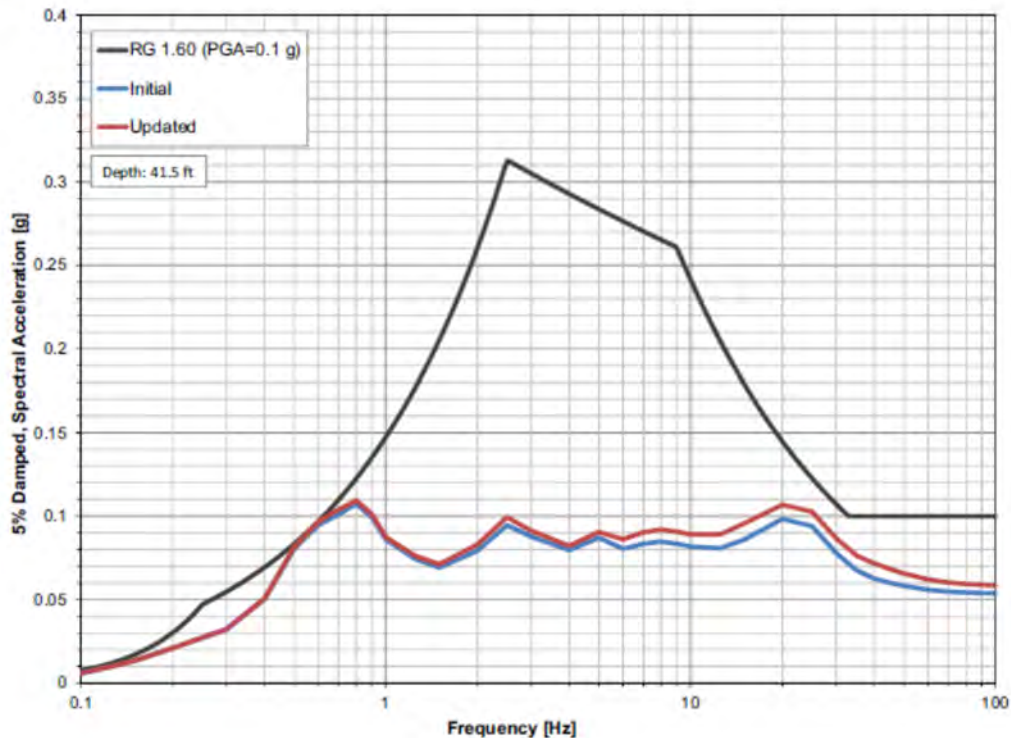


Figure 2.5.4-3 Comparison between the FIRS Computed with the Sensitivity Analysis and the Initial Analysis, near nuclear island site conditions (Reprint of Figure 3JJ-262 in Turkey Point Units 6 and 7 COL FSAR Appendix 3JJ)

P and S Wave Velocity Profiles

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.5.4-218 and 2.5.4-219, which show plots of all of the measured shear wave velocities and compression wave velocities to depths of 137 m (450 ft) and 183 m (600 ft) at Turkey Point Units 6 and Unit 7, respectively. The staff also reviewed FSAR Section 2.5.4.7.2.2, in which the applicant described the selection of seismic velocities deeper than 183 m (600 ft). The staff noted that the applicant obtained the velocities deeper than 183 m (600 ft) from Arthur (1988) and Reese and Richardson (2008) to complete the velocity profile for seismic ground response analyses with consideration of the significant depth of unconsolidated sediments at the site. The staff concludes that the applicant properly and adequately performed a detailed investigation of P and S wave velocity profiles in accordance with RG 1.132 “Site Investigations for Foundations of Nuclear Power Plants.”

Static and Dynamic Laboratory Testing

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-209 and Section 2.5.4.2.1.3, which summarize the static laboratory testing of representative soil samples obtained from the subsurface investigation. The staff also reviewed Turkey Point Units 6 and 7 COL FSAR Figures 2.5.4-232 and 2.5.4-235, which present the selected values of G/G_{max}

versus shear strain for the five strata (the Key Largo, Fort Thompson, Upper and Lower Tamiami, and Peace River formations) tested in the power block and the damping versus the shear strain for the tested data. In addition, the staff reviewed the dynamic properties of compacted structural fill. The staff concludes that the applicant properly and adequately performed static and dynamic laboratory testing in accordance with RG 1.138.

Staff's Conclusions Regarding the Response of Soil and Rock to Dynamic Loading

Based on the above review, the staff concludes that the applicant developed soil and rock dynamic properties for the Turkey Point Units 6 and 7 site based on field and laboratory tests that are in accordance with RG 1.132 and RG 1.138. In addition, the staff concludes that the applicant conducted sufficient tests and considered the variations of soil and rock properties to determine appropriate soil and rock dynamic properties to satisfy the applicable requirements of 10 CFR Part 50 and 10 CFR Part 100.

2.5.4.4.8 Liquefaction Potential

During the review of Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.8, the staff evaluated the applicant's description of the liquefaction potential at the Turkey Point Units 6 and 7 site. The staff focused on the applicant's discussion of the geologically based and state-of-the-art methodology assessments (Youd et al., 2001), such as liquefaction analyses using CPT, V_s and SPT data.

As a result of its review, the staff raised several issues in RAI 6006, Question 02.05.04-17, regarding the method by Idriss and Boulanger (2008) and some factors and parameters selected for this method in the applicant's calculation. However, the applicant revised the methodology for the liquefaction analysis of the Turkey Point Units 6 and 7 site based on its field data obtained from both the initial and the supplemental field investigations. The applicant evaluated soil liquefaction following RG 1.198, which corresponds to the methodology found in Youd et al. (2001). Therefore, issues raised by Parts (a) to (d) of RAI 6006, Question 02.05.04-17, are no longer relevant and are not discussed in this FSAR.

In Part (e) of RAI 6006, Question 02.05.04-17, the staff asked the applicant to justify use of equations from Idriss and Boulanger (2008) for determining normalized clean sand cone penetration resistance (q_{c1Ncs}) values, and how the resulting values are conservative compared to the methods outlined in RG 1.198 using the calculated soil behavior type index (I_c) values.

In its response to Part (e) of RAI 6006, Question 02.05.04-17, dated October 3, 2014, the applicant stated that it revised the liquefaction analysis to follow RG 1.198. The applicant described this methodology, indicating that the methodology considers the evaluation of data from CPT, V_s , and SPT data. The applicant indicated that it scaled up the peak ground acceleration (PGA) to 0.1 g for the liquefaction analysis per RG 1.208. The applicant also generated plots to demonstrate the factor of safety (FOS) against liquefaction based on in situ test data from CPT, V_s , and SPT to display ample FOSs for most data points obtained from the power block area. The applicant concluded that liquefaction is not a concern for the Turkey Point Units 6 and 7 site.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-17, and the associated calculation. The applicant acknowledged that RG 1.198 recommends application of relationships from Youd et al. (2001) when using empirical procedures to assess the potential for liquefaction triggering. The staff notes from Figure 2 in the response (FSAR Figure 2.5.4-

238) that the FOS against liquefaction based on CPT results is higher than 1.1 across the full depth of testing at the site with many points in the range of 1.1 and 1.4 within the layers of Upper Tamiami and Lower Tamiami. The staff also notes that of the 1,247 data points for FOS against liquefaction based on V_s results, all but 3 are above 1.4. The staff further notes that the liquefaction analysis based on SPT data considers only the results of the supplemental investigation because the original SPT N-values are too low due to the effect of overwashing and, therefore, are not representative of the actual soil conditions at the NRC site. The staff considered Figure 5 in the response (added as Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-250) and found that 44 out of 79 SPT N value data points obtained from the supplemental investigation are directly classified as non-liquefiable given that the parameter $(N_1)_{60}$ results in values equal to or higher than 30, the FOS from 33 of the 79 SPT N-values are above 1.4, and FOS for the remaining 2 data points are within the 1.1 to 1.4 range. Noting the use of only supplemental test data for the SPT liquefaction evaluation and the fact that many values from the CPT liquefaction evaluation were within the range necessitating further justification (FOS between 1.1 and 1.4), in RAI 7811, Question 02.05.04-35, the staff asked the applicant to provide a further evaluation of the potential for soil liquefaction.

In its response to RAI 7811, Question 02.05.04-35, dated April 27, 2015, the applicant emphasized that it considered the reported FOS to have a significant safety margin since it did not consider a scaled up PGA and the effects of deposit age. The applicant indicated that the scaled up PGA used in the liquefaction assessment is 0.1 g, while the PGA for the GMRS is 0.0579 g. Because the scaled up PGA used in the analysis is approximately 1.73 times higher than the calculated PGA at the site, the applicant concluded that it maintained conservatism in the approach. The applicant also cited Youd et al. (2001), which relates liquefaction susceptibility to the age and type of geologic deposit and indicates that pre-Pleistocene formations are not prone to liquefaction. The applicant noted that although the Pliocene age Upper Tamiami and Lower Tamiami Formations, and the Miocene-Pliocene age Peace River Formation are older than pre-Pleistocene, no consideration of strength gain as a function of age is made in the liquefaction assessment at Turkey Point Units 6 and 7. Accordingly, the applicant concluded that it maintained conservatism in the approach.

The staff reviewed the applicant's response to RAI 7811, Question 02.05.04-35. Given the enhanced quality of SPT in the supplemental field investigation, the staff agrees with the applicant that the liquefaction analysis based on supplemental SPT data is acceptable. Based on the RG 1.198 endorsed approach of Youd et al. (2001), and other literature, the staff further agrees that the effects from scaled up PGA, as well as the fact that the applicant did not credit the influence of the geologic age of the deposit on cyclic shear strength, provides sufficient conservatism in the liquefaction assessment. Therefore, the staff concludes that the applicant's further justification for the values of FOSs between 1.1 and 1.4 for the Upper Tamiami and Lower Tamiami is adequate and acceptable. Consequently, the staff considers RAI 6006, Question 02.05.04-17, and RAI 7811, Question 02.05.04-35, resolved.

Based on the staff's review of the information in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.8 and the applicant's responses to RAIs described in SER Section 2.5.4.4.8, the staff concludes that the assessment of the liquefaction potential at the planned Turkey Point Units 6 and 7 site is adequate and satisfies the applicable requirements of 10 CFR Part 50 and 10 CFR Part 100.

2.5.4.4.9 *Earthquake Site Characteristics*

Turkey Point Units 6 and 7 COL FSAR Sections 2.5.2.9 refers to FSAR Section 2.5.2 for a description of possible earthquake site characteristics. Section 2.5.2.4 of this SER provides the staff's technical evaluation of the earthquake potential taking into account the regional and local geology, Quaternary tectonics, seismicity, and site-specific geotechnical engineering characteristics of the site's subsurface material. SER Section 2.5.2.4 also presents the staff's evaluation of the specific investigations necessary to determine the GMRS, including the seismicity of the site region and the correlation of earthquake activity with seismic sources.

2.5.4.4.10 *Static Stability*

The staff reviewed of Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10 focusing on the determination of the representativeness of the soil and rock properties used in the analyses, the applicability of the methods of analysis used, and the applicant's statement that the estimated performance was within the AP1000 bounding criteria. The applicant presented the assumptions, methodologies, and technical references used for its evaluation of the foundation conditions relative to the proposed demands created by excavation, structure and backfill loads, and lateral pressures exerted against the exterior walls of the nuclear island.

Bearing Capacity

During the review of the applicant's bearing capacity evaluation, the staff asked the applicant in RAI 6006, Question 02.05.04-18, to clarify the methodology used to calculate the ultimate bearing capacity and to justify its applicability.

In its response to RAI 6006, Question 02.05.04-18, dated October 3, 2014, the applicant described the methodologies used to obtain the bearing capacity of the foundation materials underlying the nuclear island. The applicant discussed rock failure modes including general shear failure, local shear failure, general shear failure without cohesion, compressive failure, splitting failure, Hoek-Brown evaluation, punching failure, and beam tension failure. Based on realistic and/or conservative considerations, the applicant identified local shear failure, Hoek-Brown evaluation, punching failure, and beam tension failure as probable rock failure modes at the site. The applicant's evaluation included hand calculations, limit-equilibrium and finite element 2D models. The applicant recommended a static bearing capacity at Turkey Point Units 6 and 7 of 1,870 kPa (39 ksf) and a dynamic bearing capacity of 1,960 kPa (41 ksf).

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-18, including the hand calculations, but also limit-equilibrium and finite element 2D models used in the evaluation. The staff agrees with the applicant that these are the most plausible rock failure modes at the site because the applicant based its determination on the site condition with comprehensive and conservative considerations. For example, local shear failure represents a conservative variation of general shear failure because the depth of embedment does not contribute to the total bearing capacity in the local shear failure mode. The staff also notes that the applicant's foundation material and configuration for calculation of bearing capacity are comprehensive and include consideration of combinations of rock and/or soil layers, the degree of rock fracture, and variations of soil properties based on both the initial and supplemental field investigations. The staff determines that these configurations for calculation are acceptable because they reflect comprehensive and conservative assumptions. Because the applicant reasonably and conservatively demonstrated that the lowest allowable static bearing capacity of 1,870 kPa (39 ksf) and the minimum allowable dynamic bearing capacity of 1,960 kPa (41 ksf) exceed the 430

kPa (8.9 ksf) static bearing demand and the 1,680 kPa (35 ksf) dynamic bearing demand required by the AP1000 DCD, respectively, the staff concludes that the bearing capacities at the site are adequate. Accordingly, the staff considers RAI 6006, Question 02.05.04-18, resolved.

Settlement

During review of the applicant's settlement evaluation, the staff requested in RAI 6006, Question 02.05.04-19, that the applicant update its calculation based on the change made in AP1000 DCD Revision 18 on the applied contact pressure for the Reactor Building and provide additional information regarding the differential settlement calculations across the nuclear island foundation mat. In RAI 6006, Question 02.05.04-20, the staff noted that the Boussinesq stress distribution for calculation of settlement is based on the assumption that the soil is a homogeneous, linear elastic, isotropic half-space media, and asked the applicant to justify how the Boussinesq method is applicable to site-specific conditions with variation in elastic modulus from rock strata and soil strata.

In its response to RAI 6006, Question 02.05.04-19, dated October 3, 2014, the applicant revised the settlement analyses to consist of a hand calculation that uses stress distributions appropriate for layered systems, as well as a three-dimensional finite element model (FEM) using PLAXIS 3D. The applicant also stated that the settlement analyses use the revised best estimate material properties based on laboratory data from both the initial and supplemental field investigations. The applicant clarified that the FEM utilizes specific foundation pressures for the shield and auxiliary buildings rather than assuming one value for the entire nuclear island, which results in an equivalent average pressure of 440 kPa (9.2 ksf) for the FEM, as well as for the hand calculation for consistency. The applicant considered two cases, including a best estimate case using the design stiffness for each layer and a lower bound case for a sensitivity analysis using the lower bound stiffness defined as the 16th percentile for two soil layers (the Upper Tamiami and Peace River). For the hand calculation, the applicant considered the assumed loading conditions to include heave for the excavation below the nuclear island, dewatering prior to the construction process to an elevation of -11.5 m (-38 ft) under the nuclear island, and no buoyancy up to the construction of the lean concrete layer. For the FEM analysis, the applicant considered the actual construction sequence to involve simultaneous dewatering and excavation, as well as simultaneous building construction and re-watering. The applicant also discussed its four sensitivity analyses within the FEM analysis including mesh sensitivity, fracture density, soil constitutive behavior, and lower bound. Based on its revised settlement hand calculation and three-dimensional FEM analyses, the applicant demonstrated the predicted maximum differential settlement of 0.66 cm (0.26 in.) in 15.2 m (50 ft) across the nuclear island foundation mat, a maximum total settlement of 8.6 cm (3.4 in.) for the nuclear island foundation mat, a maximum differential settlement of 3.1 cm (1.2 in.) between the nuclear island and turbine building, and a maximum differential settlement of 4.1 cm (1.6 in.) between nuclear island and other buildings.

In its response to RAI 6006, Question 02.05.04-20, dated October 3, 2014, the applicant discussed its detailed stress distribution approaches in the hand calculations for a two-layered system (Milovic, 1992) and a three-layered system (Poulos and Davis, 1974). The applicant used the two layered system approach to represent the Key Largo and Fort Thompson limestone layers and the Upper Tamiami, Lower Tamiami, and Peace River soil layers to imitate the subsurface conditions under the nuclear island. The three-layered system represents the structural fill, in addition to the same limestone and the soil layers, to simulate the subsurface conditions beneath the turbine, first bay, annex, and radwaste buildings. The applicant compared the results from the hand calculation with the results from the FEM using PLAXIS 3D

and the results based on Boussinesq stress distribution. The applicant concluded that because the Boussinesq approach estimated higher stresses in both the rock and soil layers, it is the most conservative. The applicant further demonstrated that the stress distributions determined from the two- and three-layered systems, Milovic (1992) and Poulos and Davis (1974), respectively, are generally similar to the PLAXIS 3D stress distribution.

The staff reviewed the applicant's responses to RAI 6006, Questions 02.05.04-19, and 02.05.04-20. The staff notes that the applicant revised the settlement hand calculation to use stress distributions appropriate for layered systems instead of the Boussinesq distribution. Specifically, the applicant used the stress distribution for a two-layered system (Milovic, 1992) for the nuclear island, and a stress distribution for a three-layered system (Poulos and Davis, 1974) for the remaining buildings (turbine, first bay, annex, and radwaste). The staff agrees with the applicant that it is appropriate to use the FEM model and the hand calculation based on layered stress distribution for the revised settlement calculation because the stiffness between soil and rock strata is reasonably assumed and accounted for. The staff concludes that the conditions assumed during loading in the hand calculation, construction sequence and sensitivity analyses by FEM analysis are rational and comprehensive. The staff finds that the settlements calculated by the applicant are within the acceptable limits of the AP1000 DCD, which cites 1.3 cm (0.5 in.) per 15.2 m (50 ft) differential across the nuclear island foundation mat, 15.2 cm (6 in.) total for the nuclear island foundation mat, and 7.6 cm (3.0 in.) differential between the nuclear island and turbine building, as well as between the nuclear island and other buildings. The staff also noted that for the settlement hand calculation, the applicant used a best estimate case using the design stiffness for each layer and a lower bound case using the lower bound stiffness for the Upper Tamiami and Peace River formations.

The staff noted that the lower bound case, calculated by the applicant, may not necessarily represent the most conservative case since the stress distribution is also dependent on the stiffness contrast between the harder and softer layers. In RAI 7811, Question 02.05.04-36, the staff asked the applicant to provide a settlement calculation to including all layers using lower bound stiffness because the stiffness of the harder layer is less, and therefore more settlement is expected.

In its response to RAI 7811, Question 02.05.04-36, dated April 29, 2015, the applicant stated that, although it considered the scenario extremely unlikely, it performed another settlement sensitivity analysis using a hand calculation and three-dimensional FEM (using PLAXIS 3D) to consider the scenario of all layers with lower bound stiffness. Despite the conservatism involved in the analysis, the applicant demonstrated that the FEM results for the settlement sensitivity analysis using lower bound stiffness for all layers meets all AP1000 DCD criteria. For its hand calculation, the applicant indicated that the only exception to this is the differential settlement of 8.6 cm (3.4 in) between the nuclear island and the radwaste buildings. The applicant further indicated that if the differential settlement, as calculated by the PLAXIS 3D model, is reduced to 2.8 cm (1.1 in) for all the layers of the lower bound case, it is within the AP1000 DCD criteria.

The staff reviewed the applicant's response to RAI 7811, Question 02.05.04-36, and notes that it is conservative because for the nuclear island and other adjacent buildings, it does not account for the influence of the nuclear island loads on the settlement of adjacent buildings, and is therefore conservative. The staff further notes that the differential settlement between the nuclear island and the radwaste buildings calculated by the PLAXIS 3D model is reduced to 2.8 cm (1.1 in.) if nuclear island loads are considered in the settlement of the radwaste building. Based on this information, the staff concludes that the differential settlement between the

nuclear island and radwaste buildings calculated by hand calculation is very conservative because the applicant did not consider the nuclear island loads in the settlement of adjacent structures. The staff also compared the FEM with the hand calculation, and notes that the FEM is more accurate for modeling of rock/soil material properties, more capable of computation of stress and strain, and therefore produces more reasonable results, while the hand calculation involves significant simplifications.

Because the stress distribution found using Milovic (1992) for the hand calculation is similar to but more conservative than the PLAXIS 3D stress distribution, the staff concludes that the hand calculation is conservative to some extent, and can be calibrated by the FEM result. With a rational extrapolation of reduced differential settlement by FEM to include nuclear island loads in the settlement analysis of the radwaste building, the staff applied the same reduction rate from the result by FEM to the result by hand calculation, and finds that the differential settlement between the nuclear island and the radwaste building is within the AP1000 DCD criteria. Finally, since the lower bound rock and soil properties represent a 16 percent probability of that or a lower stiffness occurring, the staff acknowledges that the probability of having all layers with lower bound stiffness is low; and therefore, the settlement analyses based on this assumption are conservative. Because the applicant reasonably and conservatively demonstrated the FEM results for the settlement sensitivity analysis using lower bound stiffness for all layers and met all the applicable AP1000 DCD criteria, the staff concludes that settlement is not a concern at the Turkey Point Unit 6 and 7 site. Accordingly, the staff considers RAI 6006, Questions 02.05.04-19 and 02.05.04-20, and RAI 7811 Question 02.05.04-36, resolved.

Earth Pressures

The staff reviewed the static and seismic active and at-rest lateral earth pressures acting on underground structure below-grade walls. The staff noted that the pressure developed using the American Society of Civil Engineers (ASCE) 4-98 methodology uses the zero period acceleration (zpa) value from the GMRS. Since the GMRS was developed for El. -10.7 m (-35 ft), the elevation of the GMRS is considerably lower than the surface of the soils adjacent to the basement walls that are to be evaluated for seismic lateral earth pressures. In RAI 6006, Question 02.05.04-22, the staff asked the applicant to clarify the definition of the design ground motion for the active seismic pressure using the Mononobe-Okabe equation and at-rest seismic pressure using ASCE 4-98, and explain how that motion is consistent with Appendix S to 10 CFR Part 50.

In its response to RAI 6006, Question 02.05.04-22, dated October 3, 2014, the applicant confirmed that the zpa value of 0.058 g was not considered appropriate when computing lateral earth pressures because it was developed for -10.7 m (-35 ft) elevation. The applicant clarified that the design response spectra at 5 percent damping, calculated at the ground surface using the envelope of low frequency and high frequency acceleration response spectra at 10^{-4} and 10^{-5} annual probability of exceedance, gives the PGA of 0.0824 g and PGA of 0.0806 g for the near nuclear island and far from nuclear island soil sites, respectively. For active seismic pressure, the applicant used an acceleration of 0.1 g, rather than the PGA of 0.0824 g for the near nuclear island or 0.0806 g for far from nuclear island, in the Mononobe-Okabe equation, which commonly use the acceleration at the surface of the backfill or an average between the surface and the base of the wall. Similarly, for the computation of at-rest seismic pressure using ASCE 4-98, an acceleration of 0.1 g, rather than the PGA of 0.0824 g for the near nuclear island or 0.0806 g for far from nuclear island, is conservatively used.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-22. The staff noted that the acceleration of 0.1 g is used for computing lateral earth pressure, while the PGAs calculated at the ground surface are 0.0824 g for the near nuclear island or 0.0806 g for far from the nuclear island. The staff concludes that the ground motion for computing the active seismic pressure using the Mononobe-Okabe equation and at-rest seismic pressure using ASCE 4-98 is appropriately applied since this value is also consistent with the minimum peak ground acceleration of 0.1 g as defined in the Standard Review Plan 3.7.2 Section II.2 and 10 CFR 50 Appendix S. Consequently, the staff considers RAI 6006, Question 02.05.04-22, resolved.

While conducting its review, the staff noted that the applicant included a surcharge pressure of 24 kPa (500 psf) in the lateral earth pressure calculation, however, the applicant did not consider the adjacent building loads and the equipment loads. In RAI 02.05.04-23, the staff asked the applicant to explain the selection of surcharge loads for consideration of lateral earth pressure calculations.

In its response to RAI 6006, Question 02.05.04-23, dated October 3, 2014, the applicant confirmed that an area-wide surcharge pressure of 24 kPa (500 psf) is included in the earth pressure calculations to represent the temporary construction loading, and does not include the permanent adjacent building loads. The applicant stated that this temporary loading is conservatively twice the typical design pressure for heavy truck loading. The applicant adopted an additional case considering a surcharge of 190 kPa (4,000 psf) that is the highest expected building bearing pressure for the buildings founded on fill around the nuclear island to represent adjacent building loads. The applicant developed the recommended diagrams for use in calculating lateral active and at-rest earth pressures against walls based on strata thicknesses and lateral earth pressure coefficients for both 24 kPa (500 psf) surcharge and 190 kPa (4,000 psf) surcharge.

The staff reviewed the applicant's response to RAI 6006, Question 02.05.04-23. The staff agrees that the additional case considering a surcharge of 190 kPa (4,000 psf) is appropriate and conservative to address the loads from the adjacent buildings because 190 kPa (4,000 psf) is the highest expected building bearing pressure for the buildings founded on fill around the nuclear island. The staff also reviewed the recommended diagrams that contain surcharge, static and dynamic lateral earth pressures, and hydrostatic groundwater pressures acting on plant safety-related below-grade walls. Since all the loading conditions and combinations are considered in evaluating the static and seismic lateral earth pressures acting on plant safety-related below-grade walls, the staff concludes that its concern regarding surcharge pressure from adjacent buildings acting on nuclear island below-grade walls is addressed. Accordingly, the staff considers RAI 6006, Question 02.05.04-23, resolved.

Lateral Variability

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10.7 and related RAIs (RAI 6006, Question 02.05.04-9 and RAI 02.05.04-11 and RAI 7811, Question 02.05.04-30), as discussed in Section 2.5.4.4.4 of this SER. The staff's review concentrated on the applicant's evaluation of lateral variability in terms of stratigraphic and bearing pressure uniformity. The staff noted that the maximum bearing pressure difference is less than 20 percent. The staff concludes that soils supporting the nuclear island do not contain extreme variations in subgrade

stiffness. Consequently, the staff concludes that the AP1000 DCD criterion for lateral uniformity is satisfied.

Staff's Conclusions Regarding Static Stability

Based on the staff's review of the information in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10 and the applicant's responses to the RAIs described in Section 2.5.4.4.10 of this SER, the staff concludes that the applicant has provided sufficient information in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.10, which includes a static and dynamic bearing capacity evaluation; total and differential settlement evaluation; and a lateral earth pressure evaluation to meet the standard design values and to satisfy the applicable requirements of 10 CFR Part 50 and 10 CFR Part 100.

2.5.4.4.11 Design Criteria and References

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.11 summarizes the AP1000 DCD site parameter criteria and compares them to the site-specific parameters presented in the Turkey Point Units 6 and 7 COL FSAR. Figure 2.5.4-3 of this report summarizes the critical parameters.

The staff reviewed the section of the Turkey Point Units 6 and 7 COL FSAR containing the geotechnical design criteria and determined that they contained sufficient details to meet the relevant requirements of 10 CFR Part 50 and Part 100. Based on its review the staff concludes that the applicant's design criteria and references for the Turkey Point Units 6 and 7 site are acceptable and meet the requirements of the applicable regulations.

Figure 2.5.4-3. Comparison of AP1000 Design Criteria to Turkey Point Units 6 and 7 Site Characteristics

	AP1000 DCD	Turkey Point Units 6 and 7	Turkey Point FSAR	Turkey Point within Site Parameter
Static Bearing Capacity	425 kPa (8,900 psf)	1,867 kPa minimum (39 ksf minimum)	2.5.4.10.2	Yes
Dynamic Bearing Capacity	1,675 kPa 35,000 psf	1,963 kPa minimum (41 ksf minimum)	2.5.4.10.2.1	Yes
Shear Wave Velocity	305 m/s (1,000 fps) over the footprint of the nuclear island at its excavation depth	1,759 m/s average with 1,392 m/s lower bound and 2,309 m/s upper bound (5,770 fps average with 4,566 fps lower bound and 7,575 fps upper bound)	2.5.4.7.2.1	Yes
Lateral Variability	Condition 2, site- specific assessment of subsurface conditions demonstrates that the bearing pressures below	Condition 2, the maximum bearing pressure difference is less than 20 percent.	2.5.4.10.7	Yes

	the nuclear island do not exceed 120% of those from the generic analyses of the nuclear island at a uniform site			
Liquefaction Potential	No liquefaction considered beneath the SC I and SC II structures and immediate surrounding area.	None: nuclear Island founded on concrete fill over rock; adjacent structures founded on compacted fill (to a minimum of 95 percent of modified Proctor maximum dry density) above rock; Soil under rock have negligible liquefaction potential.	2.5.4.8	Yes
Minimum Angle of Internal Friction of Foundation Soils	Greater than 35 degrees.	Nuclear Island founded on concrete fill over rock meeting the criteria	Not applicable	Yes

2.5.4.4.12 *Techniques to Improve Subsurface Conditions*

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.12, the applicant stated that its ground treatment will include over-excavation of unsuitable materials, and their replacement with compacted limerock fill and concrete fill. The applicant stated that groundwater control is required as part of the over-excavation of unsuitable materials and that it will be achieved by grouting. The applicant stated that grouting will be used to constrain the sizes of potential voids. The applicant provided details of the subsurface grouting program in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5.5. The applicant stated that will prepare a thermal control plan, following ACI 207 guidelines, to minimize thermal cracking for the concrete fill to be placed under the nuclear island. The staff reviewed this information and concludes that the plan for subsurface improvements will ensure the stability of the foundation and the structures built at this site. The staff therefore concludes that the techniques presented to improve subsurface conditions of the Turkey Point Units 6 and 7 site are acceptable. Accordingly, the applicant's improvements satisfy the requirements of 10 CFR Part 100.

2.5.4.5 *Post Combined License Activities*

The applicant identifies the following ITAAC:

- ITAAC Table 3.8-5–ITAAC for Concrete Fill under Seismic Category I Structures
- ITAAC Table 3.8-6–ITAAC for Seismic Category I Structure Foundation Grouting

2.5.4.6 *Conclusion*

Staff reviewed the application and confirmed that the applicant has addressed the required information, and no outstanding information is expected to be addressed in Turkey Point Units 6 and 7 COL FSAR related to this section.

In addition, the staff compared the additional information in the Turkey Point Units 6 and 7 COL FSAR to the relevant NRC regulations, the guidance in Section 2.5.4 of NUREG-0800, and applicable NRC regulatory guides. The staff's review concludes that the applicant has provided sufficient information to satisfy the requirements of relevant NRC regulations. The staff determines that the applicant has adequately addressed COL Information Items PTN COL 2.5-1 through PTN COL 2.5-3, PTN COL 2.5-5 through PTN COL 2.5-13, PTN COL 2.5-16, and PTN COL 2.5-17 as it relates to the stability of subsurface materials and foundations.

The staff's review concludes that the applicant has adequately determined the engineering properties of soil and rock conditions underlying the Turkey Point Units 6 and 7 site through field and laboratory investigations. The applicant used the latest field and laboratory methods in accordance with the guidance in RG 1.132, RG 1.138, and RG 1.198 to determine the required site-specific engineering properties for the Turkey Point Unit 6 and 7 site and to ensure that those properties meet the design criteria outlined in the AP1000 DCD. In addition, the applicant will use the techniques including excavation, limerock fill and concrete fill, and grout to improve subsurface conditions. Accordingly, the staff concludes that the applicant has performed sufficient field investigations and laboratory testing to determine the overall subsurface profile and the properties of the soil and rock underlying the Turkey Point Unit 6 and 7 site. Specifically, the staff concludes that the applicant has adequately determined (1) the soil and rock static and dynamic properties through field investigations and laboratory tests, (2) the response of the soils and rocks to static and dynamic loading, and (3) the liquefaction potential of the soils.

As set forth above, the applicant presented and substantiated the necessary information to establish the geotechnical engineering characteristics of the Turkey Point 6 and 7 site. The staff reviewed the information and concluded that the applicant has performed sufficient investigations at the site to justify the soil and rock characteristics used in the AP1000 design, and the design analyses contain adequate margins of safety for the construction and operation of the nuclear power plant and meet the relevant requirements of 10 CFR Part 50, 10 CFR Part 52, and 10 CFR 100.23.

2.5.5 Stability of Slopes

2.5.5.1 Introduction

Turkey Point Units 6 and 7 COL FSAR Section 2.5.5 addresses the stability of all earth and rock slopes, both natural and manmade (cuts, fill, embankments, dams, etc.), whose failure, under any of the conditions to which they could be exposed during the life of the plant, could adversely affect the safety of the plant. The staff evaluated the following topics based on data provided by the applicant in the Turkey Point Units 6 and 7 COL FSAR and information available from other sources: (1) slope characteristics, (2) design criteria and design analyses, (3) results of the investigations including borings, shafts, pits, trenches, and laboratory tests, (4) properties of borrow material, compaction and excavation specifications, and (5) any additional information deemed necessary in accordance with 10 CFR Part 52.

SER Section 2.5.5 addresses slope stability information related to the Turkey Point Units 6 and 7 site. Section 2.5.5.2 of this report provides a summary of relevant geologic and seismic information contained in Section 2.5.5 of the Turkey Point Units 6 and 7 application. Section 2.5.5.3 of this report provides a summary of the regulation and guidance used in its

application and by the staff to review the application. Section 2.5.5.4 of this report provides a review of the staff's evaluation Section 2.5.5. Section 2.5.5.5 of this report discusses any post combined license activities. Finally, Section 2.5.5.6 of this report provides an overall summary of the applicant's conclusions, as well as the staff's conclusions, restates any bases covered in the application, and confirms that the application meets the requirements defined in NRC regulations.

2.5.5.2 *Summary of Application*

Section 2.5.5 of the Turkey Point Units 6 and 7 COL FSAR addresses COL Information Items 2.5-14, "Stability of Slopes," and 2.5-15, "Embankments and Dams," of the AP1000 DCD.

- PTN COL 2.5-14

The applicant provided additional information in PTN COL 2.5-14 to address COL Information Item 2.5-14, which addresses the provision of site-specific information about the static and dynamic stability of soil and rock slopes, the failure of which could adversely affect seismic Category I structures.

- PTN COL 2.5-15

PTN COL 2.5-15 addresses the provision of site-specific information about the static and dynamic stability of embankments and dams, the failure of which could adversely affect seismic Category I structures.

The applicant developed Turkey Point Units 6 and 7 COL FSAR Section 2.5.5 for the evaluation of slope stability at the Turkey Point Units 6 and 7 site based on information derived from site investigations, geotechnical characterization studies, and excavation and backfill profiles presented in Turkey Point Units 6 and 7 COL FSAR Sections 2.5.4.1 through 2.5.4.5. These investigations and studies included consideration of geologic features and characteristics, site exploration involving soil and rock boring and sampling, groundwater monitoring, surface geophysical testing, in situ testing, geotechnical test pits, geologic trench excavations, and laboratory testing; and geophysical surveys.

Supplemental Information

- PTN SUP 2.5-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 2.5, "Geology, Seismology, and Geotechnical Engineering," which provides summary information of detailed information in Turkey Point Units 6 and 7 FSAR Section 2.5.5, "Stability of Slopes," for the Turkey Point Units 6 and 7 site.

2.5.5.2.1 *Slope Characteristics*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.5.1 presents information about the permanent and temporary slopes for plant construction. Figure 2.5.5-1 (Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-221) presents a profile of the finished site grade. The applicant stated that the current site is relatively flat with an approximate elevation at sea level and that the grade of the site will be raised to avoid the effects of design storm surge. The applicant

stated that the permanent finished slopes at the site are directed away from the power block, have a maximum grade of 0.5 percent and that significant movement or failure of these slopes will not adversely affect the safety of the nuclear power plant facilities. The applicant indicated that the grade change from the existing grade to the finished grade around the power block will be made with an MSE retaining wall. The applicant indicated that the MSE wall is no closer than 152 m (500 ft) away from the Seismic Category I structures and that failure of the MSE wall will not affect safety-related structures. The applicant indicated that Turkey Point Units 6 and 7 do not use safety-related dams or embankments.

Turkey Point Units 6 and 7 COL FSAR Subsection 2.5.5.1.2 indicates that a temporary reinforced diaphragm wall will provide support to the excavation and aid with groundwater control. The applicant indicated that failure of the temporary slope will not adversely affect the safety of the nuclear power plant facilities due to its distant location from seismic Category I structures and cooling canals.

2.5.5.2.2 Design Criteria and Analyses

The applicant stated that no slopes require analyses for stability.

2.5.5.2.3 Result of the Investigations

Turkey Point Units 6 and 7 COL FSAR Section 2.5.5.3 references FSAR Section 2.5.4 and a MACTEC report (MACTEC Engineering and Consulting, Inc., 2008) for the data, investigation and summary of the results of the subsurface investigation used for consideration of stability of the structures.

2.5.5.2.4 Properties of Borrow Material, Compaction and Excavation Specification

The applicant referenced Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5 for information related to borrow material and compaction requirements. The applicant stated that it will develop the excavation specifications during the detailed design stage.

2.5.5.3 Regulatory Basis

The regulatory requirements for reviewing the applicant's discussion of stability of slopes are:

- 10 CFR 50.55a, "Codes and Standards," as it relates to the requirement that SSCs shall be designed, fabricated, erected, constructed, tested, and inspected in accordance with the requirement of applicable codes and standards commensurate with the importance of the safety function to be performed.
- 10 CFR Part 50, Appendix A, GDC 1, "Quality Standards and Records," as it relates to the requirement that SSCs important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. This regulation also requires that appropriate records of the design, fabrication, erection, and testing of SSCs important to safety be maintained by or under the control of the nuclear power unit licensee throughout the life of the unit.
- 10 CFR Part 50, Appendix A, GDC 2, "Design Bases for Protection Against Natural Phenomena," as it relates to consideration of the most severe of the natural phenomena

that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

- 10 CFR Part 50, Appendix S, , “Earthquake Engineering Criteria for Nuclear Power Plants,” as it applies to the design of nuclear power plant SSCs important to safety to withstand the effects of earthquakes.
- 10 CFR 100.23, “Geologic and Seismic Siting Criteria,” provides the nature of the investigations required to obtain the geologic and seismic data necessary to determine site suitability and identify geologic and seismic factors required to be taken into account in the siting and design of nuclear power plants.

The related acceptance criteria from Section 2.5.5 of NUREG-0800 are as follows:

- Slope Characteristics: To meet the requirements of 10 CFR Part 50 and 10 CFR Part 100, the discussion of slope characteristics is acceptable if the subsection includes: (1) cross sections and profiles of the slope in sufficient quantity and detail to represent the slope and foundation conditions, (2) a summary and description of static and dynamic properties of the soil and rock comprised by seismic Category I embankment dams and their foundations, natural and cut slopes, and all soil or rock slopes whose stability would directly or indirectly affect safety-related and seismic Category I facilities, and (3) a summary and description of groundwater, seepage, and high and low groundwater conditions.
- Design Criteria and Analyses: To meet the requirements of 10 CFR Part 50 and 10 CFR Part 100, the discussion of design criteria and analyses is acceptable if the criteria for the stability and design of all seismic Category I slopes are described and valid static and dynamic analyses have been presented to demonstrate that there is an adequate margin of safety.
- Boring Logs: To meet the requirements of 10 CFR Parts 50 and 10 CFR Part 100, the applicant should describe the borings and soil testing carried out for slope stability studies and dam and dike analyses.
- Compacted Fill: To meet the requirements of 10 CFR Part 50, the applicant should describe the excavation, backfill, and borrow material planned for any dams, dikes, and embankment slopes.

In addition, the geotechnical engineering characteristics should be consistent with appropriate sections from: RG 1.27, “Ultimate Heat Sink for Nuclear Power Plants,” RG 1.28, “Quality Assurance Program Requirements (Design and Construction),” RG 1.132, “Site Investigations for Foundations of Nuclear Power Plants,” RG 1.138, , “Laboratory Investigations of Soils And Rocks for Engineering Analysis and Design of Nuclear Power Plants,” RG 1.198, “Procedures and Criteria for Assessing Seismic Soil Liquefaction at Nuclear Power Plant Sites,” and RG 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition).”

2.5.5.4 *Technical Evaluation*

The staff reviewed Sections 2.5.5 of the Turkey Point Units 6 and 7 site related to the stability of slopes as follows:

AP1000 COL Information Item

- PTN COL 2.5-14

The staff reviewed PTN COL 2.5-14 included under Section 2.5.5 of the Turkey Point Units 6 and 7 COL FSAR, related to the stability of all earth and rock slopes both natural and manmade (cuts, fill, embankments, dams, etc.) whose failure, under any of the conditions to which it could be exposed during the life of the plant, could adversely affect the safety of the plant. The COL information item in AP1000 DCD Section 2.5.5 states:

Combined License applicants referencing the AP1000 design will address site-specific information about the static and dynamic stability of soil and rock slopes, the failure of which could adversely affect the nuclear island.

- PTN COL 2.5-15

The staff reviewed PTN COL 2.5-15 included under Section 2.5.6 of the Turkey Point Units 6 and 7 COL FSAR, related to the stability of embankments and dams, the failure of which could adversely affect the plant. The COL information item in AP1000 DCD Section 2.5.6 states:

Combined License applicants referencing the AP1000 design will address site-specific information about the static and dynamic stability of embankments and dams, the failure of which could adversely affect the nuclear island.

The staff's evaluation of COL Information Item PTN COL 2.5-14 and COL 2.5-15 is presented below.

2.5.5.4.1 *Slope Characteristics*

Turkey Point Units 6 and 7 COL FSAR Section 2.5.5.1 provides the applicant's general discussion of the slope characteristics including information for permanent slopes and temporary slopes for plant construction. The applicant noted that the permanent finished slopes at the site are directed away from the power block, have a maximum grade of 0.5 percent and that significant movement or failure of these slopes will not adversely affect the safety of the nuclear power plant facilities.

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.5.5.1, the site grade plan and foundation excavation sections as provided in Turkey Point Units 6 and 7 COL FSAR Section 2.5.4. The staff also examined the site during the site visit in May 2011 (ADAMS Accession No. ML111881052) and site audit in August 2013 (ADAMS Accession No. ML13248A497). The staff also reviewed the site boring logs and the site subsurface soil profile. The staff's evaluation of these inputs is in Section 2.5.4 of this SER.

The staff determines that (1) failure of the MSE wall will not affect safety-related structures because the MSE wall is not required to maintain the function of any Seismic Category I

structure, and there will be an ample distance of greater than 152 m (500 ft) between the MSE wall and the Seismic Category I structures to ensure that collapse of the MSE wall could not affect the SSCs of interest, and (2) failure of the temporary slope will not adversely affect the safety of the nuclear power plant facilities because of its distant location from seismic Category I structures and cooling canals. Based on these findings, the staff concludes that no slope failure at the site will adversely affect the safety of the nuclear power plant structures; and the applicant has provided sufficient information in Turkey Point Units 6 and 7 COL FSAR Section 2.5.5.1 to satisfy the applicable criteria of 10 CFR Part 50 and 10 CFR Part 100.

2.5.5.4.2 Design Criteria and Analyses

In Turkey Point Units 6 and 7 COLFSAR Section 2.5.5.2, the applicant noted that no slopes require analyses for stability. The staff considered the permanent slopes to be stable because the maximum permanent grade slope is 0.5 percent (0.3 °) and are directed away from the power block area. Based on this finding, the staff concludes that no slope failure at the site will adversely affect the safety of the nuclear power plant structures. Therefore, no slope stability analysis is necessary for the Turkey Point Units 6 and 7 site.

2.5.5.4.3 Results of the Investigations

Turkey Point Units 6 and 7 COL FSAR Section 2.5.5.3 provides references for the data, investigation and summary of the results of the subsurface investigation used for consideration of stability of the structures. SER Section 2.5.4 presents the staff evaluation of the applicant's subsurface investigation program and results. The staff concludes that the applicant's information satisfies the relevant requirements of 10 CFR Part 50 and Part 100.

2.5.5.4.4 Properties of Borrow Material, Compaction and Excavation Specification

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.5.4, the applicant referred to Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5 for information related to borrow material and compaction requirements. The applicant stated that it will develop the excavation specifications during the detailed design stage. The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.5, which describes the specific property requirements, site preparation, extent of excavation, fill and slopes, compaction requirements, and dewatering and excavation methods. The staff concludes that this information satisfies the relevant requirements of 10 CFR Part 50.

2.5.5.5 Post Combined License Activities

There are no post-COL activities related to this section.

2.5.5.6 Conclusion

Staff reviewed the application and confirmed that the applicant addressed the required information, and no outstanding information is expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. In addition, the staff compared the additional information in the Turkey Point Units 6 and 7 COL FSAR to the relevant NRC regulations, the guidance in Section 2.5.5 of NUREG-0800, and applicable NRC regulatory guides. The staff conducted independent reviews of the investigations performed for slope stability studies and concluded that the applicant has provided sufficient information to satisfy the requirements of NRC regulations. The staff determines that the applicant adequately addressed COL

Information Items PTN COL 2.5-14 and PTN COL 2.5-15, as it relates to the stability of slopes, which met the design criteria and requirements specified in the AP1000 DCD.

The staff's review concluded that the applicant has presented and substantiated information to assess the stability of all earth and rock slopes, both natural and man-made, at the Turkey Point Units 6 and 7 site. The staff reviewed the site investigations related to slope stability and concludes that (1) there are no natural or man-made slopes that could adversely affect the Turkey Point Units 6 and 7 Seismic Category I structures, (2) failure of the MSE walls would not affect the safety-related structures (3) there are no dams or embankments on the site that could adversely affect the safety of the nuclear plant facilities, and (4) failure of temporary slopes will not adversely impact the safety of the nuclear power plant facilities. The staff therefore further concludes that the result of slope stability assessment performed by the applicant meets the requirements of 10 CFR Part 50, Appendix A (GDC 1 and GDC 2); 10 CFR Part 50, Appendices B and S; and 10 CFR 100.23. Accordingly, the staff concludes that the Turkey Point Units 6 and 7 site is suitable with respect to the criteria governing the stability of slopes and, therefore, considers Turkey Point Units 6 and 7 COL FSAR Section 2.5.5 acceptable.

4.0 REACTOR

4.1 Introduction

This chapter describes the design of the AP1000 reactor and reactor core, including the reactor internals, control rod drive and core support structural materials, fuel system design (fuel rods and fuel assemblies), the nuclear design, the thermal-hydraulic design, and reactivity control systems functional design. It also specifies the principal design criteria with which the mechanical design, the physical arrangement of the reactor components, and the capabilities of reactor control, protection, and emergency cooling systems (when applicable) must comply.

4.2 Summary of Application

Chapter 4 of the Turkey Point Units 6 and 7 combined license (COL) Final Safety Analysis Report (FSAR), Revision 8, incorporates by reference Chapter 4 of the AP1000 Design Control Document (DCD), Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 4.4, the applicant provided the following:

AP1000 COL Information Item

- STD COL 4.4-2

The applicant provided additional information in Standard (STD) COL 4.4-2 to address COL Information Item 4.4-2. This item states that, upon selection of the actual instrumentation, the instrumentation uncertainties of the operating parameters shall be calculated and the validity of the design-limit departure from nucleate boiling ratio (DNBR) values shall be confirmed.

License Condition

- Part 10, License Condition 2, Item 4.4-2

The license condition will require the completion of the actions described in STD COL 4.4-2 prior to initial fuel load.

4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design."

In addition, the relevant requirements of the Commission regulations for the thermal-hydraulic design and the associated acceptance criteria are identified in Section 4.4 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)."

To resolve the confirmatory item, the U.S. Nuclear Regulatory Commission (NRC) staff also used the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.72, "Immediate notification requirements for operating nuclear power reactors," and 10 CFR 50.73,

“Licensee event report system,” and the guidance of NUREG-1022, “Event Reporting Guidelines: 10 CFR 50.72 and 50.73,” Revision 2.

4.4 Technical Evaluation

The NRC staff reviewed Chapter 4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff’s review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the reactor internals, control rod drive and core support structural materials, fuel system design (fuel rods and fuel assemblies), the nuclear design, the thermal-hydraulic design and reactivity control systems functional design. The results of the NRC staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant [VEGP], Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 4.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 4.4-2*

The NRC staff reviewed STD COL 4.4-2 related to COL Information Item 4.4-2 and related COL Action Item 4.4-1 (from Appendix F of the NRC staff’s FSER for

¹ See Section 1.2.2 for a discussion of the staff’s review related to verification of the scope of information to be included in a COL application that references a design certification (DC).

the AP1000 DCD (NUREG-1793)), included under Section 4.4 of the BLN COL FSAR, Revision 1. STD COL 4.4-2 states:

Following selection of the actual plant operating instrumentation and calculation of the instrumentation uncertainties of the operating plant parameters as discussed in DCD Subsection 7.1.6, the design limit DNBR values will be calculated. The calculations will be completed using the revised thermal design procedure (RTDP) with these instrumentation uncertainties and confirm that either the design limit DNBR values as described in DCD Section 4.4 remain valid or that the safety analysis minimum DNBR bounds the new design limit DNBR values plus DNBR penalties, such as rod bow penalty. This will be completed prior to fuel load.

License Condition

Part 10, License Condition 2, Item 4.4-2

The applicant provided a license condition in Part 10 of the BLN COL application, "Proposed Combined License Conditions," which will require the completion of the actions described in STD COL 4.4-2 prior to initial fuel load.

As reported in FSER Section 4.4 related to the DCD, expected instrument uncertainties are included in the methodology used by the applicant in calculating the design limit DNBR values. The final validation of the design limit DNBR values will be based on the actual uncertainties for instrumentations not yet procured. The quantification of instrument uncertainties includes activities that require procurement and installation of the instruments, including evaluation of changes in sensor design and location, and that can only be completed after installation of the instruments. Confirmation of instrument uncertainties after completion of the installation does not alter the methods of evaluation used to establish setpoints in the technical specifications, since the design limit DNBR values were based on the plant specifications for instrumentation uncertainties. The design limit DNBR values are expected to remain valid through plant procurement.

The NRC staff concluded in FSER Section 4.4 that the methodology for calculating the design limit DNBR values complied with the relevant regulatory requirements. The staff further concluded that it was acceptable to complete the final verification of the design limit DNBR values when the as-built specifications are available.

Therefore, the staff concludes that the supplemental information described in FSAR Section 4.4 meets COL Information Item 4.4-2 described in AP1000 DCD Subsection 4.4.7.2, complies with COL Action Item 4.4-1, and is acceptable.

The staff also finds the applicant's proposed license condition that will require completing this analysis prior to fuel load acceptable, since the applicant has committed to confirm that either the design limit DNBR values remain valid, or

that the safety analysis minimum DNBR bounds the new design DNBR values plus DNBR penalties, such as rod bow penalty.

Conformance to Regulatory Guide 1.133, Revision 1

In BLN COL FSAR Section 1.9, "Compliance with Regulatory Criteria," Section 1.9.1, "Regulatory Guides," the applicant adds Appendix 1AA, which provides an evaluation of the degree of compliance with Division 1 regulatory guides (RGs) as applicable to the content of this FSAR, or to the site-specific design, construction and/or operational aspects, and Table 1.9-201, which identifies the appropriate regulatory guide to FSAR cross-reference. In Appendix 1AA, the applicant provides an evaluation of its loose-part detection program for compliance with RG 1.133, Revision 1, May 1981, "Loose Part Detection Program for the Primary System of Light-Water-Cooled Reactors." It states that conformance of the design aspects is as stated in the DCD. It also documents conformance with the programmatic and/or operational aspects described in paragraphs C.3a and C.6 of RG 1.133, Revision 1.

RG 1.133, Revision 1, describes a method acceptable to the NRC staff for implementing regulatory requirements with respect to detecting a potentially safety-related loose part in light-water-cooled reactors during normal operation. The AP1000 design includes a digital metal impact monitoring system, which is a non-safety-related system provided for monitoring the reactor coolant system for metallic loose parts. AP1000 DCD Section 4.4.6.4 documents the conformance of this monitoring system to RG 1.133. BLN COL FSAR Appendix 1AA documents its conformance to the design aspects described in DCD Section 4.4.6.4, and also states it conforms to Regulatory Position C.3a, regarding manual mode of data acquisition for detection of loose parts and Regulatory Position C.6, regarding notification to NRC of confirmation of the presence of a loose part.

*The NRC staff noted that RG 1.133, Revision 1, was not included in Revision 1 of FSAR Table 1.9-201 for a cross-reference to the appropriate FSAR section, although an evaluation of compliance with RG 1.133 is provided in Appendix 1AA. In response to Request for Additional Information (RAI) 1-7, the applicant added RG 1.133, Revision 1, to Table 1.9-201, as part of Revision 1 to the FSAR. In addition, the response to RAI 1-7 was supplemented by adding a conformance discussion for regulatory guide positions related to the procedures and training program (positions 4g, 4h, 4i and 4j) in the proposed revision to BLN FSAR Appendix 1AA, "Conformance with Regulatory Guides." The proposed change to BLN FSAR is acceptable subject to a formal revision to BLN FSAR. Accordingly, this is **Confirmatory Item 4.4-1**. With the conformance of the programmatic and operational aspects of regulatory positions, the staff concludes that the applicant's loose parts detection program will conform to RG 1.133, Revision 1.*

Resolution of Standard Content Confirmatory Item 4.4-1

The staff notes that RAI 1-11 was mistakenly identified as RAI 1-7 in the standard content SER as it relates to the conformance discussion for RG 1.133.

The RAI number related to conformance is 1-11. The staff also notes that the BLN SER did not address Position C.6 of RG 1.133.

Confirmatory Item 4.4-1, as modified by the discussion above, is related to the applicant's conformance with the RG 1.133 Positions C.4g, 4h, 4i, 4j, and 6 as documented in Appendix 1AA of the VEGP COL FSAR. The staff's review of the VEGP COL FSAR indicates that the VEGP COL FSAR Appendix 1AA was updated to include all the information identified in the Confirmatory Item 4.4-1 except for Position C.6.

The response to RAI 1-11 included a conformance discussion for RG 1.133, Position C.6, "Notification of a Loose Part." Position C.6 refers to RG 1.16, "Reporting of Operating Information." The applicant took an exception to this position because this RG had been withdrawn. The staff considered this justification to be inadequate. Although the staff agreed it was no longer relevant to refer to RG 1.16, there remained a need to address reporting requirements. In response to this staff concern, the applicant proposed a revision to Appendix 1AA of its FSAR. In a letter dated January 8, 2010, the applicant stated that it would follow reporting requirements in accordance with requirements of 10 CFR 50.72 and 10 CFR 50.73 using guidance of NUREG-1022. The staff considers the applicant's position adequately addresses reporting requirements for loose part notification and therefore considers the exception acceptable. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 4.4-1 is now closed.

The Turkey Point Units 6 and 7 applicant has endorsed the response to RAI 1-7 and RAI 1-11 and has also endorsed the January 8, 2010, letter submitted by the VEGP applicant.

4.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above the staff finds the following license condition proposed by the applicant acceptable.

- License Condition (4-1) - Prior to initial fuel load, the licensee shall calculate the instrumentation uncertainties of the actual plant operating instrumentation to confirm that either the design limit DNBR values remain valid or that the safety analysis minimum DNBR bounds the new design limit DNBR values plus DNBR penalties, such as rod bow penalty.

4.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the application addressed the required information relating to the reactor internals, control rod drive and core support structural materials, fuel system design (fuel rods and fuel assemblies), the nuclear design, the thermal-hydraulic design, and reactivity control systems functional design and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this chapter. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented within the Turkey Point Units 6 and 7 COL FSAR is acceptable. The staff based its conclusion on the following:

- STD COL 4.4-2 is acceptable because it specifies a commitment on the part of the applicant to confirm the validity of the calculations of the design limit DNBR values, which are based on the plant specifications for instrumentation uncertainties. The confirmation of plant instrument uncertainties will be completed when the as-built specifications are available. The methodology for this calculation was previously approved by the staff in NUREG-1793.

3.0 DESIGN OF STRUCTURES, COMPONENTS, EQUIPMENT, AND SYSTEMS

3.1 Conformance with NRC General Design Criteria

Section 3.1 of the Turkey Point Units 6 and 7 Combined License (COL) Final Safety Analysis Report (FSAR), Revision 8, incorporates by reference Section 3.1, "Conformance with NRC General Design Criteria," of Revision 19 of the AP1000 Design Control Document (DCD).

In addition, in the Turkey Point Units 6 and 7 FSAR, the applicant provided the following:

Departure

- PTN DEP 6.4-1

The applicant provided additional information about PTN DEP 6.4-1 in Section 3.1.2 of the FSAR related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this report.

The U.S. Nuclear Regulatory Commission (NRC) staff (the staff) reviewed the application and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this section.¹ The NRC staff's review confirmed that the applicant addressed the required information to satisfy the evaluation criteria. There is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements. Section 21.2 of this report evaluates the departure from the DCD provided in PTN DEP 6.4-1.

3.2 Classification of Structures, Components, and Systems

3.2.1 Seismic Classification

3.2.1.1 *Introduction*

Nuclear power plant structures, systems, and components (SSCs) important to safety are to be designed to withstand the effects of earthquakes without loss of capability to perform their safety functions. Important-to-safety SSCs are defined in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix A, "General Design Criteria for Nuclear Power Plants," as those SSCs that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. Important-to-safety SSCs include safety-related SSCs that perform safety-related functions to ensure: (1) the integrity of the reactor coolant pressure boundary (RCPB), (2) the

¹ Section 1.2.2 contains a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a design certification (DC). This footnote will be referenced in several places throughout the chapter of this Safety Evaluation.

capability to shut down the reactor and maintain it in a safe-shutdown condition, and (3) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures. The earthquake for which these safety-related plant features are designed is defined as the safe-shutdown earthquake (SSE). The SSE is based on an evaluation of the maximum earthquake potential for the site and is an earthquake that produces the maximum vibratory ground motion for which SSCs are designed to remain functional. In passive nuclear plants, there may be nonsafety-related active systems and equipment that perform functions to support safe operation of the facility. Some of these functions may be deemed risk significant and, therefore, are candidates for regulatory oversight, and the regulatory treatment of nonsafety systems (RTNSS) process is applied. Specifically for seismic classification, the RTNSS process is used to define seismic requirements for these SSCs.

The methodology in the referenced AP1000 DCD classifies SSCs into three categories: seismic Category I, seismic Category II, and nonseismic (NS). Those plant features that are designed to remain functional, if an SSE occurs, are designated seismic Category I. Seismic Category I applies to both functionality and integrity, and seismic Category II applies only to integrity. If the failure of an NS SSC during an SSE could result in the loss of function of safety-related items, then they are designated as Seismic Category II. This methodology is similar to Regulatory Guide (RG) 1.29, "Seismic Design Classification," Revision 4, except that RG 1.29 does not use the terms seismic Category II and NS.

3.2.1.2 Summary of Application

Section 3.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.2 of the AP1000 DCD, Revision 19. Section 3.2 of the DCD includes Section 3.2.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.2, the applicant provided the following:

Departure

- PTN DEP 3.2-1

The applicant provided additional information about PTN DEP 3.2-1 in Section 3.2 of the FSAR related to design modifications to the condensate return portion of the Passive Core Cooling System. This information, as well as related PTN DEP 3.2-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.1 of the SER.

Supplemental Information

- Standard (STD) Supplement (SUP) 3.2-1

The applicant provided supplemental information by adding text to the end of DCD Section 3.2.1, "Seismic Classification," stating that there are no safety-related SSCs at Turkey Point Units 6 and 7 outside the scope of the DCD. The applicant also stated that the nonsafety-related SSCs outside the scope of the DCD are classified as NS.

- PTN SUP 3.2-1

The applicant provided supplemental information by adding text to the end of DCD Section 3.2.1.3, "Classification of Building Structures," stating that the seismic classification of the deep well injection system (DIS) is provided in Table 3.2-201.

3.2.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the seismic classification are given in Section 3.2.1, Revision 2, of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition."

The regulatory basis for acceptance of the supplemental information of defining the scope of safety-related SSCs is established in General Design Criteria (GDC) 2, "Design Bases for Protection against Natural Phenomena," which requires that all SSCs important to safety be designed to withstand the effects of natural phenomena, including earthquakes. Guidance on how to meet this requirement is in RG 1.29.

3.2.1.4 Technical Evaluation

The NRC staff reviewed Section 3.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to seismic classification. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant (VEGP), Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4, COL application.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- STD SUP 3.2-1

The NRC staff reviewed STD SUP 3.2-1, related to the seismic classification of safety-related SSCs included under Section 3.2.1 of the Turkey Point Units 6 and 7 COL FSAR, which states that there are no safety-related SSCs outside the scope of the DCD at Turkey Point Units 6 and 7. Therefore, the seismic classification is acceptable.

- PTN SUP 3.2-1

The NRC staff reviewed PTN SUP 3.2-1, related to the seismic classification of the deep well injection system included under Section 3.2.1 of the Turkey Point Units 6 and 7 COL FSAR. PTN SUP 3.2-1, Table 3.2-201, provides seismic Categories I, II, and NS classification of building structures. The DIS is a nonsafety-related system that contains structure subsystems of which failures would not impair the capability for safe shutdown. Therefore, the seismic classification is acceptable.

The following portion of this technical evaluation section is reproduced from Section 3.2.1.4 of the VEGP SER:

Important to Safety SSCs

GDC 2 states, in part, that SSCs important to safety shall be designed to withstand the effects of earthquakes. BLN COL FSAR Section 3.2.1 states there are no safety-related SSCs outside the scope of the DCD. In request for additional information (RAI) 3.2.1-1, the applicant was requested to clarify if there is any site-specific non-safety-related SSCs outside the scope of the DCD that are important to safety and, if so, identify the appropriate seismic classification of such SSCs. The applicant's response identified that there are no site-specific non-safety-related SSCs outside the scope of the DCD that are important to safety and that non-safety-related SSCs outside the scope of the DCD are classified as non-seismic. In Revision 1 of the BLN COL FSAR, the applicant added the statement that the non-safety-related SSCs outside the scope of the DCD are classified as non-seismic. The revised BLN COL FSAR is acceptable, and the staff's concern is closed. The staff based its conclusion on the applicant's response that there are no site-specific non-safety-related SSCs outside the DCD that are important to safety.

Seismic Classification of Other Site-Specific SSCs

Section 1.8 of the AP1000 DCD, Revision 16 identified certain site-specific SSCs that are outside the scope of the AP1000 standard plant, such as the circulating water system (CWS) and its heat sink, for which the COL applicant must provide site-specific information. The seismic classification of the CWS is not identified in DCD Table 3.2-3. Section 1.8 of BLN COL FSAR identifies certain COL items that represent interfaces for the standard design, but the seismic classification is not identified for the CWS.

In RAI 3.2.1-2, the applicant was requested to clarify if there are any site-specific SSCs outside the scope of the DCD that are not included in DCD Tables 3.2-2 and 3.2-3 that are to be seismically classified in the COL. For example, site-specific structures, the CWS and miscellaneous items such as reactor vessel insulation are not included in the tables. If so, the applicant was requested to identify the appropriate seismic classification of such SSCs. This concern was also identified in an RAI for the review of AP1000 Revision 16 and the DC applicant clarified that the seismic categorization of CWS and reactor vessel insulation are not plant-specific and are to be classified in the DCD. Therefore, this concern is closed and seismic classification of these components is to be addressed in the DCD rather than the BLN COL FSAR.

Quality Assurance for Seismic Category II SSCs

It is not clear in the BLN COL FSAR how Title 10 of the Code of Federal Regulations (CFR) 50, Appendix B is applied to seismic Category II SSCs, including those that may be site-specific. DCD Appendix 1A identifies that AP1000 conforms to RG 1.29, Regulatory Position C.4 and Section 1.8 identifies COL Information Item 17.5-1 for quality assurance (QA) in the design phase. DCD Section 17.5.2 identifies that the COL applicant will address its QA program and that the QA program will include provisions for seismic Category II SSCs. In RAI 3.2.1-4, the applicant was requested to clarify the extent that pertinent QA requirements of Appendix B to 10 CFR Part 50 in Regulatory Position C.4 of RG 1.29 apply to those activities affecting the safety-related functions of those portions of SSCs covered under Regulatory Positions 2 and 3 of RG 1.29, including any site-specific SSCs. If this issue will be resolved in the DCD rather than the COL for all plant SSCs, including those that are site-specific, the applicant was requested to advise the NRC staff that this was the case. The RAI response identified that there are no site-specific seismic Category II SSCs and that the application of 10 CFR Part 50, Appendix B is addressed by the DCD. Since there are no site-specific seismic Category II SSCs, this COL concern is closed for the BLN COL FSAR.

Consistency with RG 1.29, Revision 4

Section 3.2.1 of the BLN COL FSAR does not identify any departures relative to seismic classification identified in the DCD and BLN COL FSAR, Appendix 1AA identifies conformance with RG 1.29, Revision 3 as stated in the DCD rather than Revision 4 of RG 1.29, dated March 2007. In RAI 3.2.1-3, the applicant was requested to clarify if seismic classifications of site-specific SSCs are consistent

with RG 1.29, Revision 4. The RAI response identified that seismic classification of site-specific SSCs not addressed in the DCD is consistent with RG 1.29, Revision 4. This position is acceptable to the staff, since it represents the current RG revision. The applicant revised Appendix 1AA in Revision 1 of the BLN COL FSAR to indicate conformance to RG 1.29, Revision 4.

3.2.1.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.2.1.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR Part 50, Appendix A, and GDC 2. The staff based its conclusion on the following:

- PTN DEP 3.2-1, related to design modifications to the condensate return portion of the Passive Core Cooling System, is reviewed and found acceptable by the staff in Section 21.1 of this SER.
- STD SUP 3.2-1 is acceptable because the Turkey Point Units 6 and 7 COL FSAR states that there are no safety-related SSCs outside the scope of the AP1000 DCD. The Turkey Point Units 6 and 7 COL FSAR also states that the nonsafety-related SSCs outside the scope of the DCD are classified as NS. Therefore, the requirements of 10 CFR Part 50, Appendix A, GDC 2, the acceptance criteria in NUREG-0800, Section 3.2.1, and the guidelines in RG 1.29 are satisfied.
- PTN SUP 3.2-1 is acceptable because the Turkey Point Units 6 and 7 COL FSAR states that the DIS is a nonsafety-related system that contains structure subsystems of which failures would not impair the capability for safe shutdown. The building structures of the DIS are seismically classified to be seismic Categories I, II, and NS classifications. Therefore, the requirements of 10 CFR Part 50, Appendix A, GDC 2, the acceptance criteria in NUREG-0800, Section 3.2.1, and the scope of RG 1.29 are satisfied.

3.2.2 AP1000 Classification Systems (Related to RG 1.206, Section C.III.1, Chapter 3, C.I.3.2.2, "System Quality Group Classification")

3.2.2.1 Introduction

The system and component quality group classification addresses, in part, the general design criterion that nuclear power plant SSCs important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety function to be

performed. Important-to-safety SSCs are defined in 10 CFR Part 50, Appendix A, as those SSCs that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. Important-to-safety SSCs include safety-related SSCs that perform one of the following safety-related functions to ensure: (1) the integrity of the RCPB, (2) the capability to shut down the reactor and maintain it in a safe-shutdown condition, and (3) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures. The RTNSS process is applied to define supplemental quality requirements for SSCs that are nonsafety-related but perform risk significant function.

The system and component quality group classification in combination with the RTNSS process define appropriate classifications, codes and standards, and special treatment important to safety pressure-retaining components and their supports, depending on their safety function. RG 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," Revision 4, provides the regulatory guidance for classifying SSCs important to safety and the appropriate quality standards.

3.2.2.2 Summary of Application

Section 3.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.2 of the AP1000 DCD, Revision 19. Section 3.2 of the DCD includes Section 3.2.2.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.2, the applicant provided the following:

Supplemental Information

- STD SUP 3.2-1

The applicant provided supplemental information by adding text stating that there are no safety-related SSCs at Turkey Point Units 6 and 7 outside the scope of the DCD.

- PTN SUP 3.2-2

The applicant provided supplemental information by stating that information on the classification of the DIS is in Table 3.2-202.

3.2.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the system quality group classification are given in Section 3.2.2, Revision 2, of NUREG-0800.

The basis for acceptance of the supplemental information that defines the scope of safety-related SSCs is established in RG 1.26 and applicable American Society of Mechanical Engineers (ASME) Codes and industry standards. RG 1.26 provides regulatory guidance for

classifying SSCs important to safety and applying the appropriate quality standards. Conformance to the guidance contained in RG 1.26 is one way to ensure that component quality will be commensurate with the importance of the safety functions of these systems. Thus, this constitutes the basis for satisfying GDC 1, "Quality Standards and Records," for pressure-retaining components and their supports.

3.2.2.4 Technical Evaluation

The NRC staff reviewed Section 3.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the system quality group classification. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and the use of this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN, Units 3 and 4, COL application.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- STD SUP 3.2-1

The NRC staff reviewed STD SUP 3.2-1 related to the seismic classification of safety-related SSCs included under Section 3.2.2 of the Turkey Point Units 6 and 7 COL FSAR, which states

that there are no safety-related SSCs outside the scope of the DCD at Turkey Point Units 6 and 7.

The NRC staff reviewed STD SUP 3.2-1 related to quality group classification of systems included under Section 3.2.2 of the Turkey Point Units 6 and 7 COL FSAR. STD SUP 3.2-1 is identical to STD SUP 3.2-1 in the BLN COL FSAR with respect to quality group classification of systems included under Section 3.2.2 of the FSAR. Additional information was needed to evaluate STD SUP 3.2-1, and RAIs were submitted to the BLN applicant. The Turkey Point Units 6 and 7 applicant incorporated the BLN RAI response. As such, review of STD SUP 3.2-1 is addressed through the comparison with the BLN SER. As discussed below, there are no site-specific nonsafety-related SSCs outside the scope of the AP1000 DCD that are important to safety, so there are no changes to the quality group classifications listed in Turkey Point Units 6 and 7 COL FSAR, Section 3.2.

- PTN SUP 3.2-2

The NRC staff reviewed PTN SUP 3.2-2, related to the quality group classification of the deep well injection system included under Section 3.2.2 of the Turkey Point Units 6 and 7 COL FSAR. PTN SUP 3.2-2, Table 3.2-202, indicates Class E classification for the DIS components. As specified in AP1000 DCD, the Class E is used for nonsafety-related components that have no safety-related function to perform. These components do not contain sufficient radioactive material that a release could exceed applicable limits. Therefore, the classification is acceptable.

The following portion of this technical evaluation section is reproduced from Section 3.2.2.4 of the VEGP SER:

Special Treatment for Risk-Significant SSCs

GDC 1 identifies, in part, that SSCs important to safety shall be designed, fabricated, erected and tested to quality standards commensurate with the importance of the safety functions to be performed. Where generally recognized codes and standards are used, they shall be supplemented or modified as necessary to assure a quality product in keeping with the required safety function. Supplemental quality standards and QA programs applicable to passive SSCs used in non-safety-related regulatory treatment of non-safety systems that may be important to safety are not clearly defined in the BLN COL FSAR for site-specific SSCs.

In RAI 3.2.2-2, the applicant was requested to clarify what supplemental quality standards are applied to non-safety-related site-specific SSCs that are important to safety to ensure that all SSCs important to safety are designed, fabricated, erected, and tested to quality standards commensurate with the safety function to be performed. Any site-specific SSCs that are considered important to safety may also require special treatment, but the response to RAI 3.2.1-1 identified that there are no site-specific non-safety-related SSCs outside the scope of the DCD that are important to safety. Therefore, this concern is closed.

Codes and Standards

The Staff Requirements Memorandum (SRM), dated July 21, 1993, concerning SECY-93-087 identified that the staff will review passive plant design applications using the newest codes and standards endorsed by the NRC and unapproved revisions to the codes will be reviewed on a case by case basis. Editions of various codes and standards referenced in DCD Section 3.2.6 are not current and newer codes and standards are not referenced in BLN COL FSAR Sections 3.2 or 1.8. In RAI 3.2.2-3, the applicant was requested to clarify if any different or current codes and standards are applied to the design and procurement of site-specific SSCs, other than those identified in the DCD. The RAI response identified that the applicant intends to implement the DCD identified codes and standards and that the codes and standards applied to the design and procurement of non-safety-related site-specific SSCs are those identified in various sections of the BLN COL FSAR. Although codes and standards for site-specific SSCs would be expected to be identified and reviewed in the COL application rather than the DCD, the response to RAI 3.2.1-1 identified that there are no site-specific non-safety-related SSCs outside the scope of the DCD that are important to safety. Therefore, this concern is closed.

Consistency with RG 1.26, Revision 4

Section 3.2.2 of the BLN COL FSAR does not identify any departures relative to quality group classification identified in the DCD and BLN COL FSAR, Appendix 1AA identifies conformance with RG 1.26, Revision 3 in the DCD rather than Revision 4, dated March 2007. In RAI 3.2.2-1, the applicant was requested to clarify if quality group classifications of site-specific SSCs are consistent with RG 1.26, Revision 4. The applicant's response clarified that the quality group classification of site-specific SSCs is consistent with RG 1.26, Revision 4. This position is acceptable to the staff, since it represents the current RG revision. This staff concern is closed and the BLN COL FSAR Appendix 1AA has been revised accordingly to reflect this RAI response.

3.2.2.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.2.2.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR Part 50, Appendix A, GDC 1. The staff based its conclusion on the following:

- STD SUP 3.2-1 is acceptable with regard to quality group classifications because no change was made to the quality group classifications in Section 3.2 and there are no

site-specific nonsafety-related SSCs outside the scope of the AP1000 DCD that are important to safety. Therefore, the requirements of 10 CFR Part 50, Appendix A, GDC 1, the acceptance criteria in NUREG-0800, Section 3.2.2, and the guidelines in RG 1.26 are satisfied.

- PTN SUP 3.2-2 is acceptable with regard to quality group classifications because Class E is used for classification of the deep well injection system components. Therefore, the requirements of 10 CFR Part 50, Appendix A, GDC 1, the acceptance criteria in NUREG-0800, Section 3.2.2, and the scope of RG 1.26 are satisfied.

3.3 Wind and Tornado Loadings

Seismic Category I and II buildings and structures are designed to withstand extreme wind and tornado loading conditions in compliance with the requirements dictated in GDC 2 in Appendix A to 10 CFR Part 50, which states that SSCs important to safety shall be designed to withstand the effects of natural phenomena, such as earthquakes, tornadoes, hurricanes, floods, tsunamis, and seiches, without loss of capability to perform their safety functions. The design bases for these structures shall reflect the appropriate consideration of the most severe of the natural phenomena that have been historically reported in the area of the plant, with sufficient margin to account for limited accuracy, quantity, and period of time for collection of data.

In Section 3.3 of this SER, the staff reviewed the seismic Category I and II structures subjected to wind and tornado loadings; other natural-phenomena effects, such as earthquakes, floods, tsunamis, and seiches, are evaluated in Sections 3.4, 3.7, and 3.8 of this SER.

3.3.1 Wind Loadings

3.3.1.1 *Introduction*

Seismic Category I structures must withstand the effects of the specified design wind speed for the plant to ensure conformance with 10 CFR Part 50, Appendix A, GDC 2. The specific areas of review are the design wind speed, its recurrence interval, speed variation with height, and applicable gust factors from the standpoint of use in defining the input parameters for the appropriate structural design criteria for wind loading.

3.3.1.2 *Summary of Application*

Section 3.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.3 of the AP1000 DCD, Revision 19. Section 3.3 of the DCD includes Section 3.3.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.3.1, the applicant provided the following:

Departures

- PTN DEP 2.0-1

The portion of PTN DEP 2.0-1 included in Turkey Point Units 6 and 7 COL FSAR, Section 3.3.1 is identical to the information added by PTN COL 3.3-1 and is addressed by the staff in its evaluation of PTN COL 3.3-1 in this SER section.

AP1000 COL Information Items

- PTN COL 3.3-1

The applicant provided additional information in PTN COL 3.3-1 to address COL Information Item 3.3-1 (COL Action Item 3.3.2.2-1) by stating that the wind velocity characteristics for the Turkey Point Units 6 and 7 site are given in Turkey Point Units 6 and 7 COL FSAR, Section 2.3.1.3.1. The applicant stated that these values exceed the design wind velocities specified in AP1000 DCD, Section 3.3.1.1 for the standard AP1000 plant design. In addition, the applicant stated that the higher wind velocity does not have an adverse impact on the safety-related structures and components. The portion of PTN COL 3.3-1 relating to design tornado site characteristics and the effects of hurricane winds and windborne missiles on the safety-related SSCs due to failures in an adjacent AP1000 plant is reviewed in SER Section 3.3.2.

- PTN COL 3.5-1

The portion of PTN COL 3.5-1 included in Turkey Point Units 6 and 7 COL FSAR, Section 3.3.1 is identical to the information added by PTN COL 3.3-1 and is addressed by the staff in its evaluation of PTN COL 3.3-1 in this SER section. The additional information in PTN COL 3.5-1 included in Turkey Point Units 6 and 7 COL FSAR, Section 3.5 is addressed in Section 3.5 of this SER.

3.3.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for wind loadings are given in Section 3.3.1, Revision 3, of NUREG-0800.

The regulatory basis for PTN COL 3.3-1 is 10 CFR Part 50, Appendix A, GDC 2, and the regulatory guidance is in RG 1.76, "Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants," Revision 1, which states that SSCs important to safety shall be designed to withstand the effects of natural phenomena, such as earthquakes, tornados, hurricanes, floods, tsunami, and seiches, without loss of capability to perform their safety functions.

3.3.1.4 Technical Evaluation

The NRC staff reviewed Section 3.3 of Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to wind loadings. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 3.3-1

The NRC staff reviewed PTN COL 3.3-1 related to design wind loads applied on safety-related SSCs included under Section 3.3.1.1 of the Turkey Point Units 6 and 7 COL FSAR.

The commitment was also captured as COL Action Item 3.3.2.2-1 in NUREG-1793, Appendix F, "Combined License Action Items," which states:

COL applicants referencing the AP1000 certified design will address site interface criteria for wind and tornadoes.

The applicant stated in PTN COL 3.3-1 that the wind velocity characteristics for Turkey Point Units 6 and 7 are given in Turkey Point Units 6 and 7 COL FSAR, Section 2.3.1.3.1. The applicant stated that these values exceed the DCD design wind velocity values for the standard AP1000 plant.

For consistency, the NRC staff reviewed the site-specific information provided to address item PTN COL 3.3-1 referring FSAR Section 2.3.1.3.1. American Society of Civil Engineers (ASCE) 7-05 was used to validate wind design information in relation to the Turkey Point Units 6 and 7 site. The applicant has presented consideration to ASCE 7-05 in Table 2.0-201, "Comparison of AP1000 DCD Site Parameters and PTN Site Characteristics." In this table, the applicant identified the 3-second gust, 50-year return wind speed and 3-second gust, 100-year return wind speed to be 150 mph and 161 mph, respectively. FSAR Section 3.3.1.1 states that the Turkey Point Units 6 and 7 Maximum 50-year and 100-year return, 3-second-gust wind speeds based on Table C6-7 of ASCE 7-05 exceed the AP1000 design wind speed of 145 mph. The FSAR also states that the higher wind velocities do not have an adverse effect on safety-related structures and components. The staff generated RAI 4759, Question 03.03.01-1, to request a technical justification to support this statement and to request an explanation about the consideration given to the most severe natural phenomena historically reported, with sufficient margin, for the design of the safety-related structures.

In the response to RAI 4759, Question 03.03.01-1, dated August 30, 2010, the applicant stated that an analysis was performed using the 150-mph operating wind speed. During the same year, the analysis referred to in the RAI response was audited to confirm that the operating wind speed was used in accordance with ASCE 7-05 to produce structural loads. In its calculation, the applicant was able to show acceptable considerations to the guidance and to the site-specific operating wind velocity and topography.

Also, the applicant described the work performed to evaluate the most severe natural phenomena recorded for the site and vicinities. Hurricane Andrew was identified as producing the maximum reported wind speed for the Turkey Point Units 6 and 7. Hurricane Andrew produced higher wind speeds than the operating 3-second gust, 50- and 100-year return wind speeds. The staff performed detailed review of the acceptability of these parameters. The review is described in Section 2.3.1 of this SER. Higher velocity winds from hurricanes and tornadoes, and the effect of windborne missile impacts on safety-related SSCs, are discussed in Sections 3.3.2 and 3.5.3 of this SER.

Based on the above review, the staff finds that the information supplied by the applicant to close Action Item 3.3-1 for site interface criteria for wind is adequate in meeting the NRC regulatory requirements. Based on this, RAI 4759, Question 03.03.01-1, is resolved.

3.3.1.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.3.1.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 2. The staff based its conclusion on the following:

- PTN COL 3.3-1, as it relates to design wind loads, is acceptable based on the site-specific wind velocities, reviewed in Section 2.3 of this SER, even when these are not bounded by the AP1000 DCD design wind velocities. The staff was able to conclude this because the applicant provided a confirmatory calculation to demonstrate that the exceeding wind speeds will not cause adverse effects on the safety-related SSCs. The staff audited this calculation to confirm that the applicant followed acceptable guidance while considering the exceeding wind velocities. By doing so, the applicant addressed the site-specific operating wind criteria and therefore complies with GDC 2.

3.3.2 Tornado Loading

3.3.2.1 Introduction

Tornado loadings are considered for design in accordance with Section 3.3.2, "Tornado Loadings," of the AP1000 DCD. Section 3.3.2 of the AP1000 DCD addresses tornado loadings for seismic Category I structures using applicable tornado design parameters to determine forces on structures as explained in Section 3.3.1.2 of the AP1000 DCD. Also in Section 3.3.2.1 of the AP1000 DCD, it is stated that the estimated probability of tornado wind speeds to be greater than the design-basis tornado is between 10^{-6} and 10^{-7} per year for an AP1000 at a "worst location" anywhere within the contiguous United States.

The specific areas of review in accordance with Section 3.3.2 of NUREG-0800 include:

- the tornado wind translational and rotational speeds
- the tornado-generated atmospheric pressure change
- the spectrum of tornado-generated missiles

Similar considerations to hurricanes in the coastal and tropical regions, per RG 1.221 "Design-Basis Hurricane and Hurricane Missiles for Nuclear Power Plants," include:

- the hurricane wind speeds
- the spectrum of hurricane-generated missiles

3.3.2.2 Summary of Application

Section 3.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.3 of the AP1000 DCD, Revision 19. Section 3.3 of the DCD includes Section 3.3.2.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.3.2, the applicant provided the following:

AP1000 COL Information Items

- PTN COL 3.3-1

The applicant provided additional information in PTN COL 3.3-1 to resolve COL Information Item 3.3-1 (COL Action Item 3.3.2.2-1). In PTN COL 3.3-1, the applicant stated that tornado characteristics for Turkey Point Units 6 and 7, given in Section 2.3.1.3.2 of the Turkey Point Units 6 and 7 COL FSAR, are bounded by the tornado design parameters given in AP1000 DCD, Section 3.3.2.1 for the standard AP1000 plant. In addition, the applicant stated that the $1.0\text{E-}07$ annual exceedance probability hurricane wind speed of 260 mph at the Turkey Point site, based on RG 1.221, is bounded by the design tornado wind speed given in DCD Subsection 3.3.2.1; the effects of wind and tornado due to failures in an adjacent AP1000 plant are bounded by the evaluation of the buildings and structures in a single unit; and that the Turkey Point Units 6 & 7 site satisfies the site interface criteria for wind and tornado and will not have a tornado-initiated failure of structures and components. The applicant further stated that missiles caused by external events separate from the tornado are addressed in FSAR Subsections 3.3, 3.5.1.5, and 3.5.1.6. The portion of PTN COL 3.3-1 relating to design wind velocity characteristics is reviewed in SER Section 3.3.1.

- PTN COL 3.5-1

The portion of PTN COL 3.5-1 included in Turkey Point Units 6 and 7 COL FSAR, Section 3.3.2 is identical to the information added by PTN COL 3.3-1 and is addressed by the staff in its evaluation of PTN COL 3.3-1 in this SER section. The additional information in PTN COL 3.5-1 included in Turkey Point Units 6 and 7 COL FSAR, Section 3.5 is addressed in Section 3.5 of this SER.

3.3.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for tornado loading are given in Section 3.3.2, Revision 3, of NUREG-0800.

Acceptance of the information addressing PTN COL 3.3-1 is established based on site-specific parameters and verification of bounding conditions for relevant parameters related to the AP1000 DCD interface criteria for tornado, site arrangement, and building construction. The design of AP1000 safety-related SSCs for tornado loads, using acceptable procedures, must meet the requirements of 10 CFR Part 50, Appendix A, GDC 2, which states that SSCs important to safety shall be designed to withstand the effects of natural phenomena, such as earthquakes, tornados, hurricanes, floods, tsunamis, and seiches, without loss of capability to perform their safety functions.

3.3.2.4 Technical Evaluation

The NRC staff reviewed Section 3.3.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to tornado loading. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 3.3-1 and PTN 3.5-1

The NRC staff reviewed PTN COL 3.3-1 and PTN COL 3.5-1 included under Sections 3.3.2 and 3.5.1 of the Turkey Point Units 6 and 7 COL FSAR. Specific information provided by the applicant to address COL Action Item 3.3.2.2-1 includes development of site-specific parameters and verification of bounding conditions, site arrangement, and building construction. This information is provided to satisfy the commitment documented in Appendix F of NUREG-1793, which states:

COL applicants referencing the AP1000 certified design will address site interface criteria for winds and tornadoes.

In PTN COL 3.3-1, the applicant stated that the tornado characteristics for Turkey Point Units 6 and 7, given in Section 2.3.1.3.2 of the Turkey Point Units 6 and 7 COL FSAR, are bounded by the tornado design parameters given in DCD Section 3.3.2.1 for the standard AP1000 plant design. In addition, the applicant stated that the effects of wind and tornado due to failures in an adjacent AP1000 plant are bounded by the evaluation of the buildings and structures in a single unit.

In Section 2.3.1 of this SER, the staff concluded that tornado site characteristics chosen by the applicant were acceptable. Since these values match the design tornado site characteristics included in the AP1000 DCD, the staff concludes that the design tornado site characteristics for the Turkey Point site are in compliance with GDC 2.

The scope of PTN COL 3.3-1 also includes the effects of wind and tornado on the safety-related SSCs due to failure of nonsafety-related buildings in an adjacent AP1000 plant and Turkey

Point Units 6 and 7. The applicant states that these effects are bounded by the evaluation of the buildings and structures in a single unit.

In order to assure the failure of structures or components not designed for wind or tornado loadings does not affect the capability of safety-related SSCs to perform their intended safety functions, the COL applicants were offered three options in Section 3.3.2.3 of the AP1000 DCD:

- (1) Design the adjacent nonsafety-related structure to the design basis tornado loading.
- (2) Analyze the effect of failure of adjacent nonsafety-related structures on nuclear island (NI) structures to assure that no impairment of safety function will result.
- (3) Design a structural barrier to protect seismic Category I SSCs from adjacent structural collapse.

In PTN COL 3.3-1, the applicant used Option (2), indicating that the effects of wind and tornado on the safety-related SSCs due to failure of an adjacent nonsafety-related building are bounded by the evaluation of the structures in a single unit at Turkey Point Units 6 and 7. The analysis of the impact of building collapse on the NI structures is in Section 3.7.2.8 of the AP1000 DCD. The staff's review of this analysis is provided in NUREG-1793 and its supplements.

RG 1.221 provides the NRC staff position for selection of design-basis hurricane wind speeds and hurricane-generated missiles that a new nuclear power plant should be designed for to prevent undue risk to public health and safety. As described in Section 2.3 of this SER, the staff compared the information provided in the FSAR Section 2.3 regarding hurricane winds against the information in RG 1.221. The applicant provided additional information in its response to RAI 6251, Question 02.03.01-3, dated May 14, 2012, regarding the effects of hurricane wind and hurricane missile on safety-related structures and a comparison between DCD Tier 1 tornado-generated missiles and those in RG 1.221. The evaluation of the three missiles (1-in diameter steel sphere, 6-in diameter pipe, and 4,000 lbs automobile) compared velocities generated from both hurricane and tornado events. All vertical velocities generated by the tornado were higher than those from the hurricane. Using the horizontal velocities of the steel sphere and the 6-in pipe, the applicant performed a local analysis calculation to confirm that the wall thicknesses of the NI structures are sufficient to prevent penetration and scabbing. The penetration and scabbing generated from the steel sphere in a concrete wall were both estimated to be less than 2 inches. For the 6-in diameter pipe, the applicant stated that wall thickness needed to avoid penetration and scabbing were determined to be within the minimum thickness provided for the NI external walls. These calculations were verified by the staff to be acceptable, based on a staff confirmatory analysis that considered the concrete barrier design procedure in Section 3.5.3 of the AP1000 DCD.

The effect of the automobile missile over the concrete wall was evaluated by the applicant using shear stress and ductility analyses. After reviewing this portion of the response, the staff had questions about the use and consideration of the automobile missile in the load combinations used for structural analysis, as stated in Standard Review Plan (SRP) Section 3.3.2. Guidance in the SRP Section 3.3.2, and design codes like ACI 349 and Section III of the ASME Code, highlights the need to combine the wind pressure with the missile impact load to estimate the extreme environmental load. This information was not part of the response. Also, the staff was concerned about the potential damage the steel sphere could generate on the protecting barriers of structural openings of safety related structures. Because of the higher wind

velocities and the expanded hurricane's wind field area, it is expected that missiles could travel faster; becoming more energetic towards impact. Given these outstanding questions and concerns, the staff generated RAI 6544, Question 03.05.03-1 which supersedes RAI 6251, Question 02.03.01-3. As a result, RAI 6251, Question 02.03.01-3 is closed. As part of its response to RAI 6251, Question 2.03.01-3, the applicant provided draft revisions to the FSAR that included the hurricane missiles as part of the design parameters. The staff was able to confirm the inclusion of the draft revisions in Revision 7 of the FSAR.

In the applicant's response to RAI 6544, Question 03.05.03-1, dated May 9, 2014, the applicant explained the dynamic FEM time-history analysis performed to evaluate the different walls that were used to estimate the shear stress demands, using the forcing function for the automobile impact load from the AP1000 DCD. The applicant explained how the critical sections for the walls were selected for evaluation and provided values for the punching shear, the one-way response beam reaction shear and the allowable shear values for each of the walls considered for the analysis. In addition, the applicant explained how the walls were selected in order to consider potentially vulnerable locations around the NI. The staff performed an audit to support the statements that the automobile missile would not compromise the integrity of the NI walls.

During the audit, the staff reviewed the applicant's calculation notes for the automobile missile impact analysis described in its response and found the calculation results to be consistent with the results presented in its response. The applicant demonstrated that for the most critical case of all the walls considered, sufficient capacity to demand margin still exist. Furthermore, demands for the impact at the corner, the edge and at the center of the critical walls were compared to shear capacities specified by ACI Code 349-01, and demonstrated that the external walls are capable of withstanding the automobile missile impact without compromising the safety related function of the structural barrier. The staff prepared an audit report which summarized the detail information of the audit (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16105A431).

The staff reviewed the additional and supplement information provided by the applicant as result of the audit and verified the missile velocities used as evaluated in the SER section 3.5.2. On the bases of its review, the staff finds that the applicant's evaluation of the external walls are capable of withstanding the automobile missile impact without compromising the safety related function of the structural barrier. Therefore, it is acceptable to the staff..

Based on the above discussion, the NRC staff finds PTN COL 3.3-1 and PTN COL 3.5-1 to be resolved. As such, RAI 6544, Question 03.05.03-1, is being tracked as **Confirmatory Item 3.5-1** pending the applicant's update of the FSAR.

Resolution of Turkey Point Confirmatory Item 3.5-1

Confirmatory Item 3.5-1 is an applicant commitment to revise its FSAR Sections 3.5.2 and 3.5.5 regarding hurricane-generated missile protection. The staff verified that the Turkey Point Units 6 and 7 COL FSAR, Revision 8 was appropriately revised. As a result, Confirmatory Item 3.5-1 is now closed.

3.3.2.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.3.2.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that, the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR, Section 3.3.2 is acceptable and meets the requirements of 10 CFR Part 50, Appendix A, GDC 2. The staff based its conclusion on the following:

- PTN COL 3.3-1, as it relates to design tornado loads, is acceptable based on the design tornado site characteristics, reviewed in Section 2.3 of this SER, matching the AP1000 DCD design tornado site characteristics and, therefore, complying with GDC 2. PTN COL 3.3-1, as it relates to the effects of wind and tornado on the safety-related SSCs due to failure of nonsafety-related buildings in an adjacent AP1000 plant, is acceptable because the applicant incorporated by reference acceptable methodology from AP1000 DCD, Section 3.7.2.8.
- PTN COL 3.5-1, as it relates to hurricane missiles that are more energetic than the tornado missiles in the AP1000 DCD, is acceptable based on the evaluation of hurricane missile effects on the Turkey Point Units 6 and 7 safety-related structures in response to RAI 6544, Question 03.05.03-1, and therefore, complies with GDC 2.

3.4 Water Level (Flood) Design

3.4.1 Flood Protection

3.4.1.1 Introduction

Seismic Category I SSCs have flood protection measures for both external flooding and postulated internal flooding from plant component failures.

3.4.1.2 Summary of Application

Section 3.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.4 of the AP1000 DCD, Revision 19. Section 3.4 of the DCD includes Section 3.4.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.4, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 3.4-1

The applicant provided additional information in PTN COL 3.4-1 to resolve COL Information Item 3.4-1 (COL Action Item 3.4.1.1-1), which addresses plant-specific information on

site-specific flooding hazards protective measures. PTN COL 3.4-1, in Turkey Point Units 6 and 7 COL FSAR, Section 3.4.1.3, "Permanent Dewatering System," states that no permanent dewatering system is required because site groundwater levels are 2 ft below site grade level as described in Turkey Point Units 6 and 7 COL FSAR, Section 2.4.1.2.5.

PTN COL 3.4-1, in Turkey Point Units 6 and 7 COL FSAR, Section 3.4.3, "Combined License Information," states that the site-specific water levels given in Turkey Point Units 6 and 7 COL FSAR, Section 2.4 satisfy the interface requirements identified in AP1000 DCD, Section 2.4.

3.4.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for flood protection measures are given in Section 3.4.1, Revision 3, of NUREG-0800.

Further, the acceptance criteria associated with the relevant requirements of the NRC regulations for the identification of floods and flood design considerations are given in Section 2.4.12, Revision 3, of NUREG-0800.

3.4.1.4 Technical Evaluation

The NRC staff reviewed Section 3.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to flood protection measures. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 3.4-1

The NRC staff reviewed PTN COL 3.4-1, which addresses the permanent dewatering system and site-specific water levels in Sections 3.4.1.3 and 3.4.3 of the Turkey Point Units 6 and 7 COL FSAR, respectively.

The applicant provided additional information in PTN COL 3.4-1 to address COL Information Item 3.4-1. COL Information Item 3.4-1 states:

The Combined License applicant referencing the AP1000 certified design will demonstrate that the site satisfies the interface requirements as described in Section 2.4. If these criteria cannot be satisfied because of site-specific flooding

hazards, the Combined License applicant may propose protective measures as discussed in Section 2.4.

The commitment was also captured as COL Action Item 3.4.1.1-1 in Appendix F of NUREG-1793, which states:

The COL applicant will evaluate events leading to potential flooding and demonstrate that the design will fall within the values of these site parameters.

In Turkey Point Units 6 and 7 COL FSAR, Section 3.4, the applicant provided the following plant-specific information to resolve COL Information Item 3.4-1 (COL Action Item 3.4.1.1-1) on site-specific flooding hazards protective measures:

- PTN COL 3.4-1, in Turkey Point Units 6 and 7 COL FSAR, Section 3.4.1.3, "Permanent Dewatering System," states that no permanent dewatering system is required because site groundwater levels are 2 ft below site grade level as described in Turkey Point Units 6 and 7 COL FSAR, Section 2.4.1.2.5.
- PTN COL 3.4-1, in Turkey Point Units 6 and 7 COL FSAR, Section 3.4.3, "Combined License Information," states that the site-specific water levels given in Turkey Point Units 6 and 7 COL FSAR, Section 2.4 satisfy the interface requirements identified in AP1000 DCD, Section 2.4.

In Section 2.4.12 of this SER, the staff accepted the Turkey Point Units 6 and 7 applicant's position that no permanent dewatering system is required and that the site-specific groundwater characteristics for the Turkey Point Units 6 and 7 site fall within the Tier 1 and Tier 2 DCD parameter values. Therefore, the staff concludes that the site-specific information in PTN COL 3.4-1 is acceptable.

3.4.1.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.4.1.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the regulatory guidance in Sections 2.4.12 and 3.4.1 of NUREG-0800. The staff based its conclusion on the following:

- PTN COL 3.4-1, is acceptable based on the staff's conclusions in NUREG-1793 regarding the need for a permanent dewatering system and on the staff's conclusions in

Section 2.4.12 of this SER regarding the adequacy of the site-specific groundwater levels.

3.4.2 Analytical and Test Procedures (Related to RG 1.206, Section C.III.1, Chapter 3, C.I.3.4.2, "Analysis Procedures")

Analysis methods and procedures are described for the design of AP1000 standard plants to assess the maximum water levels due to internal flooding caused by equipment failure or external flooding caused by natural phenomena and make sure that they do not jeopardize the safety of the plant or the ability to achieve and maintain safe shutdown conditions.

Section 3.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 3.4.2, "Analytical and Test Procedures," of Revision 19 of the AP1000 DCD. Section 3.4.2 of the AP1000 DCD states that the analytical approach for external and internal flooding events is described in DCD Section 3.4.1.2, "Evaluation of Flooding Events." The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

3.5 Missile Protection

Seismic Category I structures are analyzed and designed to be protected from a wide spectrum of missiles (e.g., missiles from rotating and pressurized equipment, gravitational missiles, and missiles generated from tornado winds). Once a potential missile is identified, its statistical significance is determined (a significant missile is one that could cause unacceptable consequences or violate the requirements of 10 CFR Part 100, "Reactor Site Criteria").

3.5.1 Missile Selection and Description

3.5.1.1 *Introduction*

SSCs important to safety are protected against internally generated missiles (outside containment), in accordance with Section 3.5.1.1 of NUREG-0800. The missiles generated outside containment by rotating or pressurized (high-energy fluid system) equipment are included.

The design credits only safety-related systems to establish and maintain safe shutdown conditions. The safety-related systems and components needed to bring the plant to safe shutdown, including the main control room, are located inside the containment shield building and the auxiliary building. Both buildings are seismic Category I NI structures having thick structural concrete walls that provide internal and external missile protection. No nonsafety-related systems or components that require protection from missiles are housed in these buildings.

All SSCs that are necessary to perform safety functions are to be protected against damage from the following:

- internally generated missiles (outside containment)
- internally generated missiles (inside containment)
- turbine missiles
- missiles generated by tornadoes and extreme winds
- site proximity missiles (except aircraft)
- aircraft hazards

3.5.1.2 Summary of Application

Section 3.5 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.5 of the AP1000 DCD, Revision 19. Section 3.5 of the DCD includes Section 3.5.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.5, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 3.3-1 and PTN COL 3.5-1

The applicant provided additional information in PTN COL 3.3-1 to resolve COL Information Item 3.3-1 (COL Action Item 3.3.2.2-1) and PTN COL 3.5-1 to resolve COL Information Item 3.5-1 (COL Action Item 3.5.1.5-1).

PTN COL 3.3-1 and PTN COL 3.5-1, in Turkey Point Units 6 and 7 COL FSAR, Section 3.5.1.4, "Missiles Generated by Natural Phenomenon," state that hurricane missiles are defined in accordance with RG 1.221. PTN COL 3.3-1 and PTN COL 3.5-1 also state that the hurricane missile parameters considered for Turkey Point Units 6 and 7 are summarized in Table 3.5-201. This information was provided under Section 3.5.2 of the Turkey Point Units 6 and 7 COL FSAR and is reviewed under Section 3.5.2 of this report.

PTN COL 3.3-1 and PTN COL 3.5-1, in Turkey Point Units 6 and 7 COL FSAR, Section 3.5.1.5, "Missiles Generated by Events near the Site," state that the buildings and structures at the Turkey Point Units 6 and 7 site are common structures at a nuclear power plant. They are of similar design and construction to those that are typical at nuclear power plants. Therefore, any missiles resulting from a tornado-initiated failure are not more energetic than tornado missiles postulated for design of the AP1000. Also, PTN COL 3.3-1 and PTN COL 3.5-1 state that Turkey Point Units 6 and 7 COL FSAR, Section 2.2.3 explosion overpressure effects did not exceed the 1-psi (7-kPa) criterion of RG 1.91, "Evaluations of Explosions Postulated To Occur on Transportation Routes near Nuclear Power Plants," and state that blast-generated missile effects are not considered further because overpressure is the controlling effect and its criterion is not exceeded.

In addition, PTN COL 3.3-1 and PTN COL 3.5-1 in Turkey Point Units 6 and 7 COL FSAR, Section 3.5.1.6, "Aircraft Hazards," state that no further evaluation of aircraft impact is required, because the core damage frequency (CDF) associated with aircraft impacts is less than 1×10^{-8} per year.

Supplemental Information

- STD SUP 3.5-1

The applicant provided supplemental information by adding text to the end of AP1000 DCD, Section 3.5.1.3. This supplemental information states that the potential for a turbine missile from another AP1000 plant in close proximity has been considered for Turkey Point Units 6 and 7 in accordance with RG 1.115, "Protection against Low-Trajectory Turbine Missiles," Revision 1.

- STD SUP 3.5-2

The applicant provided supplemental information by stating that the turbine system maintenance and inspection program is discussed in AP1000 DCD, Section 10.2.3.6.

- PTN SUP 3.5-1

The applicant provided supplemental information by stating that there is no turbine missile hazard from Units 1 through 5. The basis for the applicant's conclusion is that the five existing steam turbine generators are oriented along an N/S axis and are located far enough north of Turkey Point Units 6 and 7, and therefore, there is no potential for turbine missiles from Units 1 through 5.

3.5.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for missile selection and description are given in Revision 3 of Sections 3.5.1.1 through 3.5.1.3 and Revision 4 of Sections 3.5.1.4 through 3.5.1.6, of NUREG-0800.

The regulatory basis for acceptance of PTN COL 3.5-1 is based on the development of site-specific parameters and verification of bounding conditions compared to the DCD interface criteria for missile generation, site arrangement, and building construction. The design of AP1000 safety-related structures for protection against missiles using acceptable procedures must meet the requirements of Appendix A to 10 CFR Part 50, GDC 4, "Environmental and Dynamic Effects Design Bases." Section 100.21, "Non-Seismic Siting Criteria," paragraph (e), provides regulatory requirements for potential hazards associated with nearby transportation routes, and industrial and military facilities.

Additional regulatory guidance related to the review of the issues in this SER section are given in RG 1.91, Revision 1, and RG 1.115.

3.5.1.4 Technical Evaluation

The NRC staff reviewed Section 3.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's

review confirmed that the information in the application and incorporated by reference addresses the required information relating to missile protection of safety-related SSCs. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN, Units 3 and 4, COL application.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Items

- PTN COL 3.3-1 and PTN COL 3.5-1

The NRC staff reviewed the COL Information Item PTN COL 3.5-1 and PTN COL 3.3-1 related to missiles generated by natural phenomenon under Section 3.5.1.4 of the Turkey Point Units 6 and 7 COL FSAR. This information was provided under Section 3.5.2 of the Turkey Point Units 6 and 7 COL FSAR and is reviewed under Section 3.5.2 of this report.

The NRC staff reviewed the COL Information Item PTN COL 3.5-1 and PTN COL 3.3-1 related to missiles generated by events near the site included under Section 3.5.1.5 of the Turkey Point Units 6 and 7 COL FSAR. The applicant provided site-specific information to resolve the COL information items. The applicant described and evaluated the potential missile generation events near the site in FSAR Section 2.2.3 and concluded that the explosion overpressure effects did not exceed the 1-psi (7-kPa) criterion of RG 1.91. Therefore, the applicant found that no further evaluation of postulated missiles is required, as the effect of postulated missiles will be less than those associated with the overpressure levels considered in RG 1.91.

The applicant evaluated potential aircraft hazards following the approach and methodology outlined in NUREG-0800, Section 3.5.1.6, "Aircraft Hazards," and determined the effects of an aircraft crash on safety-related structures in the site. The probability of whether aircraft accidents resulting in radiological consequences would be greater than the 10 CFR Part 100 exposure guidelines was determined by the applicant based on the following:

One airport, Homestead Air Reserve Base, located approximately 7.66 km (4.76 miles) from the Turkey Point Units 6 and 7, and one federal airway (V3) passing within 3.2 km (two miles) of the Turkey Point Units 6 and 7.

The applicant addressed the COL Information Item PTN COL 3.5-1 in COL FSAR, Section 3.5.1.6, "Aircraft Hazards," based on the discussion in COL FSAR Section 2.2.2.7. The applicant determined a total aircraft impact probability of 3.86×10^{-6} per year. Since the details of the total aircraft impact probability determination are not provided, the staff could not fully review and perform the confirmatory calculations. Therefore, the staff requested additional information (RAI 5414, Question 03.05.01.06) from the applicant for the details of assumptions, data, and calculations. In a letter dated August 24, 2011, the applicant provided the response with details in determining the aircraft crash probability. The applicant provided a revision to FSAR Section 2.2.2.7, and staff confirmed the incorporation of this revised information in FSAR Revision 3. However, the staff found it was not reflected in FSAR Section 3.5.1.6. It was incorporated later into FSAR Revision 5, Section 3.5.1.6, and the staff confirmed this. Because the aircraft crash probability exceeded the acceptance criterion of 1×10^{-7} per year, an evaluation to demonstrate that the CDF associated with the aircraft impacts is less than 1×10^{-8} per year was performed in FSAR Section 19.58.2.3.1. Therefore, the applicant concluded, based on the determined CDF, that aircraft hazards pose no undue risk to the health and safety of the public.

The staff reviewed the applicant's response to RAI 5414, Question 03.05.01.06, and performed independent calculations using conservative total flight data within 5 mi of the plant obtained from the Federal Aviation Administration. The staff determined a total aircraft accident probability of about 5.26×10^{-7} per year by using an average crash rate of 3×10^{-9} per aircraft-mile, which is less than the acceptance criteria of 10^{-6} per year in NUREG-0800, Section 3.5.1.6.

On the basis of the confirmatory analysis and the review of the applicant's assumptions and data used for the estimation of aircraft accident probability, the staff concludes that aircraft hazards have no undue risk to the Turkey Point Units 6 and 7 operation nor to the health and safety of the public and that the relevant requirements of 10 CFR 100.20, "Factors To Be Considered when Evaluating Sites," are met. This conclusion is based on the staff's independent verification of the applicant's assessment of aircraft hazards at the site that resulted in a probability less than an order of magnitude of 10^{-7} per year for an accident having radiological consequences in excess of the exposure guidelines provided in 10 CFR 50.34(a)(1).

The following portion of this technical evaluation section is reproduced from Section 3.5.1.4 of the VEGP SER:

Supplemental Information

- STD SUP 3.5-1

The NRC staff reviewed the standard supplementary information (STD SUP 3.5-1) on the probability of turbine missiles from another AP1000 plant in close proximity affecting SSCs. The applicant proposes to add to the AP1000 DCD, Section 3.5.1.3, a statement that the potential for a turbine missile from another AP1000 plant in close proximity is less than 1×10^{-5} per year, and that the reinforced concrete shield building and auxiliary building walls, roofs, and floors satisfies the guidance of RG 1.115 for two AP1000 plants side-by-side.

It should be noted that AP1000 DCD, Section 1.2.2 refers to Figure 1.2 2 of the AP1000 DCD for the building structure orientation with respect to the turbine building and the nuclear island. Figure 1.2 2 illustrates the AP1000 plant as a single unit. Section 1.2.1.3.1 of the AP1000 DCD also states that the turbine orientation minimizes potential interaction between turbine missiles and safety-related structures and components. In addition, Section 3.5.1.3 of the AP1000 DCD states that the turbine generator is located north of the nuclear island with its shaft oriented north-south so that safety-related systems are located outside the high-velocity, low trajectory missile strike zone. With this information, the AP1000 design is considered to favorably orient the turbine building with respect to safety-related SSCs as defined in RG 1.115. However, since BLN Units 3 and 4 will be side-by-side, the staff notes that each turbine generator may not be oriented favorably with respect to the other plant's safety-related SSCs (i.e., BLN Unit 3 turbine generator not favorably orientated to BLN Unit 4 safety-related SSCs, and vice versa).

*In Revision 1 of the BLN COL FSAR, the applicant revised STD SUP 3.5-1 to state that when two or more AP1000 units are situated side-by-side, the turbine generators are orientated unfavorably with respect to the other nuclear island which contains safety-related SSCs. The BLN site has two AP1000 units situated side-by-side. Therefore, the staff notes that to meet the guidance of RG 1.115 and Section 3.5.1.3 of NUREG-0800, for an unfavorable turbine generator orientation, the probability of generating a turbine missile must be equal to or less than 1×10^{-5} per year. As stated in the BLN COL FSAR, Section 3.5.1.3, the probability of generating a missile for the AP1000 turbine generator is less than 1×10^{-5} per year as calculated in the applicable bounding turbine missile analysis topical report referenced in the AP1000 DCD, Sections 3.5.1.3 and 10.2.8. The staff has not completed its review of the DCD with respect to this issue. Therefore, the staff is unable to make final determination. This is **Open Item 1-1**.*

- STD SUP 3.5-2

STD SUP 3.5-2 to BLN COL, Section 3.5.1.3 states, "The turbine system maintenance and inspection program is discussed in Section 10.2.3.6." This statement refers to Section 10.2.3.6 of the BLN COL, for information concerning the turbine maintenance and inspection program. The staff's review of the

turbine maintenance and inspection program is included in Section 10.2.3 [sic 10.2] of this SER.

Resolution of the Standard Content Evaluation Concerning Open Item 1-1 for Turbine Missiles

The NRC staff identified a statement in the text reproduced above from Section 3.5.1.4 of the BLN SER that requires clarification for the VEGP COL application. The BLN SER states that the review of the AP1000 DCD with respect to the probability of generating a turbine missile was not completed and, therefore, identified it as Open Item 1-1. The results of the NRC staff's technical evaluation of the AP1000 DC amendment application are documented in NUREG-1793 and its supplements, and include the final staff conclusions on the issue of probability of a missile striking a safety-related component.

Therefore, the staff finds that the probability of generating a turbine missile meets the guidance in Section 3.5.1.3 of NUREG-0800 and the requirements of GDC 4, since the probability of a missile striking a safety-related component is acceptably low. As an additional conservative measure, the shield building and auxiliary building walls, roofs, and floors provide some inherent protection of the safety-related components, but are not credited in preventing turbine missile strikes of safety-related components. As a result, Open Item 1-1, as it relates to the probability of a missile striking a safety-related component, is closed for the VEGP application review.

- PTN SUP 3.5-1

The applicant provided supplemental information by stating that the potential for turbine missiles from Units 1 through 5 has been considered and that the guidance of RG 1.115 is satisfied based on orientation and distance. Therefore, the applicant stated that there is no potential for turbine missiles from Units 1 through 5 to impact Turkey Point Units 6 and 7. The NRC staff reviewed and evaluated this information and finds that the potential turbine orientation and placement provides a high degree of confidence that low-trajectory missiles resulting from turbine failures will not damage essential systems. Therefore, the staff considers the applicant's conclusions acceptable.

3.5.1.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.5.1.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the regulatory guidance in Sections 3.5.1.1 through 3.5.1.6 of NUREG-0800. The staff based its conclusion on the following:

- PTN COL 3.3-1 and PTN COL 3.5-1 are acceptable because they meet the acceptance criteria provided in Sections 3.5.1.5 and 3.5.1.6 of NUREG-0800.
- STD SUP 3.5-1 is acceptable because the turbine missile evaluation for co-located AP1000 units meets the guidance of NUREG-0800, Section 3.5.1.3; therefore, it ensures that the requirements of GDC 4 are met for protecting safety-related SSCs against the effects of turbine missiles.
- STD SUP 3.5-2 provides information on the turbine maintenance and inspection program. The staff's review of the turbine maintenance and inspection program is included in Section 10.2 of this SER.
- PTN SUP 3.5-1 is acceptable because the protection of safety-related SSCs from turbine missiles meets the acceptance criteria defined in NUREG-0800, Section 3.5.1.

3.5.2 Protection from Externally Generated Missiles

3.5.2.1 Introduction

Systems required for safe shutdown are protected from the effects of missiles. Protection from external missiles, including those generated by natural phenomena, is provided by the external walls and roof of the seismic Category I NI structures. The external walls and roofs are reinforced concrete. The structural design requirements for the shield building and auxiliary building are outlined in AP1000 DCD, Section 3.8.4. Openings through these walls are evaluated on a case-by-case basis to provide confidence that a missile passing through the opening would not prevent safe shutdown and would not result in an offsite release exceeding the limits defined in 10 CFR Part 100.

3.5.2.2 Summary of Application

Section 3.5.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.5.2, "Protection from Externally Generated Missiles," of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.5.2, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 3.5-1

The applicant provided additional information in Turkey Point Units 6 and 7 COL FSAR, Sections 3.5.1.4 and 3.5.2 to resolve COL Information Item PTN COL 3.5-1. COL FSAR, Section 3.5.2 identifies the horizontal and vertical velocities of design-basis missiles generated by site-specific hurricane winds.

Supplemental Information

- PTN SUP 3.3-1

The applicant provided supplemental information by adding Table 3.5-201 to AP1000 DCD, Section 3.5. This supplemental information provides a summary of the site-specific hurricane-generated missile parameters and compares them to AP1000 DCD, Tier 1, Table 5.0-1 tornado-generated missile parameters.

3.5.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for protection from externally generated missiles are given in Sections 3.5.1.4, Revision 4, and 3.5.2, Revision 3, of NUREG-0800.

The regulatory basis for acceptance of PTN COL 3.5-1 is based on the development of site-specific parameters compared to the DCD missile parameters. The design of AP1000 safety-related structures for protection against missiles using acceptable procedures must meet the requirements of 10 CFR Part 50, Appendix A, GDC 2 and GDC 4.

Additional regulatory guidance related to the review of the issues in this SER section are given in RG 1.221.

3.5.2.4 Technical Evaluation

The NRC staff reviewed Section 3.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to missile protection of safety-related SSCs. The results of the NRC staff's evaluation of the information incorporated by reference in the PTN COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

AP1000 COL Information Item

- PTN COL 3.5-1

PTN COL 3.5-1 requests COL applicants to evaluate whether the site characteristics for wind and tornadoes satisfy the AP1000 site parameters for wind and tornado conditions. If there are exceedances, they must be discussed and shown to be acceptable. In Section 3.5.2 of the Turkey Point Units 6 and 7 COL FSAR, the applicant provided additional information to address this COL information item.

The staff reviewed the information contained in the Turkey Point Units 6 and 7 COL FSAR, Section 3.5.2. The review evaluated the applicant's assessment of possible hazards attributed to missiles generated by extreme winds (such as hurricanes and tornados) identified in FSAR Section 3.5.

RG 1.221 provides new guidance that the NRC staff considers acceptable for use in selecting the design-basis hurricane wind speed and hurricane-generated missiles that a new nuclear power plant should be designed to withstand to prevent undue risk to public health and safety. In response to RAI 6251, Question 02.03.01-3, the applicant addressed hurricane-generated missiles in Turkey Point Units 6 and 7 COL FSAR, Section 3.5-1 and provided hurricane missile spectra and associated velocities based on RG 1.221, and a discussion on whether the individual missile velocities are bounded by the AP1000 DCD. Subsequently, the last bullet of Turkey Point Units 6 and 7 COL FSAR, Section 3.5.2 discussing the automobile missile was revised in response to RAI 6544, Question 3.05.03-34.

The applicant concludes in Turkey Point Units 6 and 7 COL FSAR, Section 3.5.2 that the AP1000 DCD design-basis tornado missile vertical velocities of the automobile, 8-in. (275-lb) artillery shell, and the 1-in. steel sphere bound similar missiles subject to the site-specific hurricane wind of 260 mph. However, the site-specific hurricane winds result in horizontal missile velocities that exceed the AP1000 DCD tornado missile velocities for all three potential missiles. As a result, the applicant evaluated the impact of the site-specific hurricane-generated missiles on the exterior walls of the NI and concluded the Turkey Point Units 6 and 7 NI is adequately protected against the hurricane-generated missile spectra of RG 1.221. The staff's evaluation of the wind and missile loading and structural engineering aspects of RAI 6251, Question 02.03.01-3 and RAI 6544, Question 03.05.03-34 is in Section 3.3.2 of this SER.

In addition, the applicant provided PTN SUP 3.3-1, Table 3.5-201, which compares the site-specific hurricane-generated missile spectra and associated velocities to AP1000 DCD, Tier 1, Table 5.0-1 tornado-generated missile parameters.

The staff reviewed the additional and supplemental information provided by the applicant and verified that the methodologies used to calculate the site-specific hurricane missile spectra and associated velocities are consistent with Figure 2, Table 1, and Table 2 of RG 1.221. On the basis of its review, the staff concludes that the information in Turkey Point Units 6 and 7

COL FSAR, Section 3.5.2 associated with PTN COL 3.5-1 and PTN SUP 3.3-1 adequately addresses COL Information Item 3.5-1 and is acceptable because the site-specific hurricane missile parameters conform to the guidance of RG 1.221.

3.5.2.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.5.2.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 2 and GDC 4 with respect to missiles and environmental effects. The staff based its conclusion on the following:

- PTN COL 3.5-1 and STD SUP 3.3-1 are acceptable because they meet the acceptance criteria provided in Sections 3.5.1.4 and 3.5.2 of NUREG-0800, and conform to RG 1.221.

3.5.3 Barrier Design Procedures

Missile barriers and protective structures are designed to withstand and absorb missile impact loads to prevent damage to safety-related systems or components. Formulae used for missile penetration calculations into steel or concrete barriers are the Modified National Defense Research Committee formula for concrete and either the Ballistic Research Laboratory or Stanford formulae for steel as documented in AP1000 DCD, Section 3.5.3.

Section 3.5 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.5.3, "Barrier Design Procedures," of the AP1000 DCD, Revision 19, without any departures or supplements. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

3.6 Protection against Dynamic Effects Associated with the Postulated Rupture of Piping

3.6.1 Introduction

The design basis and criteria are described to demonstrate that safety-related systems are protected from pipe ruptures. This section also evaluates design bases for locating postulated breaks and cracks in high- and moderate-energy piping systems inside and outside the

containment; the procedures used to define the jet thrust reaction at the break location; the procedures used to define the jet impingement loading on adjacent essential SSCs; pipe whip restraint design; and the protective assembly design. Pipe breaks in several high-energy systems, including the reactor coolant loop and surge line, are replaced by small leakage cracks when the leak-before-break (LBB) criteria are applied. Jet impingement and pipe whip effects are not evaluated for these small leakage cracks.

Mechanistic pipe break evaluations (also referred to as LBB) demonstrate that, for piping lines meeting the criteria, sudden catastrophic failure of the pipe is not credible. The evaluations demonstrate that piping that satisfies the criteria leaks at a detectable rate from postulated flaws prior to growth of the flaw to a size that would fail due to applied loads resulting from normal conditions, anticipated transients, and a postulated SSE.

3.6.2 Summary of Application

Section 3.6 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.6 of the AP1000 DCD, Revision 19. Section 3.6 of the DCD includes Section 3.6.4.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.6.4, the applicant provided the following:

AP1000 COL Information Items

- STD COL 3.6-1

The applicant provided additional information in STD COL 3.6-1 to address COL Information Item 3.6-1. Specifically, the applicant stated that a pipe rupture hazard analysis is part of the piping design. It is used to identify postulated break locations and layout changes, support design, whip restraint design, and jet shield design. The applicant further stated that the final design of these activities will be completed prior to fabrication and installation of the piping and connected components.

- STD COL 3.6-4

The applicant provided additional information in STD COL 3.6-4 to address COL Information Item 3.6-4, regarding LBB inspections.

License Condition

- Part 10, License Condition 2, Item 3.6-1

The applicant has proposed a license condition addressing the completion schedule of the as-designed pipe rupture hazards analysis.

Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)

This license condition is the same as that proposed by the VEGP in its application, that proposed ITAAC requires the completion of an as-designed pipe rupture hazards analysis to demonstrate that SSCs required to be functional during and following a postulated pipe failure

are protected against or qualified to withstand the dynamic and environmental effects resulting from postulated failures in high- and moderate-energy piping.

3.6.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations (GDC 4 of Appendix A to 10 CFR Part 50) for the piping design against pipe breaks, pipe break locations and characteristics in safety-related piping, and LBB evaluation procedures are given in Sections 3.6.1, Revision 3; 3.6.2, Revision 2; and 3.6.3, Revision 1, of NUREG-0800.

The regulatory basis for terms or conditions of the combined licenses is established in 10 CFR 52.79(d)(3). Specifically, it states that any requirements and restrictions set forth in the referenced design certification rule (DCR) that could not be satisfied by the time of issuance of the combined license, must be set forth as terms or conditions of the combined license.

3.6.4 Technical Evaluation

The NRC staff reviewed Section 3.6 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the piping design against pipe break, pipe break locations and characteristics in safety-related piping, and LBB evaluation procedures. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content

material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN, Units 3 and 4, COL application. The one confirmatory item in the standard content material retains the number assigned in the VEGP SER.

AP1000 COL Information Items

The following portion of this technical evaluation section is reproduced from Section 3.6.4 of the VEGP SER:

- STD COL 3.6-1

The staff notes that there are two different actions to be addressed: 1) the COL holder item addresses the as-designed pipe rupture hazard analysis report; and 2) the ITAAC addresses as-built reconciliation of the pipe rupture hazard analysis report. The ITAAC has a stated schedule, prior to fuel load, and a regulatory requirement that the ITAAC schedule be provided one year after the license is granted.

Based on the review of the information included in the BLN COL FSAR, it is unclear to the staff when the as-designed pipe rupture hazard analysis report will be completed by the applicant. As identified in 10 CFR 52.79(d)(3), the applicant should supply the NRC with a schedule for completion of detailed engineering information, in this case, the as-designed pipe rupture hazard analysis report. The applicant is requested to revise the implementation milestone for the License Condition to address the as-designed pipe rupture hazard analysis report (as opposed to as-built reconciliation) to allow coordination of activities with the NRC construction inspection program following the issuance of the COL such that the analysis would be made available to verify the design was completed in accordance with the regulations and DCD prior to fabrication and installation of the piping and connected components. In RAI 3.6.2-1, the staff requested the applicant provide a description pertaining to the closure milestone of the as-designed pipe rupture hazard analysis activities.

The applicant responded to RAI 3.6.2-1, however, based on its review of the applicant's response, the staff determined that it is not acceptable. Specifically, RAI 3.6.2-1 requested that the applicant address the implementation milestone of the as-designed pipe rupture hazard analysis report. However, the applicant's RAI response addressed the as-built rather than the as-designed aspect. Therefore, RAI 3.6.2-1 remains unresolved and will be tracked as
Open Item 3.6-1.

- STD COL 3.6-4

The BLN COL FSAR replaced the first paragraph of Section 3.6.4.4 of AP1000 DCD with the following text:

Alloy 690 is not used in leak-before-break [LBB] piping. No additional or augmented inspections are required beyond the inservice inspection [ISI] program for leak-before-break [LBB] piping. An as-built verification of the leak-before-break piping is required to verify that no change was introduced that would invalidate the conclusion reached in this subsection.

Based upon its review of the replaced Section 3.6.4.4, the staff determined that additional information was needed by the COL applicant to address whether Alloy 690 material is being used in the BLN-specific LBB piping systems. Accordingly, the staff issued several RAIs.

In RAI 3.6.3-1, the staff noted that it was unclear why Alloy 690 was not used in LBB piping applications. If Alloy 690 base material and Alloy 52/152 weld material was not being used, the staff asked the applicant to identify what material was being used for the piping.

In RAI 3.6.3-2, the staff asked if another base material was being used other than Alloy 690/52/152, then the applicant should provide its reasons for using this material in LBB piping applications based upon operating experience, and provide justification as to why no augmented inspection plans and evaluation criteria were considered necessary. Additionally, the staff requested that the applicant provide a discussion which supports the use of an alternative material and discuss why concerns for potential PWSCC [primary water stress-corrosion cracking] should not be considered a factor.

In RAI 3.6.3-3, for piping requiring dissimilar metal welds, the applicant was requested to address that if Alloy 52/152 is not being used for the weld material, then they should identify the weld material and provide justification for its use. In addition, the applicant should provide a discussion which supports the use of an alternative weld material and why concerns regarding the potential for PWSCC should not be considered a factor. The staff noted that there are currently ASME Code cases being developed for dissimilar-metal welds due to PWSCC concerns.

In its response to these RAIs, the applicant provided additional information to clarify the material that is used for LBB piping systems. The applicant stated that there is some limited use of Alloy 690 base material as safe ends in components connected to LBB piping, and there is some limited use of Alloy 52/152 weld material associated with these safe ends. However, the applicant noted that the base material for most of the LBB piping is 316LN stainless steel material. The applicant further stated that the material used in the AP1000 LBB piping is the same material currently used for LBB piping in operating nuclear power plants. Alloy 690 and Alloy 600 are not used as base material for LBB piping in the AP1000 design and are not commonly used in the LBB piping in current operating nuclear power plants. The applicant also stated that even though the material used in the LBB piping for the AP1000 design do not presently require an augmented ISI program, if ASME Code cases are developed and approved to address PWSCC concerns for dissimilar metal welds used in the AP1000 DCD, they will be evaluated and implemented.

The staff notes that in a final rule to amend 10 CFR 50.55a (73 FR [Federal Register] 52730) issued on September 10, 2008, a new requirement was added for licensees to augment their ISI program to use ASME Code Case N-722 for ISI of Alloy 600/182/82 materials to address PWSCC concerns. The applicant stated that there will be no Alloy 600/182/82 material used for new reactor construction of AP1000 plants. The staff notes that the final rule did not impose any additional requirements for augmented ISI of Alloy 690/152/52 materials. Based on the applicant's response discussed above and its commitment to evaluate and implement ASME Code cases that are developed and approved for augmented inspections of Alloy 690/152/52 material to address PWSCC concerns, the staff concludes the applicant's changes to COL Information Item 3.6-4 is consistent with current industry practice and NRC regulations as amended in 10 CFR 50.55a and is thus, acceptable.

Resolution of Standard Content Open Item 3.6-1

To address Open Item 3.6-1 in the BLN SER with open items, the VEGP applicant proposed in its letter dated April 23, 2010, an ITAAC for as-designed pipe rupture hazards analysis in ITAAC Table 3.8-# [where # is the next sequential number] and a revision to the proposed License Condition 2, Item 3.6-1 in Part 10 of the VEGP COL application. In addition, the applicant proposed to revise VEGP COL FSAR Section 3.6.4.1 and to add VEGP COL FSAR Section 14.3.3.# [where # is the next sequential number] related to pipe rupture hazards analysis.

Specifically, the proposed ITAAC includes a post-COL requirement related to the completion of the as-designed pipe rupture hazards analysis report. The proposed VEGP COL FSAR Section 3.6.4.1 states that the completed as-designed pipe rupture hazards analysis will be in accordance with the criteria outlined in AP1000 DCD Sections 3.6.1.3.2 and 3.6.2.5. The applicant stated that the completed as-designed pipe rupture hazards analysis report will be completed prior to installation of the piping and connected components and will be made available to the NRC staff. The applicant's proposed license condition that will require completion of the as-designed pipe rupture hazards analysis report prior to installation of the piping and connected components in their final location is proposed License Condition 2, Item 3.6-1. In the proposed VEGP COL FSAR Section 14.3.3.#, [where # is the next sequential number] the applicant stated that the as-designed pipe rupture hazards analysis completed for the first standard AP1000 plant will be available to subsequent standard AP1000 plants under the "one issue, one review, one position" approach for closure.

The staff reviewed the applicant's April 23, 2010, response to BLN open items for Chapter 3, and has determined that the use of a plant-specific ITAAC to verify that the as-design pipe rupture hazards evaluation has been performed in accordance with the criteria outlined in AP1000 DCD Sections 3.6.1.3.2 and 3.6.2.5 is acceptable. The applicant's proposed license condition requiring completion of the as-designed pipe rupture hazards analysis report prior to installation of the piping and connected components in their final location,

*through the above discussed ITAAC, will allow the staff sufficient time to review the as-design pipe rupture hazards evaluation in a timely matter in order to identify and address any design issues. Therefore, the staff finds the response acceptable and concludes that Standard Content Open Item 3.6-1 has been satisfactorily resolved. The incorporation of the planned VEGP COL FSAR changes will be tracked as **Confirmatory Item 3.6-1**.*

Resolution of Standard Content Confirmatory Item 3.6-1

Confirmatory Item 3.6-1 is an applicant commitment to revise its FSAR Section 3.6.4.1 and, Section 14.3.3.2, to verify the incorporation of the as-designed pipe rupture hazard analysis and add an ITAAC (Table 3.8-1) for the as-designed pipe rupture hazard analysis. The staff verified that the VEGP COL FSAR and part 10 of the application (ITAAC Table 3.8-1) were appropriately updated. As a result, Confirmatory Item 3.6-1 is now closed.

3.6.5 Post-Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following ITAAC and license condition related to pipe rupture hazards analysis acceptable:

- The licensee shall perform and satisfy the pipe rupture hazards analysis ITAAC defined in SER Table 3-1, "Pipe Rupture Hazards Analysis ITAAC."

Table 3-1 Pipe Rupture Hazards Analysis ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
SSCs that are required to be functional during and following a design-basis event shall be protected against or qualified to withstand the dynamic and environmental effects associated with analyses of postulated failures in high- and moderate-energy piping.	Inspection of the as-designed pipe rupture hazard analysis report will be conducted. The report documents the analyses to determine where protection features are necessary to mitigate the consequence of a pipe break. Pipe break events involving high-energy fluid systems are analyzed for the effects of pipe whip, jet impingement, flooding, room pressurization, and temperature effects. Pipe break events involving moderate-energy fluid systems are analyzed for wetting from spray, flooding, and other environmental effects, as appropriate.	An as-designed pipe rupture hazard analysis report exists and concludes that the analysis performed for high- and moderate-energy piping confirms the protection of systems, structures, and components required to be functional during and following a design-basis event.

- License Condition (3-1) - Before commencing installation of individual piping segments and connected components in their final locations, the licensee shall complete the as-designed pipe rupture hazards analysis for compartments (rooms) containing those

segments in accordance with the criteria outlined in the AP1000 DCD, Revision 19, Sections 3.6.1.3.2 and 3.6.2.5, and shall inform the Director of NRO, or the Director's designee, in writing, upon the completion of this analysis and the availability of the as-designed pipe rupture hazards analysis reports.

3.6.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 4 of Appendix A to 10 CFR Part 50. The staff based its conclusion on the following:

- STD COL 3.6-1 is acceptable because the applicant's proposed resolution to COL Information Item 3.6-1 in Turkey Point Units 6 and 7 COL FSAR, Section 3.6.4.1 meets the relevant guidelines of NUREG-0800, Sections 3.6.1 and 3.6.2, and 10 CFR 52.79(d)(3) and is, thus, acceptable. Conformance with these guidelines provides an acceptable basis for satisfying, in part, the requirements of GDC 4 of Appendix A to 10 CFR Part 50.
- STD COL 3.6-4 is acceptable because the applicant's proposed resolution to COL Information Item 3.6-4 in Section 3.6.4.4 of the Turkey Point Units 6 and 7 COL FSAR meets the relevant guidelines of NUREG-0800, Section 3.6.3, and RG 1.206, Section C.III.1, Chapter 3, C.I.3.6.3 and is, thus, acceptable. Conformance with these guidelines provides an acceptable basis for satisfying, in part, the requirements of GDC 4 of Appendix A to 10 CFR Part 50.

3.7 Seismic Design

Seismic design of the AP1000 seismic Category I and II structures, systems, equipment, and components are based on the SSE which is defined as the certified seismic design response spectra (CSDRS) in the DCD. The operating-basis earthquake (OBE) has been eliminated as a design requirement for the AP1000. Low-level seismic effects are included in the design of certain equipment potentially sensitive to a number of low-level events based on a percentage of the responses calculated for the SSE.

Criteria for evaluating the need to shut down the plant following an earthquake are established. For the purposes of the shutdown criteria, the OBE for shutdown is considered to be one-third of the SSE.

Seismic Category I SSCs are designed to withstand the effects of the SSE event and to maintain the specified design functions. Seismic Category II and NS structures are designed or physically arranged (or both) so that the SSE could not cause unacceptable structural interaction with or failure of seismic Category I SSCs.

3.7.1 Seismic Design Parameters

3.7.1.1 Introduction

The input seismic design ground motion response spectra (GMRS) for the SSE in the freefield at plant grade is addressed. The horizontal and vertical design GMRS for the AP1000 were developed based on the response spectra in Revision 1 of RG 1.60, "Design Response Spectra for Seismic Design of Nuclear Power Plants," with consideration of high-frequency amplification effects.

The bases for the seismic design of safety-related SSCs and equipment include the following:

- design GMRS
- design ground motion time histories
- percentage of critical damping values
- supporting media for seismic Category I structures
- COL action items

3.7.1.2 Summary of Application

Section 3.7 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.7, of the AP1000 DCD, Revision 19. Section 3.7 of the DCD includes Section 3.7.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.7, the applicant provided the following:

Supplemental Information

- PTN SUP 3.7-1

The applicant provided supplemental information in PTN SUP 3.7-1 by adding Section 3.7.1.1.1 to the Turkey Point Units 6 and 7 COL FSAR, which addresses site-specific foundation input response spectra (FIRS), SSE motion, strain-compatible soil property profiles, and acceleration time histories for soil-structure interaction (SSI) input.

- PTN SUP 3JJ-1

The applicant provided supplemental information in PTN SUP 3JJ-1, which addresses the development of strain-compatible soil profiles and the seismic input motions used in soil-structure interaction analyses that support the information provided in PTN SUP 3.7-1.

- PTN SUP 3KK-1

The applicant provided supplemental information in PTN SUP 3KK-1, which addresses the site-specific soil-structure interaction analyses that were performed as part of the seismic evaluation to support the information provided in PTN SUP 3.7-1. The staff evaluation is included in the SER Section 3.7.2.

3.7.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations (GDC 2 of Appendix A to 10 CFR Part 50; Appendix S, "Earthquake Engineering Criteria for Nuclear Power Plants" to 10 CFR Part 50; and 10 CFR 100.23, "Geologic and Seismic Siting Criteria") for the seismic design parameters are given in Section 3.7.1, Revision 4, of NUREG-0800. Supplemental guidance is provided in DC/COL-ISG-017, "Ensuring Hazard Consistent Seismic Input for Site Response and Soil Structure Interaction Analysis."

3.7.1.4 Technical Evaluation

The NRC staff reviewed Section 3.7 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to seismic design parameters. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- PTN SUP 3.7-1
- PTN SUP 3JJ-1

In PTN SUP 3.7-1, the applicant addressed site-specific FIRS, site-specific SSE motion, strain-compatible soil property profiles, and acceleration time histories for SSI input. The applicant described that the NI is supported on 10.7 m (35 ft) of lean concrete fill over limestone formations at the site as described in Turkey Point Units 6 and 7 COL FSAR, Section 2.5.4.5. The Turkey Point site-specific seismic evaluation considers the effect of the lean concrete fill on both the site response and SSI analyses as described in Appendices 3JJ and 3KK of the Turkey Point Units 6 and 7 COL FSAR.

In FSAR Section 3.7.1, the applicant developed a FIRS using the site-specific probabilistic seismic hazard assessment (PSHA) results described in FSAR Section 2.5.2 and geologic and geophysical information presented in FSAR Section 2.5.4. The applicant developed two separate site profiles for calculating FIRS: a near-field profile located beneath the NI and a far-field profile located away from the NI (FAR). These profiles are identical with the exception that the applicant developed the NI profile assuming that lean concrete fill replaces 19 ft (5.8 m) of structural fill present in the FAR profile and the FAR profile includes structural fill up to elevation +25.5 ft to raise the site grade elevation to finished grade.

The FIRS is calculated similar to the performance-based GMRS described in SER Section 2.5.2.4.5 with the exception that, although the GMRS is calculated at the

competent rock layer elevation -10.7 m (-35 ft), the FIRS is calculated at the elevation corresponding to the bottom of the NI foundation, which is -4.9 m (-16 ft). Since PSHA results provide seismic hazard curves calculated for hard rock located about 10,000 ft below the ground surface, transformation of seismic energy from the hard rock elevation beneath the site to the base of the foundation is required to accommodate the effects of local rock and soil properties beneath the NI.

This transformation is done using site response calculations. Site response calculations require estimation of physical parameters of rocks and soils residing between the foundation and the location where hard rock conditions are observed. As explained above, in its FIRS calculations, the applicant used two site profiles: the NI profile and the FAR profile. Site response calculations also require input ground motions to be propagated from the generic rock elevation, located about 10,000 ft below the ground surface, to the base of the foundation. The applicant used the controlling earthquakes' response spectra described in FSAR Section 2.5.2 as input ground motions and calculated site response functions using a Random Vibration Theory methodology. Using these two site profiles, the applicant developed a FIRS for both the NI and the FAR profiles and enveloped the result to establish the site FIRS (Figure 3-1 below).

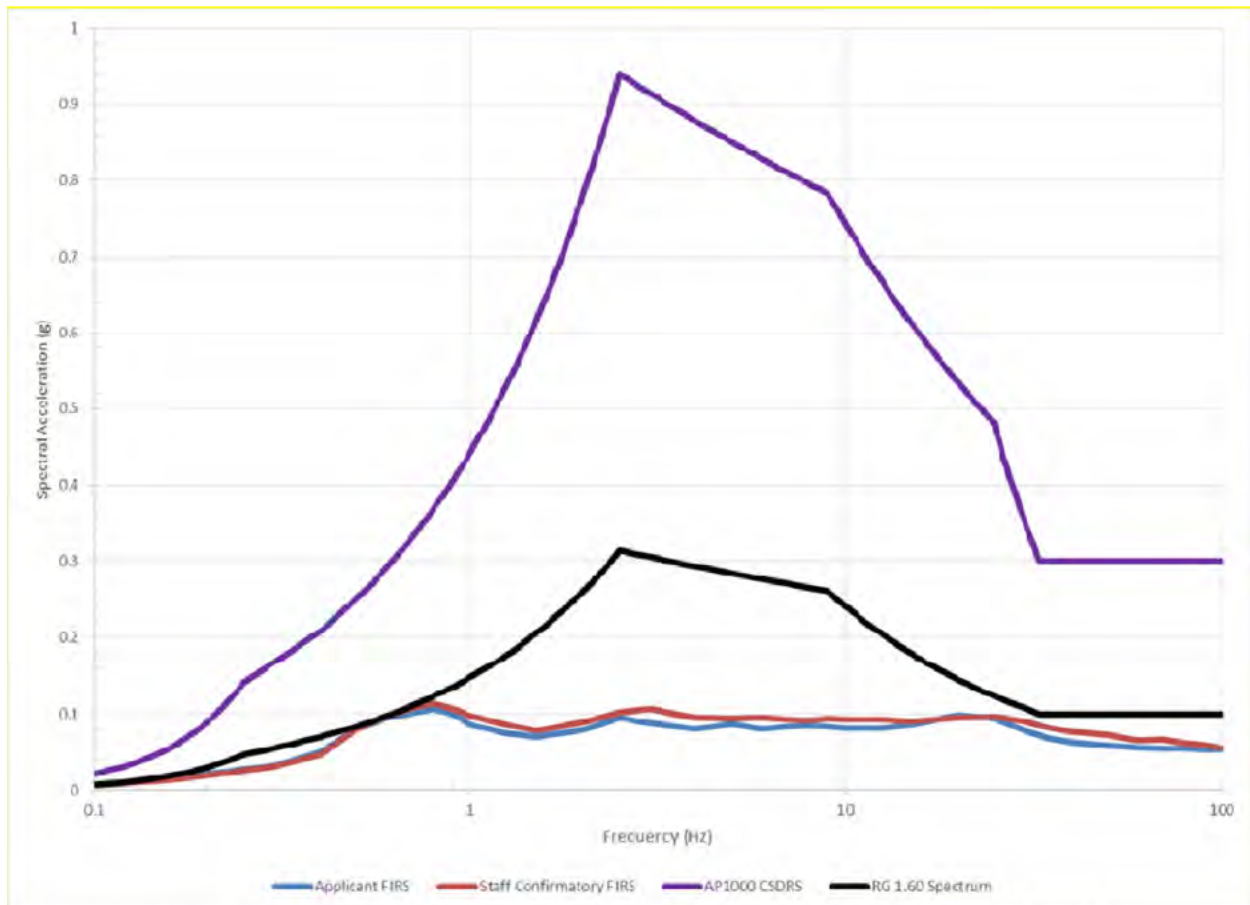


Figure 3-1 Comparison of applicant's horizontal FIRS with staff FIRS
Also shown are AP1000 CSDRS and the RG 1.60 spectrum anchored at 0.1g.

NRC Site Response Confirmatory Analysis

The staff conducted confirmatory FIRS calculations based on information provided in the FSAR and guidance in RG 1.208, "A Performance-Based Approach To Define the Site-Specific Earthquake Ground Motion," and NUREG-CR/6728, "Technical Basis for Revision of Regulatory Guidance on Design Ground Motions: Hazard- and Risk-Consistent Ground Motion Spectra Guidelines." SER Section 2.5.2.4.4 describes the staff's assessment of the PSHA results and the site-specific profiles used as input into the FIRS calculations.

The staff used only the site profile developed for the NI along with the same input response spectra used by the applicant. The staff used only the profile for the NI because the site response for NI structures can reasonably be expected to be consistent with the geologic profile located under the structures. However, the staff notes that the applicant's use of a NI and a FAR profile is conservative because the applicant considers the envelope of the two FIRS results to be the site FIRS. The applicant compared the FIRS at the base of the NI and at the AP1000 CSDRS at plant grade in Figure 3.7-202. The CSDRS for the AP1000 certified design is specified at plant grade. The staff notes that the horizontal design response spectra (DRS) at the surface (which is the same as the performance-based surface response spectrum (PBSRS) defined in ISG-017) shown in Figures 2.1-9 through 2.1-14 of Letter L-2015-085, Attachment 2, dated April 2, 2015, are significantly lower than the CSDRS which is also applied at the surface.

Figure 3-1 compares the applicant's FIRS result with that calculated by the staff, the AP1000 certified design response spectra, and the RG 1.60 response spectra anchored at 0.1g Turkey Point site-specific ground motion applied at the FIRS elevation in the SSI analyses. Overall, the FIRS results are similar, with minor differences attributable to differences in approach and randomization parameters.

The vertical FIRS is obtained by scaling the horizontal FIRS by vertical to horizontal (V/H) ratios from RG 1.60. The horizontal and vertical FIRS were compared to the AP1000 CSDRS and show that the CSDRS envelopes the FIRS. In RAI 4975, Question 03.07.01-12, the staff asked why V/H ratios selected were from RG 1.60 as opposed to V/H ratios from the generic database for the characteristic events associated with the site-specific PSHA.

The applicant's response, dated October 27, 2010, indicates that there are insufficient data in central and eastern United States (CEUS) to derive CEUS rock V/H ratios directly from empirical records. The guidance provided by NUREG/CR-6728, Appendix J, for CEUS deep soil sites with low peak rock acceleration allows the selection of RG 1.60 V/H ratios derived from western U.S. sites and modified for application to CEUS sites when sufficient empirical records do not exist. The staff finds the applicant's basis for selecting RG 1.60 V/H ratios acceptable.

In its review of SSE motions, the staff indicated in RAI 6432, Question 03.07.01-15, that the response spectra at the foundation level have zero period acceleration values less than the 0.1g required at the foundation depth by Appendix S to 10 CFR Part 50 and Sections 3.0 and 5.4 of DC/COL-ISG-017. The staff requested the applicant to provide a discussion as to how the results meet the requirements for minimum seismic input at the foundation level.

The applicant provided a response on April 2, 2015, which addresses the required minimum seismic input. The applicant stated that the horizontal and vertical SSE motions incorporate a scaling of the motion that is sufficient to achieve at least 0.1g horizontal peak ground acceleration at the bottom of the NI basemat required by Appendix S to 10 CFR Part 50 and

DC/COL-ISG-017. The applicant provided revised site-specific design response spectra at the foundation level comprised of the envelope of the Turkey Point site-specific FIRS and the amplified RG 1.60 spectra scaled to 0.1g to develop the SSE motion meeting the minimum seismic input. Acceleration time histories were matched to the DRS described above and were used in the SSI analysis. The applicant compared the site-specific floor response spectra (FRS) to the envelopes of the AP1000 FRS computed from the CSDRS and hard rock high-frequency (HRHF) at each of the six key NI locations in Section 6.0 of Appendix KK. The site-specific FRS are enveloped by the enveloped FRS from the AP1000 CSDRS and HRHF FRS at each of the six key NI locations.

The staff evaluated the response and found that the use of the amplified RG 1.60 spectra scaled to 0.1g addressed the minimum seismic input in accordance with 10 CFR Part 50, Appendix S, and DC/COL-ISG-017. This motion meets the minimum required seismic input and envelopes the site-specific FIRS.

The response to RAI 6432, Question 03.07.01-15, also includes analyses to address a supplemental site evaluation and the impact of grouted rock properties on the results of the SSI analyses. In the initial analysis, the applicant provided soil profiles and time histories used as input for the SSI analysis. The best estimate (BE), lower bound (LB), and the upper bound (UB) NI and FAR soil profiles were developed by propagating rock motions through each set of 60 simulated profiles and computing the response at the foundation elevation horizon.

These rock motions were iteratively modified until the 5-percent damped mean acceleration response spectra (ARS) matched the 5-percent damped site-specific DRS described above SSE.

The applicant stated that the SSI analysis uses the UB, BE, and LB soil profiles (Figures 3JJ-216, -217, and -218 for the NI site conditions and Figures 3JJ-219, -220, and -221 for FAR site conditions) along with the corresponding acceleration time histories applied at the FIRS horizon. The envelope of the surface ARS corresponding to the SSI input spectra to the UB, BE, and LB soil profiles envelop the corresponding DRS: surface (FSAR Appendix KK, Figures 2.1-9 through 2.1-14). Note that the "DRS: surface" is the same as the PBSRS as defined in ISG-017.

The applicant performed supplemental subsurface investigations at the Turkey Point Units 6 and 7 site that resulted in changes to the geotechnical site characterization. The changes resulted in an updated analysis. In the updated analysis, the applicant used a simplified process to update the soil profiles and include the grouted near surface rock layer in the evaluation. The staff review of the response to RAI 6432, Question 03.07.01-15, identified the following questions that were addressed during an audit from June 22 through June 25, 2015.

- The justification of a simplified approach to evaluating the impact of updated soil properties

The staff reviewed calculation results of individual amplification functions from the simplified process that used LB, BE, and UB soil profiles. These individual amplification functions were compared to smoothed functions developed by taking the average of the three soil column results. A consistent process using three similar profiles was performed for the original soil profiles and the updated profiles in order to make an appropriate comparison of differences between responses of the original and updated profiles. Since the original site response

analysis results are based on the average response of 60 profiles, which provide smoother ARS and ARS amplification functions, the results of the sensitivity analysis, using three soil columns, are averaged and smoothed, as shown in Figures 3JJ-251 and 3JJ-252. This process was used to emulate, in a simplified manner, the original analysis approach that considered 60 realizations of the site columns to represent the full range of variation of dynamic soil properties.

Comparison of the individual amplification functions for each soil case between original and updated profiles show similar changes in the individual amplification functions as seen in the mean amplification functions. This comparison demonstrates that the use of the differences between the mean amplification functions adequately captures the expected change in site response that would result from the more rigorous approach of using 60 realizations of the site columns. This review adequately addresses the staff's question.

- The ability of the lean concrete fill to transfer shear on a vertical plane at the toe of the RC foundation

The staff reviewed bearing capacity calculations for the NI at its supporting soil interface and confirmed that the capacity of the 10.7 m (35 ft) thick lean concrete fill resting on underlying rock is adequate to resist bearing demand. The October 29, 2015, response to RAI 7811, Question 02.05.04-26, additionally includes a description of analyses that determine the magnitude of stresses (including tensile) in the lean concrete due to the postulated presence of void space beneath the NI. The maximum size of these hypothesized void spaces is a 20-ft diameter sphere based on the grouting program description in Section 2.5.4.6.2. The analysis of the effect of the hypothesized voids conservatively considers them to be a 20-ft-diameter cylinder with a horizontal orientation that is placed in locations judged to provide the most severe demands on the NI foundation. These analyses demonstrate that stress levels are sufficiently low to prevent collapse of the void space and specified material strengths for the lean concrete are not exceeded. The compressive stress demands under the NI foundation are compared to the ultimate bearing capacity for the fill concrete material placed between the foundation and the top of rock in Table 2.5.4-226 of Letter L-2015-199, Attachment 1. The maximum compressive stresses shown are 77 ksf which is significantly less than the capacity of 184 ksf.

The incorporation of the response to RAI 7811, Question 02.05.04-26 into the FSAR is being tracked as a Confirmatory Item 3.7.1-1 pending the applicant's update of the FSAR.

Resolution of Turkey Point Confirmatory Item 3.7.1-1

Confirmatory Item 3.7.1-1 is an applicant commitment to revise its FSAR Sections 2.5.4.4.5.5, 2.5.4.5.1.2, 2.5.4.6.2, 2.5.4.6.2.1, 2.5.4.10.8, 2.5.4.12, 2.5.4.13, 14.3.3.5 and 14.3.3.6; regarding the ability of the lean concrete fill to transfer shear on a vertical plane at the toe of the RC foundation. The staff verified that the Turkey Point Units 6 and 7 COL FSAR, Revision 8 was appropriately revised. As a result, Confirmatory Item 3.7.1-1 is now closed.

- The staff requested a comparison of the surface motion enveloped response spectrum to the individual site responses computed for the horizontal H1 and H2 motions.

Comparisons of the propagated amplified RG 1.60 motion to the surface, using LB, BE, and UB strain-compatible profiles to the site-specific PBSRS, were provided. Sensitivity analyses were performed that show that the profile, which includes the updated geotechnical information, is very similar to the original BE profile. Additionally, the site response amplification functions compare closely. Based on these observations, the updated profile will not significantly change the computed seismic demands. This response adequately addresses the staff's question.

The staff issued RAI 6432, Question 03.07.01-17, to address the correlation coefficient required by Section 3.7.1 of the SRP for statistically independent time histories. The staff noted the zero-lag cross correlation criterion provided by the applicant did not meet the SRP criteria.

The applicant provided a response, dated July 20, 2012, which states that the time histories are statistically independent based on their correlation values being less than 0.16 as required by the SRP. The applicant updated the FSAR to include Table 3JJ-208 and remove text that incorrectly described the required correlation values. The staff confirmed that these are the appropriate correlation values in accordance with SRP Section 3.7.1.

Further, to determine the adequacy of the selected time histories, the staff issued RAI 4975, Question 03.07.01-13, to gather additional information on the selection of the TAP024 record selected from the Chi-Chi seismic event. The staff noted the applicant statement that seed records were selected from the database given in NUREG/CR-6728 for the LF deaggregation results for magnitudes greater than 7 and distances greater than 500 km. However, the TAP024 record was indicated to be about 100 km from the recording station.

The applicant's response, dated April 2, 2015, states that a lack of empirical strong ground motion time histories in the CEUS significantly limits the availability of candidate time histories for large magnitude earthquakes at large distances. The largest magnitude and distance bin in the NUREG/CR-6728 database is one for events with magnitudes greater than 7 and distances between 100 and 200 km. The candidate time histories were selected from this bin.

The staff evaluated the response to RAI 4975, Question 03.07.01-13, and the applicant provided digitized seed and fit time histories. The staff confirmed that the digitized seed and fit time histories contain sufficient energy over the response frequencies of interest and are therefore acceptable.

A site-specific SSI analysis was performed to compare the Turkey Point site-specific response with the AP1000 generic seismic response. The applicant developed an SSI model to calculate the FRS for the Turkey Point site-specific soil profile and foundation geometry. Three directions of ground motion were considered in developing the site-specific FRS consistent with the approach used in developing the AP1000 FRS. The SSI model incorporated the effects of the lean concrete fill beneath the NI, site soil profiles, and the SSE foundation level response spectra meeting the 0.1g minimum peak ground acceleration. For the SSI analysis of the NI, the BE, LB, and UB soil profiles were considered. The applicant demonstrated that the FRS considering the Turkey Point site-specific soil profiles, foundation geometry, and site-specific ground motion is enveloped by the AP1000 CSDRS FRS at the key AP1000 NI locations.

3.7.1.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.7.1.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that, the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR Part 50, Appendix A, Appendix S, and other staff guidance. The staff based its conclusion on the following:

- PTN SUP 3.7-1 is acceptable because the applicant addressed the relevant information that meets the guidance in Section 3.7.1 of NUREG-0800. In conclusion, the applicant has provided sufficient information for satisfying the applicable requirements of 10 CFR Part 50, Appendix A, GDC 2, Appendix S, and 10 CFR Part 100.23.

3.7.2 Seismic System Analysis

3.7.2.1 Introduction

Seismic analysis methods and acceptance criteria for all seismic Category I SSCs are described. It includes a review of basic assumptions, procedures for modeling, seismic analysis methods, development of in-structure response spectrum envelopes, consideration of torsional effects, evaluation of overturning and sliding of seismic Category I structures, and determination of composite damping. The effects of SSI on the seismic responses of the NI structures are included in the review scope because the Turkey Point Units 6 and 7 site has a shear wave velocity less than 8000 ft/s at foundation level. The review also covered design criteria and procedures for evaluating the interaction of NS Category I structures with seismic Category I structures and the effects of parameter variations on FRS.

Specifically, the criteria and methods for the seismic analysis of safety-related SSCs and equipment include the following:

- seismic analysis methods
- natural frequencies and response loads
- procedures used for analytical modeling
- SSI
- development of FRS
- three components of earthquake motion
- combination of modal responses
- interaction of NS Category II structures with seismic Category I SSCs
- effects of parameter variations on FRS

- use of constant vertical static factors
- method used to account for torsional effects
- methods for seismic analysis of dams
- determination of seismic Category I structures overturning moments
- analysis procedure for damping

3.7.2.2 Summary of Application

Section 3.7 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.7 of the AP1000 DCD, Revision 19. Section 3.7 of the DCD includes Section 3.7.2.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.7.2, the applicant provided the following:

Supplemental Information

- PTN SUP 3.7-2

The applicant provided supplemental information in PTN SUP 3.7 2 to Section 3.7.2.8.3 in the Turkey Point Units 6 and 7 COL FSAR, which addresses the seismic analyses of the seismic Category II adjacent structures, specifically postulated void conditions underneath the category II and non-seismic structures.

- PTN SUP 3KK-1

The applicant provided supplemental information in PTN SUP 3KK-1 which addresses the site-specific soil-structure interaction analyses that were performed as part of the seismic evaluation to support the information provided in PTN SUP 3.7-1. The supplement also addresses the seismic analyses of the seismic Category I Turkey Point NI and seismic Category II adjacent structures.

AP1000 COL Information Items

- PTN COL 3.7-1

The applicant provided additional information to the end of AP1000 DCD, Section 3.7.2.12 in PTN COL 3.7-1 regarding the existence of dams near the site.

License Condition

- Part 10, License Condition 2, Item 3.7-3

The applicant has proposed a license condition requiring a seismic interaction review for as-built information. This review is performed in parallel with the seismic margin evaluation. The review is based on as-procured data, as well as the as-constructed condition. The as-built seismic interaction review is to be completed prior to fuel load.

- Part 10, License Condition 2, Item 3.7-4

The applicant has proposed a license condition requiring a seismic analysis for detail design changes, such as those due to as-procured or as-built changes in component mass, center of gravity, and support configuration based on as-procured equipment information. The reconciliation of seismic analysis of NI structures will be complete prior to fuel load.

3.7.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the seismic system analysis are given in Section 3.7.2, Revision 4, of NUREG-0800.

3.7.2.4 Technical Evaluation

The NRC staff reviewed Section 3.7 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to seismic system analysis. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR and noted that the AP1000 DCD, (Revision 19), Section 2.5.2.3 addresses the site-specific seismic evaluation

that should be performed by the combined license applicant if the site-specific design response spectra exceed the CSDRS or if site soil conditions are outside the range evaluated for AP1000 DC.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

- PTN SUP 3.7-2
- PTN SUP 3KK-1

PTN SUP 3KK-1 addresses the site-specific seismic modeling and analysis of the seismic Category I Turkey Point NI and seismic Category II building structures (turbine building first bay and annex building). The purpose of the site-specific analysis is to demonstrate the acceptability of the AP1000 plant at the Turkey Point site. The Turkey Point site-specific analyses use the finite element models of the structures from the AP1000 DCD analyses and change only the soil properties and local model of the soils (including lean concrete fill) surrounding the embedded foundation of the NI.

The acceptability of the AP1000 plant is demonstrated by considering the Turkey Point site-specific soil parameters and comparing FRS and relative displacements between adjacent structures to the FRS and separation gaps specified in the AP1000 certified design.

The staff's review focused on the adequacy of the site conditions used for the seismic analysis. The site-specific seismic analysis for Turkey Point Units 6 and 7 addresses site-specific conditions that, although the site-specific GMRS (located at elevation -35 ft) is less than the CSDRS (located at plant grade, elevation 25.5 ft), have soil parameters that are outside the range evaluated for the AP1000 DC.

The applicant's site-specific SSI analysis of these structures considers the lean concrete fill below the NI, the best estimate, lower bound, and upper bound site soil profiles, and the SSE foundation level response spectra meeting the minimum seismicity requirement of 10 CFR Part 50, Appendix S, and DC/COL-ISG-017. The site-specific SSI analysis also includes the grouted limestone layers beneath the NI. A comparison of the site-specific three-dimensional (3D) SSI analysis results to the AP1000 certified seismic design response spectra FRS shows that the site-specific Turkey Point FRS are enveloped by the FRS from the AP1000 certified design CSDRS.

Two-dimensional (2D) coarse and fine models were created and parametric SSI analyses performed for evaluation of model frequency filtering, model mesh size limitations, and influence of the location of the bottom boundary in the SSI site model. The coarse model is representative of the meshing and layer thicknesses associated with the 3D model and has mesh passing frequencies for the layers that range from about 9 Hz to 474 Hz. This model represents the embedded portion of the 3D model. The fine model mesh passing frequency representing the same embedded portion of the 3D model range from about 49 Hz to 474 Hz. Response spectra ratios (bump factors) are computed using comparisons of the fine to coarse model results to account for potential filtering that occurs in the coarser models. These bump factors, limited to be always greater than or equal to 1.0, are used to scale up the results of the 3D SSI analyses in order to account for potential unconservatism in the computed responses due to the filtering effects caused by the necessary coarseness of the 3D model.

The effect of the postulated presence of 20-ft diameter voids beneath the NI are analyzed to assess their potential impact on the stability of the overlying soils and the structure foundations as described in SER Section 3.7.1. In addition, void spaces are postulated to occur beneath the adjacent Category II structures and evaluated in a similar manner as the voids postulated under the NI. These analyses consider the foundation pressures generated by both static and seismic demands.

The staff reviewed the application and generated several questions (RAI 4975, Questions 03.07.01-1, 03.07.01-11, 03.07.01-6) related to the modeling of the lean concrete fill beneath the NI and the side fill placed above the lean concrete to the sides of the NI.

In RAI 4975, Question 03.07.01-1, the staff requested the applicant explain the adequacy of the assumed uniform site conditions used in the 3D SSI analyses instead of modeling soil properties that reflect the presence of the lean concrete fill and backfill materials placed adjacent to the NI foundation. The staff was concerned about the impact of the supporting concrete/side fill on the computed responses.

The applicant's response to RAI 4975, Question 03.07.01-1, as described in Revision 7 of TPG-1000-SR-802, dated August, 2015, states that the use of uniform site conditions is justified by a comparison of the Turkey Point site-specific FRS responses and the CSDRS FRS envelopes at the six key locations and FRS from a 2D parametric sensitivity analysis of the site-specific geological configuration and backfill condition. The applicant demonstrated that the effects of the lean concrete fill and backfill soil are minimal.

In RAI 4975, Question 03.07.01-11, the staff requested that the applicant address the assumptions used in the FAR and NEAR (NI) soil profiles with respect to the horizontal extent of soils used for SASSI calculations.

The applicant's response to RAI 4975, Question 03.07.01-11, dated October 27, 2010, states that the NEAR (NI) soil profile was included in the SASSI model of the structure and the FAR soil profile was modeled as infinite soil layers that surround the NI structural model.

In RAI 4975, Question 03.07.01-6, the staff requested information on details of the SSI analysis, specifically details on the lean concrete fill and the fill to the side of the NI used in the 2D model of the NI.

As described in Revision 7 of TPG-1000-SR-802, dated August, 2015, the applicant included the lean concrete fill and fill adjacent to the NI embedded structure (backfill) in the model as part of the model of the structure. The applicant provided information on the lean concrete fill and backfill properties in Figures 3.1-2 and 4.3-1 of the report, and information on the soil and backfill material properties is provided in Tables 3-1 and 3-2.

The staff evaluated the responses to RAI 4975, Questions 03.07.01-1, 03.07.01-6, and 03.07.01-11. The staff examined how the 2D models were used to select the input parameters for the 3D SASSI model as described in Revision 7 of TPG-1000-SR-802. The staff found that the descriptions of the modeling assumptions used to develop the 2D models represent the expected site-specific soil conditions. The results of the 2D SSI analysis and corresponding sensitivity studies were useful in identifying important parameters to the SSI response of the structures, such as (1) the effects of using a uniform representation of the side soils while neglecting the presence of the fill materials in the 3D model, (2) coupling of the NEAR (NI) and

FAR soil columns within the 3D representation of the SSI system, (3) filtering effects of the layer passing frequencies and mesh density, and (4) effect of the location of bottom boundary in the SASSI model of the freefield site.

The 2D studies provide justification for neglecting the effects of items (1) and (2) in the 3D SSI modeling. Items (3) and (4) are accommodated by scaling up the 3D results to account for the effects not explicitly considered in the 3D analyses. The staff reviewed the analyses process used by the applicant, including consideration of sensitivity studies using 2D SSI models, to develop site-specific FRS for comparison to the FRS provided in the AP1000 DCD. On the basis of its review, the staff finds that the applicant has adequately demonstrated that the site-specific seismic demands are enveloped by the design demands used in the AP1000 DCD.

The staff issued RAI 6432, Question 03.07.01-16, to address the potential for numerical problems found when using high Poisson's ratios in SSI analysis. The staff noted that the irregular shape of the transfer functions indicated potential numerical problems with the solution.

The applicant provided the results for a series of verification problems using 2D models and demonstrated that the computed SSI responses are not sensitive to Poisson's ratios near the range of Poisson's ratio (0.48) for the set of soil parameters used in the 3D analyses and associated with the Turkey Point Units 6 and 7 site.

Additionally, the staff had concerns about the bearing capacity and the method used to model the lean concrete fill. In RAI 6432, Question 03.07.01-14, the staff asked the applicant to justify whether the lean concrete fill would remain uncracked under dynamic loading. The staff noted that the extension of the lean concrete 9.1 m (30 ft) to the sides of the NI could crack, affecting stiffness and radiation damping in the SSI problem, thereby decreasing SSI frequency and increasing the amplitude of seismic response.

The staff evaluated the response to this RAI and reviewed bearing capacity calculations during an audit June 22–25, 2015. The staff confirms that the bearing capacity of the lean concrete fill resting on grouted underlying rock is adequate to resist bearing demand. Analyses performed in support of RAI 7811, Question 02.05.04-26, determined that the stress levels in the lean concrete fill are acceptably low. A complete discussion of this issue is included in SER Section 3.7.1.

To ensure that the seismic Category II structures will not interact with seismic Category I structures, the applicant also provided relative displacement results in Appendix F to the AP1000 Turkey Point Site Specific Seismic Evaluation Report, Table F.2-1, between the NI and the turbine and annex buildings at the foundation and top of the structures. The applicant calculated displacement results using site-specific 2D NS and EW models. The results show that the maximum relative displacement at the foundation mat between the NI and adjacent structures, enveloping the BE and BE sensitivity cases, was 0.127 cm (0.050 in.). The maximum relative displacement at the top of the structures was 0.442 cm (0.174 in.). These relative displacements are less than the 54-mm (2.0-in.) gap at the foundation and 108 cm (42 in) at the top of the adjacent structures required per the AP1000 DCD.

During the audit, the staff identified an additional concern with the limited grouting under the seismic Category II structures adjacent to the NI. In response to the audit concern, the applicant performed additional analysis, including the seismic Category II structures, which include postulated voids beneath the seismic Category II structures. This analysis is analogous

to that described in SER Section 3.7.1 for determining the stresses in the lean concrete due to postulated voids, except the voids are assumed to be under seismic Category II structures.

The evaluations of displacements of the structures and their responses to postulated void spaces beneath seismic Category II structures demonstrates that the seismic Category II structures will not interact with seismic Category I structures.

The relative displacements described above are developed using the amplified RG 1.60 scaled to 0.1g, as input ground motion at the foundation level for the NI and PBSRS for the adjacent structures. Since the gaps between buildings should accommodate displacements associated with the performance goals for the facility, the staff evaluated the potential for displacements associated with the performance goal level ground motions. This evaluation conservatively scales the displacements shown in Table 6.4-1 of L-2015-085 by the ratio of the 1E-5 GMRS to the 1E-4 GMRS (approximately 2) shown in Figure 2.1-1. The resulting total relative displacements remain significantly less than the provided seismic gaps.

The following portion of this technical evaluation section is reproduced from Section 3.7.2.4 of the VEGP SER:

License Conditions

- Part 10, License Condition 2, Item 3.7-3

The applicant has proposed a license condition requiring a seismic interaction review by the licensee for as-built information. This review is performed in parallel with the seismic margin evaluation. The review is based on as-procured data, as well as the as-constructed condition. The as-built seismic interaction review is to be completed prior to fuel load. The staff has reviewed and approved this review methodology in Section 3.7.5.3 in the AP1000 DCD. Therefore, the staff finds the proposed License Condition 2 acceptable.

- Part 10, License Condition 2, Item 3.7-4

The applicant has proposed a license condition requiring a seismic analysis for detail design changes, such as those due to as-procured or as-built changes in component mass, center of gravity, and support configuration based on as-procured equipment information. The reconciliation of seismic analysis of NI structures will be performed by the licensee and will be complete prior to fuel load.

Conducting the seismic interaction review and the seismic analysis for detail design changes based on as-procured data, as well as the as-constructed condition, does not alter the methods of seismic evaluation required to ensure the as-built design parameters are consistent with the standard design and have been reviewed by the staff as part of STD COL 3.7-4, as well as the information incorporated by reference from the AP1000 DCD. In addition, the NRC staff understands and agrees with the need to have as-procured data and the as-constructed condition in order to properly conduct these analyses.

3.7.2.5 Post-Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

- License Condition (3-2) – Before initial fuel load, the licensee shall update the seismic interaction analysis in AP1000 DCD, Revision 19, Section 3.7.5.3 to reflect as-built information, which must be based on as-procured data, as well as the as-constructed condition.
- License Condition (3-3) – Before initial fuel load, the licensee shall reconcile the seismic analyses described in Section 3.7.2 of the AP1000 DCD, Revision 19, to account for detailed design changes, including, but not limited to, those due to as-procured or as-built changes in component mass, center of gravity, and support configuration based on as-procured equipment information.

3.7.2.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR Part 50, Appendix A, Appendix S, and other staff guidance. The staff based its conclusion on the following:

- PTN SUP 3.7-1 is acceptable because the applicant addressed the relevant information that meets the guidance in Section 3.7.1 of NUREG-0800. In conclusion, the applicant has provided sufficient information for satisfying 10 CFR Part 50, Appendix A, GDC 2; 10 CFR Part 50, Appendix S; and 10 CFR 100.23.

3.7.3 Seismic Subsystem Analysis

Seismic input motion, seismic analysis methods, and modeling procedure used for the analysis and design of AP1000 SC-I subsystems are described. In particular, this review focused on such subsystems as the miscellaneous steel platforms, steel frame structures, tanks, cable trays and supports, heating, ventilation, and air conditioning (HVAC) ductwork and supports, and conduit and supports.

Specifically, the criteria and methods for the seismic analysis of safety-related SSCs and equipment include the following:

- seismic analysis methods
- determination of number of earthquake cycles
- procedures used for modeling
- basis for selection of frequencies
- equivalent static load method of analysis
- three components of earthquake motion
- combination of modal responses
- analysis procedure for piping
- vertical static factors
- torsional effect of eccentric mass
- seismic Category I buried piping systems and tunnels
- interaction of other systems with seismic Category I systems
- seismic analysis of reactor internals
- analysis procedure for damping
- analysis of seismic Category I tanks
- time history analysis of piping systems

Section 3.7 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.7.3, "Seismic Subsystem Analysis," of Revision 19 of the AP1000 DCD.

In addition, in Turkey Point COL FSAR, Section 3.7 the applicant provided the following:

Departure

- PTN DEP 6.4-2

The applicant provided additional information in Table 3.7.3-1R of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR, is reviewed in Section 21.3 of this SER.

The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

3.7.4 Seismic Instrumentation

3.7.4.1 Introduction

Installation of instrumentation that is capable of adequately measuring the effects of an earthquake at the plant site is addressed. The criteria for the seismic instrumentation include the following:

- comparison with RG 1.12, "Nuclear Power Plant Instrumentation for Earthquakes," Revision 2

- location and description of instrumentation
- control room operator notification
- comparison of measured and predicted responses
- tests and inspections

3.7.4.2 Summary of Application

Section 3.7 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.7 of the AP1000 DCD, Revision 19. Section 3.7 of the DCD includes Section 3.7.4.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.7.4, the applicant provided the following:

AP1000 COL Information Items

- STD COL 3.7-2 and PTN COL 3.7-2

The applicant provided additional information in STD COL 3.7-2 and PTN COL 3.7-2 in Section 3.7.4.4 to resolve COL Information Item 3.7-2 (COL Action Item 3.7.5-2) on post-earthquake procedures to compare measured and predicted ground motions. In PTN COL 3.7-2, the applicant also stated that post-earthquake operating procedures utilize the guidance of Electric Power Research Institute (EPRI) Reports NP-5930, "A Criterion for Determining Exceedance of the Operating Basis Earthquake"; TR-100082, "Standardization of the Cumulative Absolute Velocity"; and NP-6695, "Guidelines for Nuclear Plant Response to an Earthquake"; as modified and endorsed by the NRC in RG 1.166, "Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Postearthquake Actions," and RG 1.167, "Restart of a Nuclear Power Plant Shut Down by a Seismic Event." A response spectrum checkup to 10 Hz will be based on the foundation instrument. The cumulative absolute velocity (CAV) will be calculated based on the recorded motions at the freefield instrument. If the OBE ground motion is exceeded or significant plant damage occurs, the plant must be shut down in an orderly manner.

In STD COL 3.7-2, the applicant stated that the procedures address measurement of the post-seismic event gaps between the new fuel rack and walls of the new fuel storage pit, between the individual spent fuel racks, and from the spent fuel racks to the spent fuel pool walls.

- STD COL 3.7-5

The applicant provided additional information in STD COL 3.7-5 in Section 3.7.4.2.1 to resolve COL Information Item 3.7-5 (COL Action Item 3.7.5-4) on freefield triaxial acceleration sensors. In STD COL 3.7-5, the applicant stated that a freefield sensor will be located and installed to record the ground surface motion representative of the site. It will be located such that the effects associated with surface features, buildings, and components on the recorded ground motion will be insignificant.

Supplemental Information

- STD SUP 3.7-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR, Section 3.7.4.1 to address the guidance in RG 1.12 by stating that administrative procedures define the maintenance and repair of the seismic instrumentation to keep the maximum number of instruments inservice during plant operation and shutdown.

- STD SUP 3.7-2

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR, Section 3.7.4.5 to address the test and inspection requirements for the acceleration sensors. In this section, the applicant stated that installation and acceptance testing of the triaxial acceleration sensors described in AP1000 DCD, Section 3.7.4.2.1 is completed prior to initial startup. Installation and acceptance testing of the time-history analyzer described in AP1000 DCD, Section 3.7.4.2.2 is completed prior to initial startup.

Interface Requirements

AP1000 DCD, Table 1.8-1, Items 3.3 and 3.12, refer to interfaces associated with DCD Section 3.7.4. The interface requirements for NRC review (associated with DCD Section 3.7.4.2) include an onsite implementation of the site seismic sensor locations and trigger values, and development of procedures by the COL applicant for earthquake responses from the seismic instrumentation.

3.7.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for seismic instrumentation are given in Section 3.7.4, Revision 3, of NUREG-0800.

The regulatory guidance documents for STD COL 3.7-2, PTN COL 3.7-2, and STD COL 3.7-5 are RG 1.166, RG 1.167, RG 1.12, and Appendix S to 10 CFR Part 50 that provide for installation of freefield triaxial acceleration sensors and establishment of post-earthquake procedures to compare measured and predicted responses.

3.7.4.4 Technical Evaluation

The NRC staff reviewed Section 3.7.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information related to seismic instrumentation. The results of the NRC

staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

The staff compared STD COL 3.7-2, PTN COL 3.7-2, and STD COL 3.7-5 in the Turkey Point Units 6 and 7 COL FSAR to STD COL 3.7-2, VEGP COL 3.7-2, and VEGP COL 3.7-5 in the VEGP COL FSAR, respectively. The staff concludes that the information added to the applications for these COL items is sufficiently similar so that the evaluations performed in VEGP SER Section 3.7.4 for VEGP COL 3.7-2 and VEGP COL 3.7-5 are directly applicable to STD COL 3.7-2 and STD COL 3.7-5, respectively. The one notable difference between the VEGP and Turkey Point Units 6 and 7 applications for these COL items is the specification in VEGP COL 3.7-5 that the freefield sensor is located on the ground surface of the engineering backfill. In the Turkey Point Units 6 and 7 COL FSAR, the exact location of the triaxial ground surface acceleration freefield sensor is not specified, but will be installed using NRC-approved methodology and will use the same trigger value. The staff concludes that this minor difference does not negatively affect the conclusions reached previously by the staff.

The following portion of this technical evaluation section is reproduced from Section 3.7.4.4 of the VEGP SER:

AP1000 COL Information Items

- STD COL 3.7-2

*As a result of the review in Sections 9.1.1.2 and 9.1.2.2 of the AP1000 DCD, STD COL 3.7-2 in Section 3.7.4.4 of the VEGP COL FSAR was identified to clarify the measurement of the post-seismic event gaps between the new fuel rack and walls of the new fuel storage pit, between the individual spent fuel racks, and from the spent fuel racks to the spent fuel pool wall. In a letter dated October 15, 2010, the applicant committed to specify the site-specific procedures, following the guidance of EPRI Reports NP-5930, TR-10082, and NP-6695, for: 1) checking the gaps between the new fuel rack and walls of the new fuel storage pit, between the individual spent fuel racks, and from the spent fuel racks to the spent fuel pool walls following an earthquake; and 2) to take, if needed, appropriate corrective actions in the event of an earthquake such as repositioning the racks or analysis of the as-found condition. The staff considered the applicant response to be acceptable based on the applicant's commitment to use the post-earthquake procedures described in Section 3.7.5.2 of the AP1000 DCD, which comply with the requirements of Appendix S to 10 CFR Part 50. Therefore, the NRC staff considers STD COL 3.7-2 to be resolved. The incorporation of the planned VEGP COL FSAR changes will be tracked as **Confirmatory Item 3.7-2**.*

Resolution of Standard Content Confirmatory Item 3.7-2

Confirmatory Item 3.7-2 is an applicant commitment to revise its FSAR to adjust the left margin annotations related to STD COL 3.7-2. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.7-2 is now closed.

- VEGP COL 3.7-2

The NRC staff reviewed VEGP COL 3.7-2 related to COL Information Item 3.7-2 (COL Action Item 3.7.5-2) included under Section 3.7.4.4 of the VEGP COL FSAR.

The applicant provided additional information in VEGP COL 3.7-2 to resolve COL Information Item 3.7-2. COL Information Item 3.7-2 states:

Combined License applicants referencing the AP1000 certified design will prepare site-specific procedures for activities following an earthquake. These procedures will be used to accurately determine both the response spectrum and the cumulative absolute velocity of the recorded earthquake ground motion from the seismic instrumentation system. The procedures and the data from the seismic instrumentation system will provide sufficient information to guide the operator on a timely basis to determine if the level of earthquake ground motion requiring shutdown has been exceeded. The procedures will follow the guidance of EPRI

Reports NP-5930, TR-100082, and NP-6695, as modified by the NRC staff.

The commitment was also captured as COL Action Item 3.7.5-2 in Appendix F of NUREG-1793, which states:

The COL applicant will specify site-specific procedures for activities following an earthquake and those procedures will follow the guidance of Reports NP-5930, TR-100082, and NP-6695 promulgated by the Electric Power Research Institute (EPRI).

In VEGP COL 3.7-2, the applicant stated the following:

Post-earthquake operating procedures utilize the guidance of EPRI Reports NP-5930, TR-100082, and NP-6695, as modified and endorsed by the NRC in Regulatory Guides 1.166 and 1.167. A response spectrum check up to 10Hz will be based on the foundation instrument. The cumulative absolute velocity will be calculated based on the recorded motions at the free field instrument. If the operating basis earthquake ground motion is exceeded or significant plant damage occurs, the plant must be shutdown in an orderly manner.

The NRC staff reviewed the resolution to VEGP COL 3.7-2 related to comparison of measured and predicted seismic responses included under Section 3.7.4.4 of the VEGP COL FSAR. The applicant committed to specify site-specific procedures, which follow the guidance of EPRI Reports NP-5930, TR-10082, and NP-6695, for activities following an earthquake, which were endorsed by RGs 1.166 and 1.167. In RAI 3.7.4-1, issued to the BLN applicant, the staff asked the applicant to clarify if CAV will be used as one of the criteria to determine if a power plant should be shutdown should the OBE ground motion be exceeded or significant plant damage occurs. The BLN applicant responded by stating "As indicated in FSAR Subsection 3.7.4.4, use of the guidance of Regulatory Guide 1.166 and NP-5930 signifies that CAV is to be used as one of the post-earthquake criteria for determining whether the plant should be shutdown. In addition, BLN COL FSAR Appendix 1AA indicates conformance to the guidance of Regulatory Guide 1.166." The staff considered the applicant's response to be adequate because the BLN applicant confirmed that it will use the recommended criteria from the RG 1.166 to determine a potential plant shutdown, and the staff concludes that this RAI is closed. Furthermore, the BLN response to RAI 3.7.4-4 was endorsed as standard for VEGP by SNC letter dated December 17, 2008.

Based on the VEPG applicant's commitment to use the procedures accepted by NRC for post-earthquake activities and the clarification on the use of CAV in RAI 3.7.4-1, the NRC staff concludes that the applicant provided adequate information regarding the post earthquake activities and procedures to determine if a power plant needs to be shutdown and considers VEGP COL 3.7-2 resolved.

- VEGP COL 3.7-5

The applicant provided additional information in VEGP COL 3.7-5 to resolve COL Information Item 3.7-5 (COL Action Item 3.7.5-4) included under Section 3.7.4.2.1 of the VEGP COL FSAR. COL Information Item 3.7-5 states:

The Combined License applicant will determine the location for the free-field acceleration sensor as described in [DCD] Subsection 3.7.4.2.1.

The commitment was also captured as COL Action Item 3.7.5-4 in Appendix F of NUREG-1793, which states:

The COL applicant will determine the location for the free-field acceleration sensor.

In VEGP COL 3.7-5, the applicant stated the following:

A free-field sensor will be located and installed to record the ground surface motion representative of the site. To be representative of this site in regards to seismic response of structures, systems, and components, the free-field sensor is located on the ground surface of the engineered backfill. The backfill directly supports the Nuclear Island and the adjacent structures and extends out from these structures a significant distance. The free field sensor is located where the backfill vertically extends from the top of the Blue Bluff Marl to the ground surface, but horizontally at a distance where possible effects on recorded ground motion associated with surface features, buildings, and components would be minimized. The trigger value is initially set at 0.01g.

The NRC staff reviewed the resolution to VEGP COL 3.7-5 related to triaxial acceleration sensors included under Section 3.7.4.2.1 of the VEGP COL FSAR. The applicant used the guidance in RGs 1.166 and 1.167 and supplemented information in the DCD with appropriate content, as required by Appendix S to 10 CFR Part 50. The applicant also committed to determining the location of the free field acceleration sensor and installing the sensor in a protected area. Based on the applicant's commitment to determine the location of the free-field acceleration sensor and the description of the location provided in STD COL 3.7-5, the staff concludes that the applicant presented sufficient information on the description and locations of field triaxial acceleration sensors and considers VEGP COL 3.7-5 resolved.

Supplemental information

- STD SUP 3.7-1

The applicant added the following supplemental information at the end of VEGP COL FSAR Section 3.7.4.1 to address RG 1.12:

Administrative procedures define the maintenance and repair of the seismic instrumentation to keep the maximum number of instruments inservice during plant operation and shutdown in accordance with Regulatory Guide 1.12.

The NRC staff reviewed the resolution to STD SUP 3.7-1 using the guidance in RG 1.12 and in Appendix S to 10 CFR Part 50. Because of the equivalence of the applicant's proposed resolution to the administrative procedures, maintenance and repair plans of RG 1.12, the staff concludes the applicant has adequately resolved STD SUP 3.7-1.

- STD SUP 3.7-2

The applicant added the following supplemental information at the end of VEGP COL FSAR Section 3.7.4.4 to address comparison of measured and predicted responses:

Installation and acceptance testing of the triaxial acceleration sensors described in DCD Subsection 3.7.4.2.1 is completed prior to initial startup. Installation and acceptance testing of the time-history analyzer described in DCD Subsection 3.7.4.2.2 is completed prior to initial startup.

The NRC staff reviewed the resolution to STD SUP 3.7-2, related to the timing of installation and acceptance testing of the triaxial acceleration sensors described in DCD Section 3.7.4.2.1 for the VEGP site. Because of the equivalence of the proposed resolution of STD SUP 3.7-2 to the general operability guidance for seismic equipment addressed in RG 1.12, RG 1.166 and RG 1.167, the staff concludes the applicant adequately resolved STD SUP 3.7-2.

3.7.4.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.7.4.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. On the basis of its review, the staff confirms that the applicant has addressed the required information relating to seismic instrumentation, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL application is acceptable and meets the requirements of Appendix S to 10 CFR Part 50 and complies with the guidance provided in RGs 1.166, 1.167, and 1.12. The staff based its conclusions on the following:

- STD COL 3.7-2 and PTN COL 3.7-2 are acceptable because the applicant is committed to use the procedures endorsed by RGs 1.166 and 1.167 and because the applicant has provided sufficient information for satisfying the requirements of Appendix S to 10 CFR Part 50 by committing to address the measurement of the post-seismic event gaps between the new fuel rack and walls of the fuel storage pit and to take appropriate corrective actions.
- STD COL 3.7-5 is acceptable because the applicant has provided sufficient information for satisfying the requirement of Appendix S to 10 CFR Part 50 by committing to determining the location of the freefield acceleration sensor and installing the sensor in the protected area.
- STD SUP 3.7-1 is acceptable because the applicant is committed to follow RG 1.12, to include developing administrative procedures to define the maintenance and repairing of the seismic instrumentation in order to keep the maximum number of instruments inservice during plant operation and shutdown.
- STD SUP 3.7-2 is acceptable because the applicant has provided sufficient information for satisfying the requirement of Appendix S to 10 CFR Part 50 by committing to complete installation and acceptance testing of the seismic instrumentation prior to initial startup.

3.8 Design Of Category I Structures

3.8.1 Concrete Containment

This section is not applicable to the Turkey Point Units 6 and 7 design, because AP1000 uses a steel containment.

3.8.2 Steel Containment

The steel containment in the AP1000 DCD provides the following information:

- description of the containment
- applicable codes, standard, and specifications
- loads and load combinations
- design and analysis procedures
- structural acceptance criteria
- materials, quality control, and special construction techniques
- in-service testing (IST) and inspection requirements

Section 3.8.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.8.2, "Steel Containment," of Revision 19 of the AP1000 DCD.

In addition, in the Turkey Point Units 6 and 7 COL FSAR, the applicant provided the following:

Departures

- PTN DEP 6.3-1 and PTN DEP 3.2-1

The applicant provided additional information about PTN DEP 6.3-1 and PTN DEP 3.2-1 in Section 3.8.2 of the FSAR related to design modifications to the condensate return portion of the Passive Core Cooling System and quantifying the duration that the passive residual heat removal heat exchanger can maintain safe shutdown conditions, respectively. This information, as well as related PTN DEP 3.2-1 and PTN DEP 6.3-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.1 of this report.

The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements. Section 21.1 of this report evaluates the departures from the DCD provided in PTN DEP 6.3-1 and PTN DEP 3.2-1.

3.8.3 Concrete and Steel Internal Structures of Steel or Concrete Containment

3.8.3.1 Introduction

Structures inside the containment are not part of the containment pressure boundary. They support the reactor coolant system components and related piping systems and equipment inside the containment. They also provide radiation shielding. The containment internal structures consist of the primary shield wall, reactor cavity, secondary shield walls, in-containment refueling water storage tank, refueling cavity walls, operating floor, intermediate floors, and various platforms.

The containment internal structures are constructed by reinforced concrete and structural steel. At the lower elevations, conventional concrete and reinforcing steel are used, except that permanent steel forms are used in some areas in lieu of removable forms based on constructability considerations. These steel form modules (liners) consist of steel plates reinforced with steel angle stiffeners and tee sections. The angles and the tee sections are on the concrete side of the plate. Welded studs, or similar embedded steel elements, are attached to the back of the permanent steel form where surface attachments to the plate transfer loads into the concrete. Where these surface attachments are seismic Category I, the portion of the steel form module transferring the load into the concrete is classified as seismic Category I.

3.8.3.2 Summary of Application

Section 3.8 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.8 of the AP1000 DCD, Revision 19. Section 3.8 of the DCD includes Section 3.8.3.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.8.3, the applicant provided the following:

AP1000 COL Information Items

- STD COL 3.8-5

The applicant provided additional information related to in-service testing and inspection requirements. This information is reviewed in Section 3.8.5 of this SER.

The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

3.8.4 Other Seismic Category I Structures

3.8.4.1 Introduction

The AP1000 DCD defines other seismic Category I structures as the shield building, the auxiliary building, the containment air baffle, Category I cable tray supports, and Category I HVAC supports.

The criteria for other Category I structures include the following:

- description of the structures
- applicable codes, standards, and specifications
- loads and load combinations
- design and analysis procedures
- structural acceptance criteria
- materials, quality control, and special construction techniques
- IST and inspection requirements
- construction inspection

3.8.4.2 Summary of Application

Section 3.8 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.8 of the AP1000 DCD, Revision 19. Section 3.8 of the DCD includes Section 3.8.4.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.8.4, the applicant provided the following:

AP1000 COL Information Items

- STD COL 3.8-5

The applicant provided additional information related to testing and in-service inspection requirements. This information is reviewed in Section 3.8.5 of this SER.

3.8.5 Foundations

3.8.5.1 Introduction

The foundation for the NI structures consists of the containment building, the shield building, and the auxiliary building, on a common 6-ft-thick, cast-in-place, reinforced, concrete basemat foundation.

Adjoining buildings, such as the radwaste building, turbine building, and annex building are structurally separated from the NI structures by a 2-in. gap at and below the grade. A 4-in. minimum gap is provided above grade. This provides space to prevent interaction between the NI structures and the adjacent structures during a seismic event.

This provides the required factor of safety (FS) against lateral movement under the most stringent loading conditions.

The criteria for the design of foundations include the following:

- description of the foundations
- applicable codes, standards, and specifications
- loads and load combinations
- design and analysis procedures
- standard acceptance criteria
- materials, quality control, and special construction techniques
- IST and inspection requirements
- construction inspection

3.8.5.2 Summary of Application

Section 3.8 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.8 of the AP1000 DCD, Revision 19. Section 3.8 of the DCD includes Section 3.8.5.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.8.5, the applicant provided the following:

Supplemental Information

- PTN SUP 3.8-1

The applicant provided supplemental information by adding additional text that states that the depth of overburden and depth of embedment are given in Section 2.5.4.

- PTN COL 2.5-7
- PTN COL 2.5-13

The applicant provided information in PTN COL 2.5-7 and PTN COL 2.5-13 addressing the specifications and control of the materials beneath the NI foundation for Turkey Point Units 6 and 7.

- PTN COL 2.5-10

The applicant provided information in PTN COL 2.5-10 addressing the static stability and bearing capacity of the foundation for Turkey Point Units 6 and 7.

- PTN COL 2.5-12
- PTN COL 2.5-16

The applicant provided information in PTN COL 2.5-12 and PTN COL 2.5-16 addressing the settlements of the NI for Turkey Point Units 6 and 7.

AP1000 COL Information Items

- PTN COL 2.5-17

The applicant provided information addressing the type of waterproofing system to be used for the below-grade exterior walls exposed to flood and to groundwater under the seismic Category I structures.

- STD COL 3.8-5

The applicant incorporated the material proposed in the August 17, 2010, letter from the VEGP applicant that proposed STD COL 3.8-5, adding new Sections 3.8.3.7, 3.8.4.7, and 3.8.5.7 to the FSAR. The applicant provided information in STD COL 3.8-5, addressing the construction inspection program related to seismic Category I and II structures.

- STD COL 3.8-6

In Turkey Point Units 6 and 7, the applicant incorporated the October 1, 2010, letter from the VEGP applicant that proposed STD COL 3.8-6, adding a new Section 3.8.6.6 to the FSAR. The applicant provided information in STD COL 3.8-6, addressing the construction procedure program related to safety-related Category I structures.

License Condition

- Part 10, License Condition 6

In its letter dated April 20, 2011 the applicant endorsed the October 1, 2010, letter from the VEGP applicant that proposed to add another line item to proposed License Condition 6, addressing the availability to NRC inspectors of the schedule for the implementation of construction and inspection procedures related to concrete activities.

ITAAC

In Appendix B to Part 10 of the Turkey Point Units 6 and 7 COL application, the applicant proposed ITAAC requiring that the mudmat-waterproofing-mudmat interface beneath the NI basemat have a coefficient of friction to resist sliding of greater than or equal to 0.55.

3.8.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations (GDC 1, GDC 2, GDC 4, and GDC 5, "Sharing of Structures, Systems, and Components," of Appendix A to 10 CFR Part 50; 10 CFR 50.55a; and Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50) for the foundations are given in Section 3.8.5, Revision 4, of NUREG-0800.

3.8.5.4 Technical Evaluation

The NRC staff reviewed Section 3.8.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to foundations. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- PTN SUP 3.8-1

In Turkey Point Units 6 and 7 COL FSAR, Section 3.8.5.1, “Description of the Foundations,” the applicant cited Subsection 2.5.4, “Stability of Subsurface Materials and Foundations,” which describes the depth of overburden and embedment of the Turkey Point Units 6 and 7 foundation. A foundation is a structural element that connects the superstructure and the supporting medium, such as soils or rocks. The purpose of the foundation is to hold the superstructure in place and to transmit all the loads from the superstructure to the underlying soils or rocks. The NI foundation basemat will be supported by lean concrete, unreinforced concrete with a lower ratio of cement to aggregate than structural concrete, which is underlain by continuous rock stratum—Key Largo Limestone. The lean concrete will be placed from elevation –35 ft North American Vertical Datum of 1988 (NAVD 88) to elevation –16 ft NAVD 88 resulting in an approximately 19-ft-thick concrete subbasemat.

- PTN COL 2.5-7
- PTN COL 2.5-13

Section 2.5.4.5.1.2, “Power Block and Site Grade Raising,” of the FSAR provides a description of the methods and procedures used for the verification and quality control of the fill concrete that will be used to bring the subgrade elevation up to the NI foundation elevation within the foundation support zone of the NI for the Turkey Point Units 6 and 7. The applicant intends to use lean concrete fill, with a compressive strength of 1,500 psi, rather than soil fill. The applicant stated that concrete fill provides a uniform base with well-defined material properties. The applicant analyzed and modeled the concrete fill for the Turkey Point Units 6 and 7 site using the concrete compressive strength of 1,500 psi for static and dynamic loads and concluded that the concrete fill with a compressive strength of 1,500 psi is adequate for the Turkey Point Units 6 and 7 site. The methods and procedures used for the verification and quality control of the fill concrete are further discussed in Section 2.5.4 of this SER.

In the review of the standard supplemental information in Turkey Point Units 6 and 7 COL FSAR, Section 2.5.4, the staff determined that the applicant did not provide sufficient information for the site characteristics of the fill concrete that will be used to bring the subgrade elevation up to the NI foundation elevation. In RAI 4975, Question 03.07.01-3, the applicant was requested to address the potential for cracking of the lean concrete to be placed beneath the NI.

In the applicant’s revised response to RAI 4975, Question 03.07.01-3, dated December 11, 2014, the applicant stated that a thermal control plan will be developed during detailed design to minimize thermal cracking of the concrete fill. The applicant indicated that the thermal control plan will follow the guidance prescribed in American Concrete Institute (ACI) 207.1R, “Guide to Mass Concrete.” The applicant further stated that the required activities for reducing thermal cracking of the lean concrete will include controls on cementitious material content, precooling of aggregates and mixing water, and construction scheduling and procedures. A thermal control plan considering the geometry of Turkey Point Units 6 and 7 fill concrete with a compressive strength of 1,500 psi, total volume of the fill concrete placement,

and rate of concrete production, will be prepared to make sure that the recommended temperature limit will not be exceeded.

The staff reviewed the applicant's response and noted that the applicant is committed to using the guidance in ACI 207.1R for reducing the risk of cracking of the concrete fill beneath the NI. The staff finds the applicant's response to RAI 4975, Question 03.07.01-3, to be acceptable because the applicant has demonstrated through a thermal control plan that the risk of cracking the concrete fill beneath the NI is minimal. As such, RAI 4975, Question 03.07.01-3, is resolved.

As stated above, the applicant provided a description of a thermal control plan for reducing thermal cracking of the lean concrete fill beneath the NI but did not describe the design and construction approach (i.e., quality control of backfill materials, fill-concrete mix design, field observations, procurement of test specimens, and operation of a quality-control sampling and testing program) for the lean concrete fill to attain the required fill mechanical properties. In RAI 7815, Question 03.08.05-3, the staff requested the applicant to describe in sufficient detail the design and construction approaches of the lean concrete fill in Section 2.5.4.1.2 of the FSAR.

In the applicant response to RAI 7815, Question 03.08.05-3, dated April 19, 2015, the applicant stated that the mechanical properties of the lean concrete fill will be consistent with the properties used for the design analyses and the mechanical properties will be achieved by selecting an appropriate mix design, performing verification testing during construction, and following industry guidance for construction and placement methods. The selection of the lean concrete mix design will be made at the detailed design stage of the project. Section 2.5.4.4.5, "Geophysical Exploration for Possible Dissolution Features," of this SER further discusses the concrete mix design and the design and construction of the concrete fill.

Construction and testing of the lean concrete will follow the guidance in ACI 207.1R. Testing of materials and lean concrete fill during construction will verify that the as-placed concrete properties are consistent with the properties established during the mix design. At a minimum, the construction verification and testing includes: verification of manufacturer's certifications for cementitious materials; aggregate testing for gradation, moisture content, and specific gravity; fresh concrete testing of slump and placement temperature; and hardened concrete testing of compressive strength. The lean concrete will be batched onsite and placed in a series of successive layers and lifts. The layer thickness is determined prior to construction based on the maximum aggregate size of concrete mix.

Concrete consolidation is achieved for each layer by internal vibration from driven vibrators. To ensure proper consolidation, the vibrators will penetrate the lower layer for approximately 2 to 4 in. and are maintained in a nearly vertical position at each penetration during vibration. The horizontal lift joint surface will be prepared between lifts to ensure bond between joints. Before placement of the next lift, surface film and contamination will be removed to expose fresh, clean mortar, and aggregate surface by means of sandblasting or high-pressure water jet. The lean concrete will be water-cured between lift placements.

The staff reviewed the applicant response to RAI 7815, Question 03.08.05-3, and concludes that the applicant's design and construction approaches of the lean concrete are acceptable because they are consistent with industry practices. The applicant is committed to using industry practices by selecting an appropriate mix design, performing verification testing during

construction, and following industry guidance for construction and placement methods for the design of the concrete fill. The staff verified that the Turkey Point Units 6 and 7 COL FSAR was appropriately revised to address the design and construction of the lean concrete beneath the NI.

- PTN COL 2.5-10

Section 2.5.4.10 provides a description of the static and dynamic bearing capacity of the NI foundation. The applicant provided information that describes the static and dynamic capacities of the foundation materials (fill concrete, granular fill, etc.), the basis for the capacities, and a comparison to the relevant AP1000 DCD site parameters for “Rock; Rock and Soil; and Soil” in Turkey Point Units 6 and 7 FSAR, Table 2.5.4-217, “Summary of Bearing Capacity.”

Table 2.5.4-217 shows the computed results of the allowable static and dynamic bearing capacities for Turkey Point Units 6 and 7 of the Turkey Point NI structures. In the case of static bearing capacity, a minimum FS of 3 is used to evaluate the allowable static bearing capacity of the NI structures. The computed allowable static bearing capacity of 39 kips per square foot (ksf) exceeds the average bearing demand of 8.9 ksf over the footprint of the NI at its excavation depth. For the dynamic bearing capacity calculation, an FS of 2 is applied against the design load combination, which includes the normal loads plus the SSE load for evaluating the required allowable dynamic bearing capacity of the Turkey Point Units 6 and 7 NI structures. The applicant stated that, because the AP1000 certified seismic design response spectra has a peak ground acceleration of 0.3g, which is much higher than anticipated at the Turkey Point Units 6 and 7 site (0.1g), the required dynamic bearing capacity in the AP1000 DCD is greater than the maximum dynamic loading that would be experienced at the Turkey Point Units 6 and 7 site. The site-specific computed allowable dynamic bearing capacity of 41 kips exceeds the maximum bearing demand of 35 ksf.

The staff reviewed the applicant’s description of the bearing demands on the Turkey Point Units 6 and 7 NI structures’ foundation and finds PTN COL 2.5-10 to be acceptable because the applicant has demonstrated that (1) the site-specific bearing demands are bounded by the limit in the AP1000 DCD and (2) the foundation for the Turkey Point Units 6 and 7 NI is capable of withstanding the bearing demand from the AP1000 NI.

- PTN COL 2.5-12
- PTN COL 2.5-16

Section 2.5.4.10.3 of the FSAR provides a description of the post-construction settlement results for Turkey Point Units 6 and 7. The results indicate that the Turkey Point Units 6 and 7 NI structures are founded on rock of the Key Largo Limestone and fill concrete which does not incur sufficient settlement to impact the safety function of the structures. The settlement analyses consist of a hand calculation that uses stress distributions appropriate for layered systems as well as a three-dimensional finite element computer model, PLAXIS 3D Foundation (PLAXIS 3D). The settlement of the Turkey Point Units 6 and 7 NI structures founded on rock or fill concrete is calculated to be less than 0.3 in. Table 2.5.4-224, “Comparison of Limits of Acceptable Settlement without Additional Evaluation,” shows that the maximum estimated differential settlement for the NI foundation is 0.26 in. (0.26 in. for the lower bound hand calculation, 0.23 in. for the LB PLAXIS 3D calculation, 0.22 in. for the best estimate hand

calculation, and 0.20 in. for the BE PLAXIS 3D calculation), which is less than the AP1000 DCD's allowable settlement of 0.5 in.

For the adjacent seismic Category II structures, the results indicate that the mat foundation will settle less than 2.8 in. (2.7 in. for the lower bound hand calculation, 2.2 in. for the LB PLAXIS 3D calculation, 2.0 in. for the best estimate hand calculation, and 1.6 in. for the BE PLAXIS 3D calculation), which is less than the criterion of 3-in. differential settlement relative to the settlement of the NI established in the DCD. DCD Table 2.5-1, "Limits of Acceptable Settlement without Additional Evaluation," provides guidance to the COL on predictions of absolute and differential settlement that are acceptable without further evaluation.

The staff reviewed the information in Section 2.5.4.10.3 of the FSAR and concludes that the amount of post-construction differential and absolute settlement for the seismic Categories I and II structures described in Section 2.5.4.10.3 of the FSAR is bounded by the acceptable values stated in the DCD and therefore acceptable. As such, the staff considers PTN COL 2.5-12 and PTN COL 2.5-16 to be acceptable.

AP1000 COL Information Items

- PTN COL 2.5-17

SRP Section 3.8.5 requires confirmation that the NI remains stable under design-basis demands. AP1000 DCD, Section 3.4.1.1.1.1, "Waterproofing," states that (1) the waterproof membrane between the mudmat must provide adequate shear strength to transfer horizontal shear caused by seismic loading and (2) the function of the membrane is seismic Category I. In this regard, Section 3.4.1.1.1 of the AP1000 DCD provides a requirement for the COL applicant to identify a waterproofing system and to demonstrate a friction coefficient greater than or equal to 0.55 with all horizontal concrete surfaces.

The staff reviewed Section 14.3.3.4, "Waterproofing Membrane ITAAC," of the FSAR, and noticed that the applicant provided a brief description of the waterproofing membrane ITAAC. The applicant stated, "Site-specific ITAAC for the waterproof membrane will be developed to verify by testing that the mudmat-waterproofing-mudmat interface beneath the NI basemat has a minimum coefficient of friction [COF] to resist sliding of 0.55." To ensure that the COF of 0.55 is met, the staff issued RAI 7815, Question 03.08.05-04, requesting the applicant provide in Appendix B to Part 10 of the FSAR an ITAAC table that describes the design commitment; the inspection, testing, or analyses to be performed; and the as-built design criteria of the waterproofing membrane.

In its response to RAI 7815, Question 03.08.05-04, dated April 16, 2015, the applicant stated that the chosen mudmat waterproofing system, a sheet-type high density polyethylene, for the Turkey Point nuclear station is one of the acceptable alternatives described in Subsection 3.4.1.1.1.1 of the AP1000 DCD and will be demonstrated to produce a friction coefficient of 0.55 or greater with the mudmat's horizontal concrete surface.

The staff reviewed the applicant's response to RAI 7815, Question 03.08.05-04, and finds the response to be acceptable because the applicant is committed to (1) use one of the three waterproofing membrane systems identified in the standard AP1000 design and (2) demonstrate that the waterproofing membrane meets the waterproofing and friction

requirements of greater than or equal to 0.55 as specified in Section 3.4.1.1.1.1 of the AP1000 DCD.

The staff verified that the Turkey Point Units 6 and 7 COL FSAR was appropriately revised to address the design commitment, ITAAC, and acceptance criteria for the waterproof membrane.

The following portion of this technical evaluation section is reproduced from Section 3.8.5.4 of the VEGP SER:

- **STD COL 3.8-5**

*In a letter dated August 17, 2010, the applicant proposed STD COL 3.8-5, adding a new Section 3.8.3.7, 3.8.4.7, and 3.8.5.7 to the VEGP COL FSAR, addressing the construction inspection program related to seismic Category I and II structures. The construction inspection program will be consistent with the maintenance rule (10 CFR 50.65) and guidance in RG 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," in addressing maintenance requirements for the seismic Category I and seismic Category II structures. The staff concludes that the applicant has provided an acceptable construction inspection program that meets the requirement described in Section 3.8.4.8 of the AP1000 DCD. Therefore, the NRC staff considers STD COL 3.8-5 to be resolved. The incorporation of the planned VEGP COL FSAR changes will be tracked as **Confirmatory Item 3.8-2**.*

Resolution of Standard Content Confirmatory Item 3.8-2

Confirmatory Item 3.8-2 is an applicant commitment to revise its FSAR Table 1.8-202, Table 1.9-201, Appendix 1AA, Section 3.8.3.7, Section 3.8.4.7, Section 3.8.5.7, Section 3.8.6.5, and Section 17.6 to address STD COL 3.8-5. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.8-2 is now closed.

- **STD COL 3.8-6**

*In a letter dated October 1, 2010, the applicant proposed STD COL 3.8-6, adding a new Section 3.8.6.6 to the VEGP COL FSAR, addressing the construction procedure program related to safety-related Category I structures. The construction procedures program addresses the pre- and post-concrete placement, and use of construction mock-ups for the SC modules. The staff concludes that the applicant has provided an acceptable construction procedures program that meets the requirement described in Section 3.8.4.8 of the AP1000 DCD. Therefore, the NRC staff considers STD COL 3.8-6 to be resolved. The incorporation of the planned VEGP COL FSAR changes will be tracked as **Confirmatory Item 3.8-3**.*

Resolution of Standard Content Confirmatory Item 3.8-3

Confirmatory Item 3.8-3 is an applicant commitment to revise its FSAR Table 1.8-202 and Section 3.8.6.6 to address STD COL 3.8-6. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.8-3 is now closed.

The following portion of this technical evaluation section is reproduced from Section 3.8.5.4 of the VEGP SER:

License Condition

- *Part 10, License Condition 6*

In its letter dated October 1, 2010, the applicant proposed to add another line item to proposed License Condition 6, addressing the availability to NRC inspectors of the schedule for the implementation of construction and inspection procedures related to concrete activities. Specifically, the applicant has proposed to add a new standard item to proposed License Condition 6 to read (where # is the next appropriate letter):

- #. the implementation of construction and inspection procedures for concrete filled steel plate modules activities before and after concrete placement, use of construction mock-ups, and inspection of modules before and after concrete placement as discussed in DCD Subsection 3.8.4.8.*

The applicant's proposed new standard item related to concrete construction and inspection procedures will allow the staff sufficient time to inspect the procedures. Therefore, the staff finds the addition of this line item to proposed License Condition 6 acceptable.

Evaluation of Additional Information Submitted by Applicant

In a letter dated May 6, 2011, the applicant revised the proposed license condition regarding the implementation of construction and inspection procedures for steel concrete composite (SC) construction activities for seismic Category I nuclear island modules (including shield building SC). The staff found these changes acceptable because they clarified the applicant commitment regarding construction procedure.

3.8.5.5 Post-Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following ITAAC and license condition acceptable:

- The licensee shall perform and satisfy the waterproofing membrane ITAAC in SER Table 3-2.
- License Condition (3-4) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the construction and inspection procedures for steel concrete composite (SC) construction activities for seismic Category I NI modules. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until each this license condition has been fully implemented. The schedule shall identify the completion of or implementation of the construction and inspection procedures for steel concrete composite (SC) construction activities for seismic Category I NI modules (including shield building SC modules) described in AP1000 DCD, Revision 19, Section 3.8.4.8.

3.8.5.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. On the basis of its review, the staff confirms that the applicant has addressed the required information relating to foundations, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 1, 2, 4, and 5 to 10 CFR Part 50, Appendix A. The staff based its conclusion on the following:

- STD SUP 3.8-1 is acceptable because the applicant addressed the relevant information that meets the guidance in Section 3.8.5 of NUREG-0800 and specifically addressed PTN COL 2.5-7, PTN COL 2.5-13, PTN COL 2.5-10, PTN COL 2.5-12, PTN COL 2.5-13, and PTN COL 2.5-16. In conclusion, the applicant has provided sufficient information for satisfying 10 CFR Part 50, Appendix A, GDC 1, 2, 4, and 5.
- PTN COL 2.5-17 is acceptable because the applicant committed to (1) use one of the three waterproofing-membrane systems identified in Subsection 3.4.1.1.1.1 of the AP1000 standard design and which were reviewed and accepted by the staff and (2) demonstrate that the waterproofing membrane meets the waterproofing and COF requirements of greater than or equal to 0.55 as specified in Section 3.4.1.1.1.1 of the AP1000 DCD.

Table 3-2 Waterproof Membrane ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
The friction coefficient to resist sliding is ≥ 0.55 .	Testing will be performed to confirm that the mudmat-waterproofing-mudmat interface beneath the NI basemat has a coefficient of friction to resist sliding of ≥ 0.55 .	A report exists and documents that the as-built waterproof system (mudmat-waterproofing-mudmat interface) has a coefficient of friction of ≥ 0.55 as demonstrated through material qualification testing.

3.9 Mechanical Systems and Components

Structural integrity and functional capability of various safety-related mechanical components are described. The design is not limited to ASME Code components and supports, but is extended to other components such as control rod drive mechanisms (CRDMs), certain reactor internals, and any safety-related piping designed to industry standards other than the ASME Code. The design includes issues as load combinations, allowable stresses, methods of analysis, summary of results, and preoperational testing. The evaluation of this section is focused on determining whether there is adequate assurance of a mechanical component performing its safety-related function under all postulated combinations of normal operating conditions, system operating transients, postulated pipe breaks, and seismic events.

3.9.1 Special Topics for Mechanical Components

In Section 3.9.1, “Special Topics for Mechanical Components,” design transients and methods of analysis are described for all seismic Category I components, component supports, core support (CS) structures, and reactor internals designated as Classes 1, 2, 3, and CS under ASME Code, Section III, and those not covered by the ASME Code. Also included are the assumptions and procedures used for the inclusion of transients in the design and fatigue evaluation of ASME Code Class 1 and CS components and the computer programs used in the design and analysis of seismic Category I components and their supports, as well as experimental and inelastic analytical techniques.

Section 3.9 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 3.9.1, “Special Topics for Mechanical Components,” of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the NRC staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

3.9.2 Dynamic Testing and Analysis of Systems, Structures, and Components

The criteria, testing procedures, and dynamic analyses employed to ensure the structural and functional integrity of piping systems, mechanical equipment, reactor internals, and their supports (including supports for conduit and cable trays, and ventilation ducts) under vibratory loadings, are addressed in this section. The loadings include those due to fluid flow (and especially loading caused by adverse flow conditions, such as flow instabilities over standoff pipes and branch lines in the steam system) and postulated seismic events.

Section 3.9 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 3.9.2, “Dynamic Testing and Analysis of Systems, Structures and Components,” of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the NRC staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

3.9.3 ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structures

3.9.3.1 Introduction

The structural integrity and functional capability of pressure-retaining components, their supports, and CS structures are ensured by designing them in accordance with ASME Code, Section III, or other industrial standards. The loading combinations and their respective stress limits, the design and installation of pressure-relief devices, and the design and structural integrity of ASME Code Class 1, 2, and 3 components and component supports are included.

The criteria for the SSC design include the following considerations:

- loading combinations, design transients, and stress limits
- pump and valve operability assurance
- design and installation criteria of Class 1, 2, and 3 pressure-relieving devices
- component and piping supports

3.9.3.2 Summary of Application

Section 3.9 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.9 of the AP1000 DCD, Revision 19. Section 3.9 of the DCD includes Section 3.9.3.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.9.3, the applicant provided the following:

Departure

- PTN DEP 6.4-2

The applicant provided additional information in Table 3.9-12R of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR, is reviewed in Section 21.3 of this SER.

AP1000 COL Information Items

- STD COL 3.9-2

The applicant provided additional information in STD COL 3.9-2 to address COL Information Item 3.9-2, which states that “Reconciliation of the as-built piping (verification of the thermal cycling and stratification loadings considered in the stress analysis discussed in [DCD] Subsection 3.9.3.1.2) is completed by the COL holder after the construction of the piping systems and prior to fuel load.” Evaluation of this particular COL information item is provided in Section 3.12 of this SER.

- STD COL 3.9-3

The applicant provided additional information in STD COL 3.9-3 to address COL Information Item 3.9-3 (COL Action Item 3.9.8-1), which describes snubber design and testing, snubber installation requirements, and snubber preservice and inservice examination and testing.

- STD COL 3.9-5

The applicant provided additional information in STD COL 3.9-5 to address COL Information Item 3.9-5 (COL Action Item 3.12.5.10-1), which addresses pressurizer surge line monitoring. Evaluation of this particular COL information item is provided in Section 3.12 of this SER.

- STD COL 3.9-7

The applicant incorporated the information provided in the letter dated April 23, 2010, from the VEGP applicant, that proposed to add STD COL 3.9-7 to the FSAR. This COL item provides additional information on the process to be used to complete the piping design and to complete the ITAAC added to verify the design. Evaluation of this particular COL Information item is provided in Section 3.12 of this SER.

Supplemental Information

- STD SUP 3.9-3

The applicant provided supplemental information in STD SUP 3.9-3 to describe snubber design and testing and snubber installation requirements.

3.9.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the ASME Code Class 1, 2, and 3 components, component supports, and CS structures are given in Section 3.9.3, Revision 3, of NUREG-0800.

3.9.3.4 Technical Evaluation

The NRC staff reviewed Section 3.9.3 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the functional design of ASME Code Class 1, 2, and 3 components and component supports and CS structures. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review

in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAls.
- The staff confirmed that all responses to RAls identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN, Units 3 and 4, COL application.

The following portion of this technical evaluation section is reproduced from Section 3.9.3.4 of the VEGP SER:

AP1000 COL Information Items

- *STD COL 3.9-3 and STD SUP 3.9-3*

AP1000 DCD, Section 3.9.8.3, "Snubber Operability Testing," states that COL applicants referencing the AP1000 design will develop a program to verify operability of essential snubbers as outlined in Section 3.9.3.4.3, "Snubbers Used as Component and Piping Supports," and Section 3.9.3.4.4, "Inspection, Testing, Repair and/or Replacement of Snubbers." In the BLN COL FSAR, the applicant states in Section 3.9.8.3, "Snubber Operability Testing," that STD COL 3.9-3 is addressed in BLN COL FSAR Section 3.9.3.4.4, which incorporates by reference AP1000 DCD Section 3.9.3.4.4, with supplemental snubber information added to the end of the existing Section 3.9.3.4.4.

As indicated in the BLN COL FSAR, STD COL 3.9-3 contains a wide range of supplemental information on snubber design and testing requirements, snubber installation requirements, and snubber preservice and inservice examination and testing. It was not clear to the staff, however, whether STD COL 3.9-3 had provided the required information called for by AP1000 DCD, Section 3.9.8.3. In RAI 3.9.3-1, the staff requested that the applicant address the following: (1) clarify what was meant by "snubber operability testing" when the applicant prepared the COL information; (2) discuss whether the entire STD COL 3.9-3 represents BLN's plant-specific, updated snubber requirements, not already covered in AP1000 DCD, Section 3.9.3; (3) clarify whether all or part of

STD COL 3.9-3 is related to snubber operability testing; (4) for the portions of STD COL 3.9-3 which are not related to snubber operability testing, explain why they are included as part of the COL item; (5) discuss all the pertinent codes and standards on which STD COL 3.9-3 is based to assure snubber operability; and (6) discuss the need to modify the content and the physical placement of STD COL 3.9-3 in the BLN COL FSAR.

In its response, the applicant explained that information presented in BLN COL FSAR Section 3.9.3.4.4 regarding snubber testing includes information specific to qualification and installation tests and examinations for snubbers included in the inservice testing (IST) program and preservice examination and testing programs; and information specifically related to snubber inservice examination and testing. The applicant acknowledges, therefore, that not all information added by STD COL 3.9-3 is related specifically to snubber "operability testing." The applicant also noted that BLN COL FSAR Section 3.9.3.4.4 has been subjected to a revision responding to a separate staff RAI on snubber IST programs. Details of the applicant's responses to the RAI are provided in the following:

- (1) For the purpose of STD COL 3.9-3, operability testing encompasses the preservice and inservice examinations and testing required by the ASME Code for Operation and Maintenance (OM) for Nuclear Power Plants (ASME OM Code), Subsection ISTD, "Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-Water Reactor Nuclear Power Plants" as described in BLN COL FSAR Section 3.9.3.4.4.c and Section 3.9.3.4.4.d (as revised in applicant's response to RAI 3.9.6-3).*
- (2) In order to provide a complete description of the snubber operability testing program, that is, the preservice and IST programs for snubbers, additional information was provided in BLN COL FSAR Section 3.9.3.4.4 as indicated in the applicant's letter to the NRC in response to RAI 3.9.6-3. Previously, only snubber preservice examination and testing had been described in BLN COL FSAR Section 3.9.3.4.4.c.*
- (3) As noted above, some of the information provided in the original BLN COL FSAR Section 3.9.3.4.4 relates to snubber qualification testing and examinations and snubber installation verification requirements. These activities are considered precursors to the snubber operability testing that will be conducted in accordance with the ASME OM Code, Subsection ISTD.*
- (4) The information not specifically related to STD COL 3.9-3 operability testing, i.e., Sections 3.9.3.4.4.a and 3.9.3.4.4.b, should have been labeled as standard supplemental information, using the left margin annotation STD SUP 3.9-3.*
- (5) Snubber operability testing is to be conducted during implementation of the preservice and ISI and testing programs in accordance with the*

requirements of the ASME OM Code, Subsection ISTD. As indicated in the first paragraph of BLN COL FSAR Section 3.9.3.4.4, the description of the program provided in the BLN COL FSAR is based on the 2001 Edition through the 2003 Addenda of the ASME OM Code. However, the initial IST program for snubbers will incorporate the latest Edition and Addenda of the ASME OM Code approved in 10 CFR 50.55a(f) on the date 12 months before initial fuel load.

- (6) BLN COL FSAR Section 3.9.3.4.4 will be revised as indicated in the Application Revision section of this response to segregate the snubber operability testing from the remaining portions of the section (i.e., the snubber design and qualification testing, and the snubber installation requirements) and to include the appropriate left margin annotation. In addition, to maintain consistency, to the extent possible, with other industry COL applications, Section 3.9.3.4.4.a is revised to clarify and expand on snubber qualification examination and testing. Finally, minor editorial changes are made to the Section 3.9.3.4.4.c changes provided in the applicant's letter to the NRC in response to RAI 3.9.6-3. Additionally, changes will be made to the introductory (roadmap) paragraph for BLN COL FSAR Section 3.9.3.4.4 indicating it is a new subsection to follow DCD Section 3.9.3.4.3.

The staff found that above responses provided by the applicant to be adequate in clarifying that the information for snubber operability testing originally provided in STD COL 3.9-3 was primarily intended for preservice and inservice examination and testing. The staff also found that the supplemental information provided under a new STD SUP 3.9-3, for snubber design and qualification testing, and the snubber installation requirements includes a better description for snubber design and qualification testing, and is more consistent with other industry COL applications. The staff confirmed that Revision 1 has incorporated all the changes as required. RAI 3.9.3-1 is closed.

Clarification of BLN SER Standard Content

Based on the staff's review of the standard content, there were two minor changes of an editorial nature that were found not to affect the staff's conclusion. The first paragraph discussed in Item (5) above was moved in the final VEGP COL FSAR such that it is appropriately included with the write up specific to STD COL 3.9-3. The introductory (roadmap) paragraph was not changed as described following Item (6) above because the AP1000 DCD was modified to include a paragraph numbered "3.9.3.4.4." As a result, the new text was added to an existing section as opposed to being a standalone section.

Resolution of Difference Between FSARs

In Section 3.9.3.4.4 of the BLN COL FSAR, the BLN applicant stated that a list of snubbers on systems which experience sufficient thermal movement to measure cold to hot position, is included as part of the testing program after piping analysis has been completed. In Section 3.9.3 of the VEGP COL FSAR, the VEGP applicant provides Table 3.9-201 with this list of snubbers. The addition of

a list of snubbers on systems which experience sufficient thermal movement to measure cold to hot position to the VEGP COL FSAR is acceptable to the staff.

3.9.3.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.9.3.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." The staff based its conclusion on the following:

- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.
- STD COL 3.9-3 and STD SUP 3.9-3 are acceptable because the applicant addressed the relevant information that meets the guidance in Section 3.9.3 of NUREG-0800. In conclusion, the applicant has provided sufficient information for satisfying 10 CFR Part 50, Appendix A, GDC 1 and 4.

3.9.4 Control Rod Drive System

The control rod drive system (CRDS) consists of the control rods and the related mechanical components that provide the means for mechanical movement. As discussed in GDC 26, "Reactivity Control System Redundancy and Capability," and GDC 27, "Combined Reactivity Control Systems Capability," the CRDS provides one of the independent reactivity control systems. The rods and the drive mechanism are capable of reliably controlling reactivity changes either under conditions of anticipated operational occurrences, or under postulated accident conditions. A positive means for inserting the rods is always maintained to ensure appropriate margin for malfunction, such as stuck rods. Because the CRDS is a safety-related system and portions of the CRDS are a part of the RCPB, the system is designed, fabricated, and tested to quality standards commensurate with the safety-related functions to be performed. This provides an extremely high probability of accomplishing the safety-related functions either in the event of anticipated operational occurrences or in withstanding the effects of postulated accidents and natural phenomena such as earthquakes, as discussed in GDC 1; GDC 2; GDC 14, "Reactor Coolant Pressure Boundary"; GDC 29, "Protection against Anticipated Operational Occurrences"; and 10 CFR 50.55a, "Codes and Standards."

Section 3.9 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 3.9.4, "Control Rod Drive System (CRDS)," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

3.9.5 Reactor Pressure Vessel Internals

AP1000 reactor internals consist of two major assemblies—the lower internals and the upper internals. The reactor internals provide the protection, alignment, and support for the core, control rods, and gray rods to provide safe and reliable reactor operation. In addition, the reactor internals help to accomplish the following: direct the main coolant flow to and from the fuel assemblies; absorb control rod dynamic loads, fuel assembly loads, and other loads and transmit these loads to the reactor vessel; support instrumentation within the reactor vessel; provide protection for the reactor vessel against excessive radiation exposure from the core; and position and support reactor vessel radiation surveillance specimens.

Section 3.9 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 3.9.5, "Reactor Pressure Vessel Internals," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

3.9.6 Inservice Testing of Pumps and Valves (Related to RG 1.206, Section C.III.1, Chapter 3, C.I.3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints")

3.9.6.1 Introduction

In this section, the NRC staff describes its review of the functional design, qualification, and inservice testing (IST) programs for pumps, valves, and dynamic restraints as required by the NRC regulations in 10 CFR Part 52 and 10 CFR 50.55, "Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses," for Turkey Point Units 6 and 7. RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," discusses the Commission's position provided in SECY-05-0197, "Review of Operational Programs in a Combined License Application and General Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," that operational programs should be fully described in COL applications to avoid the need to specify ITAAC for those programs. The applicant relies on the Turkey Point Units 6 and 7 COL FSAR with its incorporation by reference of the AP1000 DCD and supplemental information to fully describe the IST and motor-operated valve (MOV) testing operational programs in support of the COL application for Turkey Point Units 6 and 7.

3.9.6.2 Summary of Application

Section 3.9 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.9 of the AP1000 DCD, Revision 19. Section 3.9 of the DCD includes Section 3.9.6.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.9.6, the applicant provided the following:

Departure

- PTN DEP 6.4-2

The applicant provided additional information in Table 3.9-16R of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR, is reviewed in Section 21.3 of this SER.

AP1000 COL Information Item

- STD COL 3.9-4

The applicant provided additional information in several sections of Turkey Point Units 6 and 7 COL FSAR, Section 3.9.6 in response to STD COL 3.9-4 to supplement the AP1000 DCD provisions to fully describe the IST and MOV testing programs for Turkey Point Units 6 and 7. For example, the Turkey Point Units 6 and 7 COL FSAR supplements the provisions in the AP1000 DCD with respect to the Edition and Addenda of the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code) applicable to the description of the IST program for Turkey Point Units 6 and 7, determination of the MOV testing frequency, operability testing of power-operated valves (POVs) other than MOVs, performance of check valve exercise tests, and plans to apply alternatives to the ASME OM Code. Under STD COL 3.9-3, the applicant supplemented the AP1000 DCD provisions for design, installation, preservice examination and testing, and inservice examination and testing of dynamic restraints (snubbers) in Turkey Point Units 6 and 7 COL FSAR, Section 3.9.3.4.4, "Inspection, Testing, Repair, and/or Replacement of Snubbers."

The AP1000 DCD addresses the functional design and qualification of mechanical equipment to be used at an AP1000 nuclear power plant in several DCD sections. For example, Section 3.9.3.2, "Pump and Valve Operability Assurance," states that criteria are developed to assess the functional capability of required components to operate. Section 3.9.3.2.2, "Valve Operability," indicates that operational tests will be performed to verify that valves open and close prior to installation. This section also specifies cold hydro tests, hot functional tests, periodic ISIs, and periodic inservice operations to be performed in situ to verify the functional capability of the valves. Section 5.4.8, "Valves," includes provisions regarding design and qualification, and preoperational testing of valves within the scope of those systems, and refers to these activities for other safety-related valves. Section 5.4.8.3, "Design Evaluations," specifies that the requirements for qualification testing of power-operated active valves are based on ASME Standard QME-1-2007, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants." Section 5.4.9, "Reactor Coolant System Pressure Relief Devices,"

includes provisions for design, testing, and inspection of relief devices in the reactor coolant system. Section 5.4.10, "Component Supports," includes provisions for design, testing, and inspection of component supports in the reactor coolant system. The Turkey Point Units 6 and 7 COL FSAR incorporates by reference these specific sections in the AP1000 DCD.

With respect to flow-induced vibration (FIV) of plant components, AP1000 DCD, Section 3.9.2, "Dynamic Testing and Analysis," describes tests to confirm that piping, components, restraints, and supports have been designed to withstand the dynamic effects of steady-state FIV and anticipated operational transient conditions. Section 14.2.9.1.7, "Expansion, Vibration and Dynamic Effects Testing," states that the purpose of the expansion, vibration, and dynamic effects testing is to verify that the safety-related, high-energy piping and components are properly installed and supported such that, in addition to other factors, vibrations caused by steady-state or dynamic effects do not result in excessive stress or fatigue to safety-related plant systems. The Turkey Point Units 6 and 7 COL FSAR incorporates by reference these sections in the AP1000 DCD.

AP1000 DCD, Section 3.9.3.4.4, "Inspection, Testing, Repair, and/or Replacement of Snubbers," specifies that a program for inservice examination and testing of dynamic supports (snubbers) to be used in the AP1000 reactor will be prepared in accordance with the requirements of the ASME OM Code, Subsection ISTD, "Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-Water Reactor Nuclear Power Plants." Section 3.9.3.4.4 indicates that details of the snubber inservice examination and testing program, including test schedules and frequencies, will be reported in the ISI and testing plan included in the IST Program required by Section 3.9.8.3, "Snubber Operability Testing." Section 3.9.8.3 states that COL applicants referencing the AP1000 design will develop a program to verify operability of essential snubbers. The Turkey Point Units 6 and 7 COL FSAR provides supplemental information for Section 3.9.3.4.4 regarding snubbers. For example, Turkey Point Units 6 and 7 COL FSAR, Section 3.9.3.4.4 includes provisions for snubber design and testing with specifications that snubber qualification and production testing will satisfy the applicable sections of the ASME Boiler and Pressure Vessel Code (BPV Code), the ASME OM Code, and ASME Standard QME-1-2007. Turkey Point Units 6 and 7 COL FSAR, Section 3.9.3.4.4 also describes the inservice examination and testing of safety-related snubbers in accordance with the requirements of the ASME OM Code, Subsection ISTD. The description includes specifications for initial and subsequent examination intervals, visual examination attributes, IST methods and intervals, establishment of snubber test groups, response to examination and test results, snubber repair and replacement, post-maintenance examination and testing, and establishment and monitoring of snubber service life. Turkey Point Units 6 and 7 COL FSAR, Table 3.9-201, "Safety Related Snubbers," provides a list of safety-related snubbers to be installed at Turkey Point Units 6 and 7, including the snubber identification number and the associated system or component.

AP1000 DCD, Section 3.9.6, "Inservice Testing of Pumps and Valves," provides a general description of the IST Program to be developed for AP1000 reactors. Table 3.9-16, "Valve Inservice Test Requirements," in AP1000 DCD, lists valves within the scope of the IST Program provided in support of the AP1000 DC, and indicates the valve tag number, valve and actuator type, safety-related missions, safety functions, ASME Code Class and IST Category, and IST type and frequency. Turkey Point Units 6 and 7 COL FSAR, Section 3.9.6 incorporates by reference AP1000 DCD, Section 3.9.6, with supplemental information in several areas. For example, the applicant stated that the description of the IST Program for Turkey Point Units 6 and 7 is based on the ASME OM Code, 2001 Edition through 2003 Addenda. The applicant

also indicated that the initial IST Program will incorporate the latest Edition and Addenda of the ASME OM Code approved in 10 CFR 50.55a(f) on the date 12 months before initial fuel load. In the Turkey Point Units 6 and 7 COL FSAR, the applicant describes the periodic testing program for POVs other than MOVs that incorporates lessons learned based on nuclear power plant operating experience and research programs for MOV performance. The applicant also indicated its plan to apply Revision 1 to ASME OM Code Case OMN-1, "Alternative Rules for the Preservice and Inservice Testing of Certain Electric Motor-Operated Valve Assemblies in Light Water Reactor Power Plants," as an alternative to the quarterly MOV stroke-time testing provisions in the ASME OM Code, and to satisfy the supplemental requirements specified in 10 CFR 50.55a(b)(3)(ii) to ensure that MOVs continue to be capable of performing their design-basis safety functions. The Turkey Point Units 6 and 7 COL FSAR does not identify any additional plant-specific valves to be included in the IST Program beyond those listed in AP1000 DCD, Table 3.9-16.

License Conditions

- Part 10, License Condition 3, Items G2 and G5

The applicant proposed a license condition providing the implementation milestones for the Preservice Testing Program and MOV Testing Program.

- Part 10, License Condition 6

The applicant proposed a license condition to provide a schedule to support the NRC's inspection of operational programs including the Preservice Testing Program and MOV Testing Program.

3.9.6.3 Regulatory Basis

The regulatory basis of the design-related information incorporated by reference is addressed in NUREG-1793 and its supplements.

The regulatory basis for the NRC staff's review of the Turkey Point Units 6 and 7 COL FSAR is provided in 10 CFR Parts 50 and 52. Specifically, the NRC regulations in 10 CFR 52.79(a) require that the COL application include information at a level sufficient to enable the Commission to reach a final conclusion on all safety matters that must be resolved by the Commission before COL issuance. For example, paragraph (4)(i) in 10 CFR 52.79(a) requires that a COL application include the design of the facility with specific reference to the GDC in Appendix A to 10 CFR Part 50, which establish the necessary design, fabrication, construction, testing, and performance requirements for SSCs that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. Paragraph (11) in 10 CFR 52.79(a) requires that a COL application provide a description of the programs and their implementation necessary to ensure that the systems and components meet the requirements of the ASME BPV Code and the ASME OM Code in accordance with 10 CFR 50.55a. Paragraph (29)(i) in 10 CFR 52.79(a) requires that a COL application provide plans for conduct of normal operations, including maintenance, surveillance, and periodic testing of SSCs. Paragraph (37) in 10 CFR 52.79(a) requires that a COL application provide the information necessary to demonstrate how operating experience insights have been incorporated into the plant design.

RG 1.206 provides guidance for a COL applicant in preparing and submitting its COL application in accordance with the NRC regulations. For example, Section C.IV.4 in RG 1.206 discusses the requirement in 10 CFR 52.79(a) for descriptions of operational programs that need to be included in the FSAR for a COL application to allow a reasonable assurance finding of acceptability. In particular, a COL applicant should fully describe the IST, MOV testing, and other operational programs as defined in Commission Paper SECY-05-0197 to avoid the need for ITAAC for the implementation of those programs. The term “fully described” for an operational program should be understood to mean that the program is clearly and sufficiently described in terms of scope and level of detail to allow a reasonable assurance finding of acceptability. Further, operational programs should be described at a functional level and an increasing level of detail where implementation choices could materially and negatively affect the program effectiveness and acceptability. The Commission approved the use of a license condition for operational program implementation milestones that are fully described or referenced in the FSAR as discussed in the staff requirements memorandum (SRM) for SECY-05-0197, dated February 22, 2006.

The NRC staff followed Section 3.9.6, Revision 3, of NUREG-0800 in its review of the Turkey Point Units 6 and 7 COL application. The staff also compared the Turkey Point Units 6 and 7 COL FSAR information with the guidance provided in RG 1.206. Appendix 1AA, “Conformance with Regulatory Guides,” of the Turkey Point Units 6 and 7 FSAR, indicates that the COL application conforms to RG 1.206 without exceptions related to the IST Program. In addition, Table 1.9-202, “Conformance with SRP Acceptance Criteria,” in the Turkey Point Units 6 and 7 COL FSAR indicates that the COL application conforms to NUREG-0800, Section 3.9.6.

3.9.6.4 *Technical Evaluation*

The NRC staff reviewed Section 3.9.6 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff’s review confirmed that the information in the application and incorporated by reference addresses the required information relating to functional design, qualification, and IST programs for pumps, valves, and dynamic restraints. The results of the NRC staff’s evaluation of the design-related information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements. The results of the staff’s review of the material in the AP1000 DCD related to the IST operational program for pumps, valves, and dynamic restraints are in this SER section.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. The confirmatory items in the standard content material retain the numbers assigned in the VEGP SER.

The following portion of this technical evaluation section is reproduced from Section 3.9.6.4 of the VEGP SER:

In its letter dated December 17, 2008, Southern Nuclear Operating Company (SNC) listed the RAIs prepared by the NRC staff on the BLN Units 3 and 4 COL application. In that letter, SNC endorsed the responses, including proposed changes to the FSAR, submitted by the Tennessee Valley Authority (TVA) on 16 RAIs related to the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints as applicable to the VEGP COL application. In letters dated December 14, 2009, and January 12, March 1, and May 14, 2010, SNC described its plans to resolve open items identified in the "SER with open items on the standard content information" prepared by the NRC staff on the description of the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints in the BLN Units 3 and 4 COL application. The NRC staff has reviewed the SNC letters and Revision 2 to the VEGP COL FSAR to determine whether the description of the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints in the VEGP COL application with its incorporation by reference of the AP1000 DCD meets the regulatory requirements to provide reasonable assurance that those components at VEGP will be capable of performing their safety functions if these programs are developed and implemented consistent with the description in the VEGP COL FSAR and AP1000 DCD.

The staff reviewed the information in the VEGP COL FSAR, and the staff's review of the standard content open item is provided.

AP1000 COL Information Item

- STD COL 3.9-4

The NRC staff reviewed STD COL 3.9-4 related to COL Information Item 3.9-4 included in AP1000 DCD Tier 2, Section 3.9.8.4. COL Information Item 3.9-4 states:

Combined License applicants referencing the AP1000 design will develop an inservice test program in conformance with the valve inservice test requirements outlined in subsection 3.9.6 and Table 3.9-16. For power-actuated valves, the requirements for

operability testing shall be based on subsection 3.9.6.2.2. This program will include provisions for nonintrusive check valve testing methods and the program for valve disassembly and inspection outlined in subsection 3.9.6.2.3. The Combined License applicant will complete an evaluation as identified in subsection 3.9.6.2.2 to determine the frequency of power-operated valve operability testing.

The information item for COL applicants to develop an IST Program was specified as COL Action Item 3.9.6.4-1 in Appendix F of NUREG-1793, which states:

The COL applicant will provide an inservice test (IST) program that complies with the inservice testing requirements for valves.

In STD COL 3.9-4, the applicant states that this COL item is addressed in Sections 3.9.6, 3.9.6.2.2, 3.9.6.2.3, 3.9.6.2.4, 3.9.6.2.5, and 3.9.6.3 for the VEGP COL application.

In this section of the SER, the NRC staff describes its review of the VEGP COL FSAR with the incorporation by reference of the AP1000 DCD for an acceptable description of the functional design, qualification, and IST programs, including the MOV Testing Program, for VEGP Units 3 and 4 to provide reasonable assurance that the safety-related components within the scope of the VEGP IST Program will be capable of performing their safety functions in accordance with the NRC regulations and the ASME Code requirements.

AP1000 DCD Tier 2, Section 3.9.6.1, "Inservice Testing of Pumps," specifies that the AP1000 reactor design does not include pumps with safety functions with the exception of the coastdown of the reactor coolant pumps. As determined in NUREG-1793, the NRC staff considers the IST Program scope for the AP1000 design with respect to pumps to be acceptable. Therefore, the NRC staff did not include pumps in the review of the IST Program for safety-related components at VEGP Units 3 and 4.

VEGP COL FSAR Section 3.9.6 states that the description of the IST Program for VEGP Units 3 and 4 is based on the ASME OM Code, 2001 Edition through 2003 Addenda, and that the limitations and modifications set forth in 10 CFR 50.55a will be incorporated. The NRC regulations in 10 CFR 50.55a incorporate by reference the ASME OM Code, 2001 Edition through 2003 Addenda, with certain limitations and modifications. Therefore, the NRC staff considers the application of the ASME OM Code, 2001 Edition through 2003 Addenda, as incorporated by reference in the NRC regulations with applicable limitations and modifications, to be acceptable for the VEGP IST Program description in support of the VEGP COL application. As specified in 10 CFR 50.55a, a COL licensee is required to incorporate in its IST Program the latest Edition and Addenda of the ASME OM Code approved in 10 CFR 50.55a(f) on the date 12 months before initial fuel load.

The VEGP COL FSAR incorporates by reference AP1000 DCD Tier 2, Table 3.9-16, "Valve Inservice Test Requirements," that includes the valve type, safety-related missions, safety functions, the ASME Code IST category, and IST type and frequency. The NRC staff considers this table to be sufficient in describing the IST Program in support of the VEGP COL application. Following the issuance of the VEGP COL, the guidance in NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," can be used to develop the VEGP IST Program, including the specific information to be included in the IST Program documentation and tables for NRC inspection.

On March 26 and 27, 2008, the NRC staff held a public meeting to discuss the NRC's review of the description of the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints in COL applications referencing the AP1000 certified design and the AP1000 DC amendment application. At the public meeting, Westinghouse stated that it would make information available on the functional design and qualification of safety-related valves and dynamic restraints within the scope of the AP1000 DCD in design and procurement specifications that will be applicable to AP1000 COL applications. On October 14 and 15, 2008, the NRC staff conducted an audit of design and procurement specifications for pumps, valves, and dynamic restraints to be used for the AP1000 reactor at the Westinghouse office in Monroeville, Pennsylvania. In a memorandum dated November 6, 2008, the NRC staff documented the results of the onsite review with specific open items. For example, the staff found that Westinghouse had included ASME Standard QME-1-2007 in its design and procurement specifications for AP1000 components. ASME QME-1-2007 incorporates lessons learned from valve testing and research programs performed by the nuclear industry and the NRC Office of Nuclear Regulatory Research. Also, AP1000 DCD Tier 2 has been revised in Section 5.4.8.3 to specify that the provisions for qualification testing of power-operated active valves will be based on ASME QME-1-2007. In September 2009, the NRC issued RG 1.100, "Seismic Qualification of Electric and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants," Revision 3, which accepts the use of ASME QME-1-2007, with certain staff positions, for the functional design and qualification of safety-related pumps, valves, and dynamic restraints. In a letter dated January 26, 2010, Westinghouse provided its planned response to the audit follow-up items. In a letter dated December 14, 2009, SNC stated, in response to Standard Content Open Item 3.9-1 in the "SER with open items" on the BLN COL application, that it had not identified any specific actions for the VEGP COL application based on the audit open items. The NRC staff discussion of the audit of the design and procurement specifications for pumps, valves, and dynamic restraints to be used for the AP1000 reactor is in the SER on the AP1000 DC amendment application. Therefore, the staff considers Standard Content Open Item 3.9-1 resolved.

The VEGP COL FSAR incorporates by reference AP1000 DCD Tier 2, Section 3.9.3.4, "Component and Piping Supports," and adds a new Section 3.9.3.4.4, "Inspection, Testing, Repair and/or Replacement of Snubbers." VEGP COL FSAR Section 3.9.3.4.4 specifies that snubber design and testing will satisfy the applicable sections of the ASME BPV Code, ASME OM Code, and

ASME QME-1-2007. Further, VEGP COL FSAR Section 3.9.3.4.4 describes the snubber inservice examination and testing program for VEGP Units 3 and 4. For example, the FSAR specifies that the inservice examination and testing of safety-related snubbers will be conducted in accordance with the requirements of the ASME OM Code, Subsection ISTD. The inservice visual examination will be performed to identify physical damage, leakage, corrosion, degradation, indication of binding, misalignment or deformation, and potential defects generic to a particular design. Snubbers will be tested in service to determine operational readiness during each fuel cycle, beginning no sooner than 60 days before the start of the refueling outage. Defined test plan groups will be established and snubbers in each group will be tested each fuel cycle according to an established sampling plan. Unacceptable snubbers will be adjusted, modified, or replaced. Service life for snubbers will be established, monitored, and adjusted in accordance with ASME OM Code, ISTD-6000, "Service Life Monitoring," and ASME OM Code, Appendix F, "Dynamic Restraints (Snubbers) Service Life Monitoring Methods." In addition, VEGP COL FSAR Table 3.9-201 provides a list of safety-related snubbers to be installed at VEGP, including the snubber identification number and the associated system or component. Revision 3 to RG 1.100 accepts with certain conditions the use of ASME QME-1-2007 for the functional design and qualification of dynamic restraints. The NRC staff finds that the provisions in the VEGP COL FSAR, together with the AP1000 DCD, provide an acceptable description of the inservice examination and testing program for dynamic restraints that support a finding that the program, when developed and implemented, will satisfy the 10 CFR 50.55a regulatory requirements.

The VEGP COL FSAR incorporates by reference AP1000 DCD Tier 2, Section 3.9.6.2.2, "Valve Testing," with supplemental information. Table 3.9-16 in AP1000 DCD lists the valves in the IST Program for the AP1000 design. VEGP COL FSAR Section 3.9.6.2.2 includes provisions for (a) the establishment of reference values; (b) the prohibition of preconditioning that undermines the purpose of IST activities; (c) comparison of stroke time to the reference value except for fast-acting valves for which a stroke-time limit of 2 seconds is assigned; (d) determination of valve obturator movement during valve exercise tests; (e) testing of solenoid-operated valves; (f) preoperational testing of check valves; (g) acceptance criteria for check valve tests; (h) use of nonintrusive techniques for check valve tests; (i) test conditions for check valve tests; (j) post-maintenance testing for check valves; (k) check valve disassembly and testing; and (l) re-establishment of reference values following maintenance. The VEGP COL FSAR also includes provisions for valve disassembly and inspection; valve preservice tests; and valve replacement, repair, and maintenance in Sections 3.9.6.2.3 to 3.9.6.2.5. The NRC staff finds that these provisions in the VEGP COL FSAR are consistent with Subsection ISTC of the ASME OM Code incorporated by reference in 10 CFR 50.55a, and therefore, are acceptable.

In its letter dated March 1, 2010, SNC provided its planned response for VEGP to Standard Content Open Item 3.9-2 on POV operability tests discussed in the "SER with open items" on the BLN COL application. The NRC staff review of the response by SNC to the three issues in this open item is discussed below.

First, SNC states in its letter dated March 1, 2010, that TVA had indicated in its response to BLN RAI 3.9.6-8 that the BLN COL FSAR would be revised to indicate that MOV testing will apply the provisions of ASME OM Code Case OMN-1 (Revision 1) and the guidance in the Joint Owners Group (JOG) MOV Periodic Verification Program including the applicable NRC safety evaluation (and its supplement) for periodic verification of the design-basis capability of safety-related MOVs. SNC did not consider additional changes to the VEGP COL FSAR to be necessary. The NRC staff finds that the VEGP COL FSAR with its incorporation by reference of the AP1000 DCD (including the planned DCD changes) will address the use of JOG MOV Periodic Verification Program. As the AP1000 IST Program applies the JOG MOV Periodic Verification Program, SNC will need to confirm that MOVs provided by the valve supplier and their application at VEGP Units 3 and 4 are within the scope of the JOG program. The planned use of ASME OM Code Case OMN-1 (Revision 1) is addressed below in this SER section.

Second, SNC provides in its letter dated March 1, 2010, a planned revision to the VEGP COL FSAR that specifies the use of Revision 1 to ASME OM Code Case OMN-1 as an alternative to the quarterly MOV stroke-time testing provisions in the ASME OM Code. In the letter, SNC notes that RG 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code," accepts the use of Revision 0 to ASME OM Code Case OMN-1 with three conditions. SNC considers Revision 1 to ASME OM Code Case OMN-1 to represent a superior alternative to Revision 0 to ASME OM Code Case OMN-1 by addressing the conditions on the use of the Code case specified in RG 1.192. In a telephone discussion on April 13, 2010, the NRC staff requested that SNC address the specific provisions in RG 1.192 in justifying the use of Revision 1 to ASME OM Code Case OMN-1 as an alternative to the MOV stroke-time provisions in the ASME OM Code pursuant to 10 CFR 50.55a(a)(3)(i).

In a letter dated May 14, 2010, SNC modified its response to Standard Content Open Item 3.9-2 to provide a planned revision to the VEGP COL FSAR in Section 3.9.6.3 in support of the request to apply Revision 1 to Code Case OMN-1 as an alternative to the quarterly IST stroke-time provisions in the ASME OM Code. The NRC staff has accepted the application of ASME OM Code Case OMN-1 (Revision 0) in RG 1.192 with certain conditions. In the planned VEGP COL FSAR revision, SNC has addressed those conditions as they apply to the requested use of ASME OM Code Case OMN-1 (Revision 1) at VEGP Units 3 and 4. In particular, the VEGP COL FSAR revision specifies that the IST Program will incorporate the provisions in RG 1.192 by providing that the adequacy of the diagnostic test interval for each MOV will be evaluated and adjusted as necessary, but not later than 5 years or three refueling outages (whichever is longer) from the initial implementation of the Code case. The planned VEGP COL FSAR revision also states that the potential increase in core damage frequency (CDF) and risk associated with extending high-risk MOV test intervals beyond quarterly will be determined to be small and consistent with the intent of the Commission's Safety Goal Policy Statement. The VEGP COL FSAR also specifies this provision as consistent with the conditions specified in RG 1.192 for application of ASME OM Code Case OMN-11, "Risk-Informed Testing of Motor-Operated Valves," which has been incorporated into Revision 1

to ASME OM Code Case OMN-1. The planned VEGP COL FSAR revision specifies that risk insights will be applied using MOV risk ranking methodologies accepted by the NRC on a plant-specific or industry-wide basis, consistent with the conditions in the applicable safety evaluations. The planned VEGP COL FSAR revision also indicates that the benefits for performing any particular test will be balanced against the potential adverse effects placed on the valve or system caused by this testing. The VEGP COL FSAR indicates that use of Revision 1 to ASME OM Code Case OMN-1 will be appropriate for the ASME OM Code 2001 Edition with the 2003 Addenda that is the basis for the description of the VEGP Units 3 and 4 IST Program in support of the COL application. The NRC staff finds that the provisions to be specified in the VEGP COL FSAR for the use of Revision 1 to ASME OM Code Case OMN-1 satisfy the conditions specified in RG 1.192 for the use of Revision 0 to ASME OM Code Case OMN-1. The staff considers Revision 1 in ASME OM Code Case OMN-1 to continue to provide an acceptable technical approach for MOV diagnostic testing as an alternative to quarterly MOV stroke-time testing, and that the changes from Revision 0 to Revision 1 reflect improvements for user application and incorporation of ASME OM Code Case OMN-11. Pursuant to 10 CFR 50.55a(a)(3)(i), the staff authorizes the use of ASME OM Code Case OMN-1 (Revision 1) requested by SNC as an alternative to the quarterly MOV stroke-time testing provisions in the ASME OM Code for VEGP Units 3 and 4 on the basis that the proposed alternative provides an acceptable level of quality and safety and therefore, Standard Content Open Item 3.9-2 is resolved. The incorporation of the planned VEGP COL FSAR changes will be tracked as **Confirmatory Item 3.9-1**.

Resolution of Standard Content Confirmatory Item 3.9-1

Confirmatory Item 3.9-1 is an applicant commitment to revise its FSAR Table 1.9-201, Section 3.9.6.3, Section 3.9.6.2.2, and Section 3.9.9, to address IST of valves. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.9-1 is now closed.

Third, SNC in its March 1, 2010, submittal provides several planned changes to the VEGP COL FSAR to clarify the provisions that would be redundant when combined with the valve testing provisions in the AP1000 DCD. The NRC staff considers the proposed changes to the VEGP COL FSAR to be acceptable because these provisions are incorporated by reference as part of the AP1000 DCD. The incorporation of the planned VEGP COL FSAR changes will be tracked as part of **Confirmatory Item 3.9-2**.

Resolution of Standard Content Confirmatory Item 3.9-2

Confirmatory Item 3.9-2 is an applicant commitment to revise its FSAR. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.9-2 is now closed.

In light of the weaknesses in the IST provisions in the ASME OM Code for quarterly MOV stroke-time testing, the NRC issued Generic Letter (GL) 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related

Motor-Operated Valves,” to request that nuclear power plant licensees establish programs to assure the capability of safety-related MOVs to perform their design-basis functions on a periodic basis. Further, the NRC revised 10 CFR 50.55a to require that nuclear power plant licensees supplement the quarterly MOV stroke-time testing provisions specified in the ASME OM Code with a program to ensure that MOVs continue to be capable of performing their design-basis safety functions. In its letter dated March 1, 2010, SNC provided its response to Standard Content Open Item 3.9-3 related to MOV testing in the “SER with open items” on the BLN COL application. The NRC staff review of the response by SNC to the six issues in this open item is discussed below:

First, SNC notes the planned use of Revision 1 to ASME OM Code Case OMN-1 as part of the IST Program to be developed for VEGP. As discussed above in this SER section, the NRC staff authorized the use of Revision 1 to ASME OM Code Case OMN-1 at VEGP Units 3 and 4.

Second, SNC states that the MOV Testing Program at VEGP will implement the JOG MOV Periodic Verification Program as described in the VEGP COL FSAR and AP1000 DCD. As indicated above, the NRC staff finds that the VEGP COL FSAR with its incorporation by reference of the AP1000 DCD (including the planned DCD changes) will address the use of the JOG MOV Periodic Verification Program. Other necessary changes to the VEGP COL FSAR regarding MOV testing are discussed in this SER section.

Third, SNC indicates that MOV output capability will be determined using the provisions of ASME OM Code Case OMN-1. The NRC staff has reviewed ASME OM Code Case OMN-1 as part of its acceptance in RG 1.192, and has determined that the Code case provides acceptable provisions for diagnostic testing to determine the output capability of MOVs.

Fourth, SNC describes MOV testing using the guidance in the JOG MOV Periodic Verification Program and Revision 1 to ASME OM Code Case OMN-1 to periodically determine the capability of MOVs to perform under design-basis conditions. The NRC staff has reviewed the JOG MOV Periodic Verification Program as part of its acceptance in an NRC safety evaluation dated September 25, 2006 with a supplement dated September 18, 2008, and has reviewed ASME OM Code Case OMN-1 as part of its acceptance in RG 1.192. From those evaluations, the staff has determined that the JOG MOV Periodic Verification Program and ASME OM Code Case OMN-1 will demonstrate continued MOV capability to open and close under design-basis conditions. As discussed above in this SER section, the NRC staff authorized the use of Revision 1 to ASME OM Code Case OMN-1 at VEGP Units 3 and 4.

Fifth, SNC notes that the initial test frequency of MOVs will be based on the ASME OM Code or applicable ASME OM Code cases. For example, the VEGP COL FSAR specifies that the IST frequency will be determined as specified by ASME OM Code Case OMN-1. Further, the JOG MOV Periodic Verification Program with the NRC safety evaluation and its supplement includes provisions for MOV test frequencies based on risk ranking and functional margin with a maximum diagnostic test interval of 10 years. The staff considers these

provisions in the VEGP COL FSAR and the AP1000 DCD for POV test frequency to incorporate lessons learned from MOV testing and research programs, and therefore, to be acceptable.

Sixth, SNC describes provisions for successful completion of MOV testing at VEGP in its March 1, 2010, letter, and provides several planned changes to the VEGP COL FSAR. For example, SNC provides a planned FSAR change to specify the use of ASME OM Code Case OMN-1, Revision 1. SNC also plans to revise the FSAR to specify that the design-basis capability testing of MOVs will apply guidance from GL 96-05 and the JOG MOV Periodic Verification Program. SNC will revise the FSAR to note the need to consider degraded voltage, control switch repeatability, and load-sensitive MOV behavior in ensuring that MOVs have adequate capability margin, in addition to the consideration of age-related degradation. SNC provides a proposed addition to the description of the MOV test frequency determination in the FSAR that will specify that maximum torque and/or thrust (as applicable) achieved by the MOV (allowing sufficient margin for diagnostic equipment inaccuracies and control switch repeatability) must not exceed the allowable structural and undervoltage motor capability limits for the individual parts of the MOV. SNC provides a proposed addition to the description of POV operability testing that specifies that successful completion of the preservice testing and IST of MOVs, in addition to MOV testing as required by 10 CFR 50.55a, will demonstrate that the following criteria are met for each valve tested: (i) valve fully opens and/or closes as required by its safety function; (ii) adequate margin exists and includes consideration of diagnostic equipment inaccuracies, degraded voltage, control switch repeatability, load-sensitive MOV behavior, and margin for degradation; and (iii) maximum torque and/or thrust (as applicable) achieved by the MOV (allowing sufficient margin for diagnostic equipment inaccuracies and control switch repeatability) does not exceed the allowable structural and undervoltage motor capability limits for the individual parts of the MOV. In its letter dated May 14, 2010, SNC provided an additional planned revision to the VEGP COL FSAR that clarifies the application of the JOG MOV Periodic Verification Program (including the applicable NRC safety evaluation and its supplement on the JOG program) in response to NRC staff comments provided during the telephone discussion on April 13, 2010. The NRC staff considers the planned changes to the VEGP COL FSAR to resolve Standard Content Open Item 3.9-3. The incorporation of the planned changes to the VEGP COL FSAR will be tracked as **Confirmatory Item 3.9-3**.

Resolution of Standard Content Confirmatory Item 3.9-3

Confirmatory Item 3.9-3 is an applicant commitment to revise its FSAR Section 3.9.6.2.2 to address MOV testing. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.9-3 is now closed.

In addition to incorporating by reference AP1000 DCD Tier 2 Section 3.9.6.2.2, the VEGP COL FSAR includes a paragraph titled "Other Power-Operated Valve Operability Tests," that states that POVs other than active MOVs are exercised quarterly in accordance with ASME OM Code, Subsection ISTC, unless justification is provided in the IST Program for testing these valves at other

Code-mandated frequencies. Lessons learned from the resolution of weaknesses in the design, qualification, and testing of MOVs are also applicable to other POVs used at nuclear power plants. In discussing the MOV lessons learned applicable to other POVs in Regulatory Issue Summary (RIS) 2000-03, "Resolution of Generic Safety Issue 158: Performance of Safety-Related Power-Operated Valves Under Design Basis Conditions," the NRC staff determined that the current regulations provide adequate requirements to ensure design-basis capability of safety-related POVs. For example, the staff noted that licensees are required by 10 CFR 50.65 (Maintenance Rule) to monitor the performance of SSCs in a manner sufficient to provide reasonable assurance that the SSCs are capable of fulfilling their intended functions. VEGP COL FSAR Section 3.9.6.2.2 provides a description of operability testing for POVs other than MOVs to be implemented at VEGP. For example, the FSAR states that subsequent to verification of the design-basis capability of POVs as part of the design and qualification program, POVs that perform an active safety function will be tested after installation to ensure valve setup is acceptable to perform their required functions consistent with valve qualification. This testing will document the baseline performance of the valves and will include measurement of critical parameters with consideration of uncertainties associated with the performance of these tests and use of the test results. Additional periodic testing will be performed as part of the air-operated valve (AOV) program based on the JOG AOV program discussed in RIS 2000-03 with specific reference to NRC staff comments on that program. The AOV program will also include the attributes for a successful POV periodic verification program described in RIS 2000-03 by incorporating lessons learned from nuclear power plant operations and research programs as they apply to the periodic testing of AOVs and other POVs in the IST Program. The FSAR specifies AOV program attributes including valve categorization based on safety significance and risk ranking, AOV setpoints based on current vendor information or valve qualification diagnostic testing, periodic static testing to identify potential degradation, use of sufficient diagnostics to collect relevant data to verify that the valve meets functional requirements, specification of test frequency and evaluation based on data trends, post-maintenance procedures to ensure baseline testing will be re-performed as necessary when high-risk valve performance could be affected, inclusion of lessons learned from other valve programs, and retention and periodic evaluation of AOV test documentation.

The NRC staff has reviewed the VEGP COL FSAR, including the incorporation by reference of the AP1000 DCD, to determine whether it addresses the lessons learned from MOV operating experience and research programs in describing the program for the periodic verification of the design-basis capability of POVs other than MOVs. In its letters dated December 14, 2009, and March 1, 2010, SNC provided a response to Standard Content Open Item 3.9-4 related to other POV operability testing in the "SER with open items" on the BLN COL application. In particular, SNC provided planned changes to the VEGP COL FSAR to clarify the potential need for periodic dynamic testing of POVs other than MOVs based on the design qualification results or valve operating experience. The planned FSAR change will also clarify that post-maintenance procedures will be implemented for all safety-related POVs consistent with the QA requirements in 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power

*Plants and Fuel Reprocessing Plants,” regardless of their specific risk ranking. SNC also provided a proposed change to the VEGP COL FSAR specifying that the attributes of the AOV testing program, to the extent that they apply to and can be implemented on other safety-related POVs (such as electro-hydraulic valves) will be applied to those other POVs. The NRC staff considers that the planned revision to the VEGP COL FSAR, when combined with the AP1000 DCD provisions incorporated by reference, will adequately describe the periodic testing program for POVs other than MOVs to be used at VEGP and resolves Standard Content Open Item 3.9-4. The incorporation of the planned changes to the VEGP COL FSAR will be tracked as **Confirmatory Item 3.9-4**.*

Resolution of Standard Content Confirmatory Item 3.9-4

Confirmatory Item 3.9-4 is an applicant commitment to revise its FSAR Section 3.9.6.2.2, to address POV testing. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.9-4 is now closed.

The VEGP COL FSAR incorporates by reference AP1000 DCD Tier 2, Section 3.9.6.3, “Relief Requests,” with a discussion of the planned use of ASME OM Code Case OMN-1, Revision 1. The applicant stated that use of Revision 1 to ASME OM Code Case OMN-1 will require request for relief, unless it is approved by the NRC in RG 1.192 or incorporated into the ASME OM Code on which the IST Program is based and that Code Edition is incorporated by reference in 10 CFR 50.55a. As discussed above in this SER section, the NRC staff authorized the use of Revision 1 to the ASME OM Code Case OMN-1 at VEGP Units 3 and 4.

AP1000 DCD Tier 2, Section 3.9.2, “Dynamic Testing and Analysis,” describes tests to confirm that piping, components, restraints, and supports have been designed to withstand the dynamic effects of steady-state FIV and anticipated operational transient conditions. Section 14.2.9.1.7, “Expansion, Vibration and Dynamic Effects Testing,” in AP1000 DCD Tier 2, Chapter 14, “Initial Test Program,” states that the purpose of the expansion, vibration and dynamic effects testing is to verify that safety-related, high energy piping and components are properly installed and supported such that, in addition to other factors, vibrations caused by steady-state or dynamic effects do not result in excessive stress or fatigue to safety-related plant systems. Nuclear power plant operating experience has revealed the potential for adverse flow effects from vibration caused by hydrodynamic loads and acoustic resonance on reactor coolant, steam, and feedwater systems. In its letter dated January 12, 2010, SNC provided its response for VEGP to Standard Content Open Item 3.9-5 related to FIV in the “SER with open items” on the BLN COL application. In its response, SNC stated that it intended to use the overall Initial Test Program to demonstrate that the plant has been constructed as designed and the systems perform consistent with design requirements. SNC referenced the provisions in the AP1000 DCD for vibration monitoring and testing to be implemented at VEGP. For example, the applicant notes that AP1000 DCD Tier 2, Section 3.9.2.1, “Piping Vibration, Thermal Expansion and Dynamic Effects,” specifies that the preoperational test program for ASME BPV Code, Section III, Class 1, 2, and 3

pipng systems simulates actual operating modes to demonstrate that components comprising these systems meet functional design requirements and that piping vibrations are within acceptable levels. SNC indicates that the planned vibration testing program described in AP1000 DCD Tier 2, Sections 14.2.9 and 14.2.10, with the preservice and IST programs described in AP1000 DCD Tier 2, Sections 3.9.3.4.4 and 3.9.6, will confirm component installation in accordance with design requirements, and address the effects of steady-state (flow-induced) and transient vibration to ensure the operability of valves and dynamic restraints in the IST Program. The NRC staff considers the response by SNC clarifies its application of the provisions in the AP1000 DCD to ensure that potential adverse flow effects will be addressed at VEGP. Therefore, the staff considers Standard Content Open Item 3.9-5 to be resolved for the VEGP COL application.

*Subsection ISTC-5260, "Explosively Actuated Valves," in the ASME OM Code specifies that at least 20 percent of the charges in explosively actuated valves shall be fired and replaced at least once every 2 years. If a charge fails to fire, the ASME OM Code states that all charges with the same batch number shall be removed, discarded, and replaced with charges from a different batch. In light of the updated design and safety significance of squib valves in new reactors, the need for improved surveillance activities for squib valves is being considered by the nuclear industry, ASME, and U.S. and international nuclear regulators. In RAI 3.9.6-1, the NRC staff requested that SNC describe its plans for addressing the surveillance of squib valves that will provide reasonable assurance of the operational readiness of those valves to perform their safety functions in support of the VEGP COL application. In a letter dated May 27, 2010, SNC submitted a planned revision to VEGP COL FSAR Section 3.9.6 to specify that industry and regulatory guidance will be considered in the development of the IST Program for squib valves. The FSAR will also state that the IST Program for squib valves will incorporate lessons learned from the design and qualification process for these valves such that surveillance activities provide reasonable assurance of the operational readiness of squib valves to perform their safety functions. The NRC staff finds that the planned changes to the VEGP COL FSAR are sufficient to describe the IST Program for squib valves for incorporating the lessons learned from the design and qualification process in developing surveillance activities that will provide reasonable assurance of the operational readiness for squib valves to perform their safety functions. Therefore, the NRC staff considers the planned changes to the VEGP COL FSAR to resolve this RAI acceptable. The incorporation of the planned changes to the VEGP COL FSAR will be tracked as **Confirmatory Item 3.9-5**.*

Resolution of Standard Content Confirmatory Item 3.9-5

Confirmatory Item 3.9-5 is an applicant commitment to revise its FSAR Section 3.9.6.2.2 to address squib valve testing. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.9-5 is now closed.

Technical Specifications

*In its letter dated December 14, 2009, SNC provided a response to an open item related to Part 4, "Technical Specifications," (Standard Content Open Item 3.9-6) in the "SER with open items" on the BLN COL application. In its response, SNC stated that Part 4 of the VEGP COL application will be revised to ensure that Technical Specifications and Technical Specification Bases are consistent with the ASME OM Code, 2001 Edition through the 2003 Addenda. Therefore the NRC staff considers the planned changes to the VEGP COL application in Part 4 to resolve Standard Content Open Item 3.9-6. The incorporation of the planned changes to the VEGP COL FSAR will be tracked as **Confirmatory Item 3.9-6**.*

Resolution of Standard Content Confirmatory Item 3.9-6

Confirmatory Item 3.9-6 is an applicant commitment to revise its FSAR Section 3.9.6.2.2 to address the ASME OM Code. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.9-6 is now closed.

License Conditions

- *Part 10, License Condition 3, Items G2 and G5*

The applicant proposed a license condition providing the implementation milestones for the Preservice Testing Program and MOV Testing Program.

- *Part 10, License Condition 6*

The applicant proposed a license condition to provide a schedule to support the NRC's inspection of operational programs including the Preservice Testing Program and MOV Testing Program.

These license conditions are consistent with the policy established in SECY-05-0197 and are, thus, acceptable.

Squib Valves

During the uncontested hearing for the VEGP Units 3 and 4 COL application, the Commission discussed issues associated with the IST and inspection program for squib valves to be used to perform safety functions at VEGP Units 3 and 4. Tier 1 of the AP1000 DCD requires squib valves to undergo tests or type tests to demonstrate their operational capability under design conditions. Additionally, the Commission asked the staff questions on this topic after the VEGP and V.C. Summer Nuclear Station (VCSNS) COL uncontested hearings. For these COL applications, the Commission concluded that, although it found that the staff's review of the squib valve issues was rigorous, it had a concern similar to that initially raised by the Advisory Committee on Reactor Safeguards regarding the status of the IST and inspection program for this component. As such, the Commission imposed a license condition for each COL that directs the implementation of a surveillance program for squib valves at VEGP Units 3 and 4

and VCSNS Units 2 and 3, with the specific requirements described in the Commission orders authorizing issuance of the VEGP and VCSNS COLs.

The squib valves subject to the surveillance program license condition under the VEGP and VCSNS COLs are part of the AP1000 certified design, and the same squib valves are specified in the Turkey Point Units 6 and 7 COL application. Therefore, the staff determined that it was appropriate to apply the same surveillance program license condition to the Turkey Point Units 6 and 7 squib valves.

The surveillance program is established to provide reasonable assurance that the Turkey Point Units 6 and 7 squib valves are operational and ready to perform their safety function. The staff-proposed license condition follows the precedent set in the VEGP and VCSNS COLs (ADAMS Accession Nos. ML113540620 and ML113420105) to require such a surveillance program.

3.9.6.5 Post-Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

- License Condition (3-5) – Before initial fuel load, the licensee shall implement (1) the Preservice Testing Program and (2) the MOV Testing Program.
- License Condition (3-6) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO a schedule that supports planning for and conduct of NRC inspections of the IST Program (including preservice and MOV testing). The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the IST Program (including preservice testing and the MOV testing) has been fully implemented.
- License Condition (3-7) – Before initial fuel load, the licensee shall implement a surveillance program for explosively actuated valves (squib valves) that includes the following provisions in addition to the requirements specified in the edition of the ASME OM Code as incorporated by reference in 10 CFR 50.55a.

a. Preservice Testing

All explosively actuated valves shall be preservice tested by verifying the operational readiness of the actuation logic and associated electrical circuits for each explosively actuated valve with its pyrotechnic charge removed from the valve. This must include confirmation that sufficient electrical parameters (voltage, current, resistance) are available at the explosively actuated valve from each circuit that is relied upon to actuate the valve. In addition, a sample of at least 20 percent of the pyrotechnic charges in all explosively actuated valves shall be tested in the valve or a qualified test fixture to confirm the capability of each sampled pyrotechnic charge to provide the necessary

motive force to operate the valve to perform its intended function without damage to the valve body or connected piping. The sampling must select at least one explosively actuated valve from each redundant safety train. Corrective action shall be taken to resolve any deficiencies identified in the operational readiness of the actuation logic or associated electrical circuits, or the capability of a pyrotechnic charge. If a charge fails to fire or its capability is not confirmed, all charges with the same batch number shall be removed, discarded, and replaced with charges from a different batch number that has demonstrated successful 20 percent sampling of the charges.

b. Operational Surveillance

Explosively actuated valves shall be subject to the following surveillance activities after commencing plant operation:

(1) At least once every 2 years, each explosively actuated valve shall undergo visual external examination and remote internal examination (including evaluation and removal of fluids or contaminants that may interfere with operation of the valve) to verify the operational readiness of the valve and its actuator. This examination shall also verify the appropriate position of the internal actuating mechanism and proper operation of remote position indicators. Corrective action shall be taken to resolve any deficiencies identified during the examination with post-maintenance testing conducted that satisfies the preservice testing requirements.

(2) At least once every 10 years, each explosively actuated valve shall be disassembled for internal examination of the valve and actuator to verify the operational readiness of the valve assembly and the integrity of individual components and to remove any foreign material, fluid, or corrosion. The examination schedule shall provide for both of the 2 valve designs used for explosively actuated valves at the facility to be included among the explosively actuated valves to be disassembled and examined every 2 years. Corrective action shall be taken to resolve any deficiencies identified during the examination with post-maintenance testing conducted that satisfies the preservice testing requirements.

(3) For explosively actuated valves selected for test sampling every 2 years in accordance with the ASME OM Code, the operational readiness of the actuation logic and associated electrical circuits shall be verified for each sampled explosively actuated valve following removal of its charge. This must include confirmation that sufficient electrical parameters (voltage, current, resistance) are available for each valve actuation circuit. Corrective action shall be taken to resolve any deficiencies identified in the actuation logic or associated electrical circuits.

(4) For explosively actuated valves selected for test sampling every 2 years in accordance with the ASME OM Code, the sampling must select at least 1 explosively actuated valve from each redundant safety train. Each sampled pyrotechnic charge shall be tested in the valve or a qualified test fixture to confirm the capability of the charge to provide the necessary motive force to operate the valve to perform its intended function without damage to the valve body or connected piping. Corrective action shall be taken to resolve any deficiencies identified in the capability of a pyrotechnic charge in accordance with the preservice testing requirements.

This license condition shall expire upon (1) incorporation of the above surveillance provisions for explosively actuated valves into the facility's IST program, or (2) incorporation of IST requirements for explosively actuated valves in new reactors (i.e., plants receiving a construction permit, or COL for construction and operation, after January 1, 2000) to be specified in a future edition of the ASME OM Code as incorporated by reference in 10 CFR 50.55a, including any conditions imposed by the NRC, into the facility's IST program.

3.9.6.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the design-related information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements. The results of the staff's review of the material in the AP1000 DCD related to the IST operational program for pumps, valves, and dynamic restraints are in this SER section.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidance in Section 3.9.6 of NUREG-0800 and in RG 1.206. The staff based its conclusion on the following:

- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.
- STD COL 3.9-4, regarding the operational program for pumps, valves, and dynamic restraints is acceptable because the requirements of 10 CFR 52.79(a) are satisfied.

3.9.7 Integrated Head Package

AP1000 DCD, Section 3.9.7, describes the integrated head package (IHP). The IHP combines several components in one assembly to simplify refueling the reactor. The IHP includes a lifting rig, seismic restraints for CRDM, support for reactor head vent piping, cable bridge, power cables, cables for in-core instrumentation, cable supports, and shroud assembly. The IHP provides the ability to rapidly disconnect cables, including the CRDM power cables, digital rod position indication cables, and in-core instrument cables from the components.

Section 3.9 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 3.9.7, "Integrated Head Package," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment

3.10.1 Introduction

Seismic and dynamic qualification of seismic Category I equipment includes the following types:

- safety-related active mechanical equipment that performs a mechanical motion while accomplishing a system safety-related function (e.g., pumps, valves, and valve operators)
- safety-related, nonactive mechanical equipment whose mechanical motion is not required while accomplishing a system safety-related function, but whose structural integrity must be maintained in order to fulfill its design safety-related function
- safety-related instrumentation and electrical equipment and certain monitoring equipment

Mechanical and electrical equipment (including instrumentation and controls), and where applicable, their supports classified as seismic Category I must demonstrate that they are capable of performing their intended safety-related functions under the full range of normal and accident (including seismic) loadings. This equipment includes devices associated with systems essential to safe shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, or is otherwise essential in preventing significant release of radioactive material to the environment or in mitigating the consequences of accidents.

The criteria for the seismic and dynamic qualification include the following considerations:

- adequacy of seismic and dynamic qualification input motions
- methods and procedures for qualifying electrical equipment, instrumentation, and mechanical components
- methods and procedures for qualifying supports of electrical equipment, instrumentation, and mechanical components
- documentation

3.10.2 Summary of Application

Section 3.10 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.10 of the AP1000 DCD, Revision 19.

Section 3.10 of the Turkey Point Units 6 and 7 COL FSAR does not include any COL information items or supplemental information related to AP1000 DCD, Section 3.10.

3.10.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the seismic and dynamic qualification of mechanical and electrical equipment are given in Section 3.10, Revision 3, of NUREG-0800.

3.10.4 Technical Evaluation

The NRC staff reviewed Section 3.10 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the seismic and dynamic qualification program. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

The following portion of this technical evaluation section is reproduced from Section 3.10.4 of the VEGP SER:

Implementation Program

In RAI 3.10-1, dated August 7, 2008, the applicant was requested to provide an implementation program, including milestones and completion dates with appropriate information submitted with sufficient time for staff review and approval prior to installation of the equipment, not prior to fuel loading, in accordance with Section C.I.3.10.4 of RG 1.206.

In its response, the applicant stated that details of the implementation milestones for the seismic and dynamic qualification program are not currently available, and are not expected to be available until after a detailed construction schedule of the plant has been developed. Appropriate scheduling information will be provided, when available, to the NRC as necessary to support timely completion of their inspection and audit functions. Additionally, seismic and dynamic qualification is the subject of ITAAC, and 10 CFR 52.99(a) does not require that a schedule for implementing ITAAC be provided to the NRC until one year after issuance of the COL.

*The NRC staff determined that the applicant's response to RAI 3.10-1 is not adequate because, in accordance with Section C.I.3.10.4 of RG 1.206, if the results of seismic and dynamic qualification is not available at the time of the COL application, the applicant is expected to submit the following before the issuance of the combined license: (1) descriptions of the implementation program such as identification of seismic qualification methods (Testing or Analysis) for each type of equipment; and (2) milestones for when the different aspects of the seismic qualification program will be complete - dates or condition should be such that the NRC staff will be able to audit the qualification results prior to the installation of the equipment (not before fuel loading as part of the ITAAC program). This is **Open Item 3.10-1**.*

Resolution of Open Item 3.10-1

*In its responses dated February 5, 2010 and April 2, 2010, the VEGP applicant submitted a table providing the planned methods of seismic qualification for safety-related, seismic Category I equipment types listed in AP1000 DCD, Chapter 3, Table 3.2-3. Furthermore, the applicant stated that the seismic qualification packages will be available to the NRC as necessary to support timely completion of its inspection and audit functions. Because not all packages are expected to be completed within a year of the issuance of the COL (or at the start of construction as defined in 10 CFR 50.10(a), whichever is later), a schedule for the availability of the seismic qualification packages will be included with the schedule information for closure of ITAAC (as required by 10 CFR 52.99(a)). The staff finds the applicant's response acceptable, and Open Item 3.10-1 is closed. The incorporation of the planned changes to the VEGP COL FSAR will be tracked as **Confirmatory Item 3.10-1**.*

Resolution of Standard Content Confirmatory Item 3.10-1

Confirmatory Item 3.10-1 is an applicant commitment to revise its FSAR to address seismic qualification for Category I equipment. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.10-1 is now closed.

3.10.5 Post-Combined License Activities

There are no post-COL activities related to this section.

3.10.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff compared the information in the application to the relevant NRC regulations and the acceptance criteria in Section 3.10 of NUREG-0800. The staff's review confirmed that the applicant has adequately addressed the seismic qualification of equipment in accordance with the requirements of GDC 2, GDC 4, and GDC 14.

3.11 Environmental Qualification of Mechanical and Electrical Equipment

3.11.1 Introduction

The objectives of environmental qualification (EQ) are to reduce the potential for common failure due to specified environmental and seismic events and to demonstrate that equipment within the scope of the EQ Program is capable of performing its intended design safety function under all conditions including environmental stresses resulting from design bases events. The information presented includes identification of the equipment required to be environmentally qualified and, for each item of equipment, the designated functional requirements, definition of the applicable environmental parameters, and documentation of the qualification process employed to demonstrate the required environmental capability. During plant operation, the licensee implements the EQ Program, which specifies the replacement frequencies of affected safety-related equipment in harsh environments, and nonsafety-related equipment whose failure under the postulated environmental conditions could prevent satisfactory performance of the safety functions of the safety-related equipment, and certain post-accident monitoring equipment. The seismic qualification of mechanical and electrical equipment is presented in Section 3.10. The portions of post-accident monitoring equipment required to be environmentally qualified are identified in AP1000 DCD, Table 7.5-1.

RG 1.206 discusses the Commission's position provided in SECY-05-0197, that operational programs should be fully described in COL applications to avoid the need to specify ITAAC for those programs. The applicant relies on the Turkey Point Units 6 and 7 COL application with its incorporation by reference of the AP1000 DCD and supplemental information to fully describe the EQ and other related operational programs in support of the COL application for Turkey Point Units 6 and 7.

3.11.2 Summary of Application

Section 3.11 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 3.11 of the AP1000 DCD, Revision 19. Section 3.11 of the AP1000 DCD describes the EQ Program for electrical and mechanical equipment to be used in the AP1000 certified design.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 3.11, the applicant provided the following:

Departures

- PTN DEP 3.11-1

The applicant provided additional information about PTN DEP 3.11-1 in Section 3.11.5 of the FSAR, related to the “Environmental Zone” for three spent fuel pool level instruments (SFS-JE-LT 019A, SFS-JE-LT 019B, and SFS JE LT 019C) from AP1000 DCD, Table 3.11-1, “Environmentally Qualified Electrical and Mechanical Equipment,” (Sheet 14 of 51) to correct the location of those instruments.

- PTN DEP 6.4-2

The applicant provided additional information in Tables 3.11-1R, 3I.6-2R, and 3I.6-3R and in Figure 3D.5-1R of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR, is reviewed in Section 21.3 of this SER.

AP1000 COL Information Item

- STD COL 3.11-1

In Turkey Point Units 6 and 7 COL FSAR, Section 3.11.5, “Combined License Information Item for Equipment Qualification File,” the applicant provided additional information to address COL Information Item 3.11-1 (COL Action Item 3.11.2-1) regarding administrative control of the EQ Program for Turkey Point Units 6 and 7.

License Conditions

- Part 10, License Condition 3, Item G1

The applicant proposed a license condition providing the implementation milestone for the EQ Program.

- Part 10, License Condition 6

The applicant proposed a license condition to provide a schedule to support the NRC's inspection of operational programs, including the EQ Program.

3.11.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the EQ of mechanical and electrical equipment are given in Section 3.11, Revision 3, of NUREG-0800.

The applicable regulatory requirements for the Operational EQ Program are as follows:

10 CFR 52.79(a)(10) requires that a COL application provide a description of the program, and its implementation, required by 10 CFR 50.49(a) for the EQ of electric equipment important to safety and the list of electric equipment important to safety that is required by 10 CFR 50.49(d).

10 CFR 52.79(a)(29)(i) requires that a COL application provide plans for conduct of normal operations, including maintenance, surveillance, and periodic testing of SSCs.

RG 1.206 provides guidance for a COL applicant in preparing and submitting its COL application in accordance with the NRC regulations. For example, Section C.IV.4 in RG 1.206 discusses the requirement in 10 CFR 52.79(a) for descriptions of operational programs that need to be included in the FSAR for a COL application to allow a reasonable assurance finding of acceptability. In particular, a COL applicant should fully describe EQ and other operational programs as defined in Commission Paper SECY-05-0197 to avoid the need for ITAAC for the implementation of those programs. The term “fully described” for an operational program should be understood to mean that the program is clearly and sufficiently described in terms of scope and level of detail to allow a reasonable assurance finding of acceptability. Further, operational programs should be described at a functional level and an increasing level of detail where implementation choices could materially and negatively affect the program effectiveness and acceptability. The Commission approved the use of a license condition for operational program implementation milestones that are fully described or referenced in the FSAR as discussed in the SRM for SECY-05-0197, dated February 22, 2006.

3.11.4 Technical Evaluation

The NRC staff reviewed Section 3.11 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the EQ of mechanical and electrical equipment. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAls identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

Departure

- PTN DEP 3.11-1

In Turkey Point Units 6 and 7 COL FSAR, Table 3.11-1R, the applicant included a departure of “Environmental Zone” for three spent fuel pool level instruments (SFS-JE-LT019A, SFS-JE-LT019B, and SFS-JE-LT019C) from AP1000 DCD, Table 3.11-1, “Environmentally Qualified Electrical and Mechanical Equipment,” (Sheet 14 of 51) to correct the location of those instruments. This change updates DCD Table 3.11-1 and addresses the spent fuel pool level instruments concern related to the Fukushima Lessons Learned report. All the aforementioned instruments currently shown in an Environmental Zone (number) 11 will change (i.e., SFS-JE-LT019A to Environmental Zone 6, SFS-JE-LT019B to Environmental Zone 7, and SFS-JE-LT019C to Environmental Zone 6) in the proposed DCD Table 3.11-1.

The staff reviewed the departure that corrects the location of three spent fuel pool level instruments (i.e., Environmental Zone from 11 to 6 and 7). The staff finds that the above corrections do not result in any changes in the environmental qualification requirements (i.e., environment, “Function,” “Operating Time Required,” and “Qualification Program”). Thus, the staff concludes the departure is acceptable.

The following portion of this technical evaluation section is reproduced from Section 3.11.4 of the VEGP SER:

AP1000 COL Information Item

- STD COL 3.11-1

The COL information item for the EQ file in Section 3.11.5 of the AP1000 DCD, states:

Westinghouse Electric Company LLC will act as the agent for the COL holder during the equipment design phase, equipment selection and procurement phase, equipment qualification phase, plant construction phase, and ITAAC inspection phases.

The COL holder will define the process and procedures for which the equipment qualification files will be accepted from Westinghouse and how the files will be retained and maintained in an auditable format for the period that the equipment is installed and/or stored for future use in the nuclear power plant.

This commitment was also captured as COL Action Item 3.11.2-1 in the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

Pursuant to 10 CFR 50.49(j), the COL applicant shall keep the list and information in the file current and retain the file in auditable form for the entire period during which the covered item is installed in the nuclear power plant or is stored for the future use to permit verification that each item of electrical equipment important to safety (1) is qualified for its application, and (2) meets its specified performance requirements. To conform with 10 CFR 50.49, electrical equipment for PWRs referencing the AP1000 design should be qualified according to the criteria in Category I of NUREG-0588 and Revision 1 of RG 1.89.

This commitment was also listed as COL Action Item 3.11.2-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant is responsible for maintaining the equipment qualification file during the equipment selection and procurement phase.

In STD COL 3.11-1, the applicant describes under "Combined License Information Item for Equipment Qualification File," that the COL holder is responsible for the maintenance of the equipment qualification file. The NRC staff reviewed STD COL 3.11-1 related to equipment qualification file included under Section 3.11.5 of the BLN COL. The NRC staff's evaluation is as follows.

Section 3.11.5 of the BLN COL FSAR states that the COL holder is responsible for the maintenance of the equipment qualification file upon receipt from the reactor vendor. EQ files developed by the reactor vendor are maintained as applicable for equipment and certain post-accident monitoring devices that are subject to a harsh environment. The files are maintained for the operational life of the plant.

The Environmental Qualification Master Equipment List (EQMEL) identifies the electrical and mechanical equipment or components that must be environmentally qualified for use in a harsh environment. The BLN COL FSAR states that the EQMEL and a summary of equipment qualification results are maintained as part of the equipment qualification file for the operational life of the plant. Administrative programs are in place to control revision to the EQ files and the EQMEL. When adding or modifying components in the EQ Program, EQ files are generated or revised to support qualification. The EQMEL is revised to reflect these new components. Plant modifications and design basis changes are subject to change process reviews, e.g., reviews in accordance with 10 CFR 50.59 or Section VIII of Appendix D to 10 CFR Part 52, in accordance with appropriate plant procedures. Any changes to the EQMEL that are not the result of a modification or design basis change are subject to a separate review that is accomplished and documented in accordance with plant procedures.

Based on the above, the NRC staff concludes that the COL applicant would keep the equipment qualification file and information in the file current and retain the file in an auditable form for the entire period during which the covered item is installed in the nuclear power plant or is stored for the future use to permit verification that each item of electrical equipment important to safety: (1) is qualified for its application; and (2) meets its specified performance requirements. This is consistent with 10 CFR 50.49(j) and acceptable.

In addition, the staff requested additional information related to specific implementation of this program, which is discussed below.

*BLN COL FSAR Section 3.11 incorporates by reference AP1000 DCD Tier 2, Section 3.11.2.2, "Environmental Qualification of Mechanical Equipment," in the AP1000 DCD, which references Appendix 3D, "Methodology for Qualifying AP1000 Safety-Related Electrical and Mechanical Equipment." In RAI 3.11-1, the NRC staff requested that the applicant describe in more detail the EQ Program for safety-related mechanical equipment to be used at BLN Units 3 and 4. In its response, the applicant stated that the EQ Program will be performed as described in Section 3.11 and Appendix 3D of the AP1000 DCD, by reference as stated in the BLN COL FSAR. The EQ Program will be implemented through design specifications, equipment procurement documents, and equipment qualification procedures. Equipment qualification specifications and equipment design specifications will be developed based on the AP1000 EQ requirements. The incorporation of the AP1000 DCD, Section 3.11 and Appendix 3D into the BLN COL FSAR also includes future maintenance, surveillance, and replacement activities to maintain EQ over the life of the BLN plant through operational programs and procedures. AP1000 DCD, Table 3.11-1 provides a listing of the safety-related mechanical equipment, its location, and the environment to be considered in the EQ Program. AP1000 DCD, Appendix 3D, describes: (1) qualification methodology for the critical safety-related nonmetallic sub-components; (2) thermal and radiation information for the nonmetallic components used in safety-related mechanical equipment; (3) plant normal, abnormal, and accident environmental parameters; and (4) documentation requirements. On October 14 and 15, 2008, the NRC staff conducted an onsite review of design and procurement specifications, including EQ, for pumps, valves, and dynamic restraints to be used for the AP1000 reactor at the Westinghouse offices in Monroeville, PA. The staff found that Westinghouse had included ASME Standard QME-1-2007, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants," in its design and procurement specifications for AP1000 components, including ASME QME-1, Appendix QR-B, "Guide for Qualification of Nonmetallic Parts." At the conclusion of the onsite review, the staff provided comments on the AP1000 design procurement specifications, and Westinghouse indicated that those comments would be addressed in a future revision to the specifications. The staff also identified several items that remain open from the onsite review that are specified in Section 3.9.6 of the SER on the AP1000 DCD revision. As noted in Section 3.9.6 of the BLN COL FSAR, the NRC staff documented the results of the on-site review with follow-up items in a memorandum dated November 6, 2008, (ML083110154). **This is Open Item 3.11-1.***

Section 3D.6.2.3, "Analysis of Safety-Related Mechanical Equipment," in the AP1000 DCD, Appendix 3D, summarizes the EQ of safety-related mechanical equipment by analysis methods, but does not discuss implementation of the EQ approach. In RAI 3.11-2, the NRC staff requested that the applicant discuss the implementation of the EQ approach, including the application of industry standards, prescribed in Section 3D.6.2.3 in Appendix 3D to Chapter 3 in the AP1000 DCD. In its response to this RAI, the applicant stated that equipment qualification specifications and equipment design specifications have been developed based on the AP1000 DCD EQ requirements. The applicant stated that these procurement documents reference ASME QME-1 and Institute of Electrical and Electronic Engineers (IEEE) Standard 323 for the EQ of active safety-related mechanical equipment. As noted above, the NRC staff conducted an onsite review of the Westinghouse design and procurement specifications for the AP1000 components on October 14 and 15, 2008. The issues in this RAI are being addressed under **Open Item 3.11-1**. Therefore, RAI 3.11-2 is closed.

AP1000 DCD, Appendix 3D, Section 3D.6.3, "Operating Experience in the Equipment Qualification Program," states that the COL applicant will provide documentation of the EQ methodology where seismic experience data are used. In RAI 3.11-3, the NRC staff requested that the applicant discuss the documentation of the EQ methodology where seismic experience data are used. In its response to this RAI, the applicant stated that Westinghouse would revise the AP1000 DCD to resolve this issue. Revision 17 to the AP1000 DCD, Appendix 3D, Section 3D.6.3 specifies that qualification by experience is not employed in the AP1000 equipment qualification program as a method of qualification. The applicant revised the BLN COL FSAR to reflect the revision to the AP1000 DCD. Therefore, RAI 3.11-3 is resolved.

The section titled "In-Service Vibration" in Section B.4.5, "External Stresses," in Attachment B, "Aging Evaluation Program," to Appendix 3D to Chapter 3 in the AP1000 DCD, states that inservice pipe and FIV may be significant for line-mounted equipment. As a consequence, the section states that an additional vibration aging step is included in the aging sequence. Operating experience has revealed that FIV from acoustic resonance and hydraulic loading can adversely impact safety-related mechanical equipment at nuclear power plants. The COL applicant will demonstrate the performance of this additional vibration aging step specified in the AP1000 DCD in the EQ of safety-related mechanical equipment to be used at BLN Units 3 and 4. This technical issue is addressed in Section 3.9.6 of this SER.

License Conditions

Section 3, "Operational Program Implementation," in Part 10 of the BLN COL application provides proposed license conditions for operational program implementation. One specified license condition is that the EQ Program will be implemented prior to initial fuel loading. In addition, Section 6 in Part 10 provides a proposed license condition for operational program readiness that requires the licensee to submit a schedule no later than 12 months after COL issuance that supports planning and conducting NRC inspections of operational programs with

periodic updating. These license conditions are consistent with the policy established in SECY-05-0197 and are, thus, acceptable.

Resolution of Standard Content Open Item 3.11-1

Standard Content Open Item 3.11-1 resulted from the identification of items that remained open from the October 14 and 15, 2008, onsite review at Westinghouse offices of design and procurement specifications, including EQ, for pumps, valves, and dynamic restraints to be used for the AP1000 reactor. As noted in Section 3.9.6.4 of the BLN COL FSAR, the NRC staff documented the results of the onsite review with follow-up items in a memorandum dated November 6, 2008. In a letter dated December 14, 2009, the VEGP applicant stated that it had not identified any specific actions for the VEGP COL application based on the audit open items. The NRC staff's discussion of the audit of the EQ specifications, which includes the issues in RAI 3.11-2 addressed to the BLN applicant, is in NUREG-1793 and its supplements. Therefore, Standard Content Open Item 3.11-1 is resolved for the VEGP COL application.

Supplemental Review of Operational Aspects of the EQ Program

As discussed in RG 1.206 and Commission Paper SECY-05-0197, COL applicants must fully describe their operational programs to avoid the need for ITAAC regarding those programs. In addition to the initial EQ of electrical and mechanical equipment, the NRC staff reviewed the VEGP COL FSAR Section 3.11 with its incorporation by reference of the AP1000 DCD and supplemental information for operational aspects of the EQ Program. For example, AP1000 DCD Tier 2, Appendix 3D, Section 3D.7, "Documentation," states that information regarding maintenance, refurbishment, or replacement of the equipment will be included in the equipment qualification package if necessary to provide confidence in the equipment's capability to perform its safety function. Further, Section 3D.7.1, "Equipment Qualification Data Package," states that equipment qualification data packages will specify preventive maintenance that is required to support qualification or the qualified life, including maintenance or periodic activities assumed as part of the qualification program or necessary to support qualification. With respect to safety-related mechanical equipment, AP1000 DCD Tier 2, Section 3D.6.2.3.8, "Equipment Qualification Maintenance Requirements," specifies that maintenance requirements resulting from EQ activities will be based on: (1) qualification evaluation results (for example, periodic replacement of age-susceptible parts before the end of their qualified life); (2) equipment qualification-related maintenance activities derived from the qualification report; and (3) vendor recommended equipment qualification maintenance, if required, in order to maintain qualification. The staff finds that the VEGP COL applicant provides an acceptable description of the transition from the initial to the operational aspects of the EQ Program in support of the VEGP COL application through the VEGP COL FSAR with its incorporation by reference of the AP1000 DCD Tier 2, Section 3.11. The NRC staff will evaluate the implementation of the EQ Program through inspections conducted during plant construction and operation. The NRC inspection activities will include consideration of: (1) evaluation of EQ results for design life to establish activities

to support continued EQ; (2) determination of surveillance and preventive maintenance activities based on EQ results; (3) consideration of EQ maintenance recommendations from equipment vendors; (4) evaluation of operating experience in developing surveillance and preventive maintenance activities for specific equipment; (5) development of plant procedures that specify individual equipment identification, appropriate references, installation requirements, surveillance and maintenance requirements, post-maintenance testing requirements, condition monitoring requirements, replacement part identification, and applicable design changes and modifications; (6) development of plant procedures for reviewing equipment performance and EQ operational activities, and for trending the results to incorporate lessons learned through appropriate modifications to the EQ Program; and (7) development of plant procedures for the control and maintenance of EQ records.

Based on the above discussion, the NRC staff finds the information added to the VEGP COL application as part of STD COL 3.11-1 to be acceptable.

License Conditions

- *Part 10, License Condition 3, Item G1*

The applicant proposed a license condition providing the implementation milestone for the EQ Program.

- *Part 10, License Condition 6*

The applicant proposed a license condition to provide a schedule to support the NRC's inspection of operational programs including the EQ Program.

These license conditions are consistent with the policy established in SECY-05-0197 and are, thus, acceptable.

3.11.5 Post-Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

- License Condition (3-8) – Before initial fuel load, the licensee shall implement the EQ Program.
- License Condition (3-9) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO a schedule that supports planning for and conduct of NRC inspections of the EQ Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the EQ Program has been fully implemented.

3.11.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidance in Section 3.11 of NUREG-0800 and in RG 1.206. The staff based its conclusion on the following:

- PTN DEP 3.11-1, regarding a correction to the Environmental Zone designation for three level instruments for the spent fuel pool, is acceptable because the correction does not result in any changes in the environmental qualification requirements applicable to the instruments.
- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.
- STD COL 3.11-1, regarding the administrative control of the EQ Program for Turkey Point Units 6 and 7, is acceptable because the requirements of 10 CFR 52.79(a)(10) and 10 CFR 52.79(a)(29)(i) are satisfied.

3.12 Piping Design (Related to RG 1.206, Section C.III.1, Chapter 3, C.I.3.12, "Piping Design Review")

3.12.1 Introduction

This section covers the design of the piping system and piping support for seismic Category I, Category II, and nonsafety systems. It also discusses the adequacy of the structural integrity, as well as the functional capability, of the safety-related piping system, piping components, and their associated supports. The design of piping systems should ensure that they perform their safety-related functions under all postulated combinations of normal operating conditions, system operating transients, postulated pipe breaks, and seismic events. This includes pressure-retaining piping components and their supports, buried piping, instrumentation lines, and the interaction of NS Category I piping and associated supports with seismic Category I piping and associated supports. This section covers the design transients and resulting loads and load combinations with appropriate specified design and service limits for seismic Category I piping and piping support, including those designated as ASME Code Classes 1, 2, and 3.

3.12.2 Summary of Application

Chapter 3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Chapter 3 of the AP1000 DCD, Revision 19. Sections 3.7 and 3.9 of the AP1000 DCD address

Section 3.12, "ASME Code Class 1, 2, and 3 Piping Systems, Piping Components and Their Associated Supports" of NUREG-0800.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Sections 3.7 and 3.9, the applicant provided the following:

Supplemental Information

- PTN SUP 3.7-1

PTN SUP 3.7-1 adds a new Section 3.7.1.1.1 to demonstrate that the AP1000 DCD design values for the CSDRS and HRHF response spectra are acceptable for the Turkey Point Units 6 and 7 site.

AP1000 COL Information Items

- STD COL 3.9-2

The applicant provided additional information in STD COL 3.9-2 to address COL Information Item 3.9-2, which states that design specifications and design reports for the ASME Code, Section III, piping will be available for the NRC's review and that reconciliation of these documents is completed after construction and prior to fuel load.

- STD COL 3.9-5

The applicant provided additional information in STD COL 3.9-5 to address COL Information Item 3.9-5, which provides a description for pressurizer surge line monitoring.

- STD COL 3.9-7

In its letter dated November 15, 2010, the applicant endorsed the letter dated April 23, 2010, from the VEGP applicant, that proposed to add STD COL 3.9-7 to the FSAR. This COL item provides additional information on the process to be used to complete the piping design and ITAAC added to verify the design.

License Condition

- Part 10, License Condition 2, Item 3.9-7

In its letter dated November 15, 2010, the applicant endorsed the letter dated April 23, 2010, from the VEGP applicant, that proposed a license condition addressing the as-designed piping analysis completion schedule.

ITAAC

The applicant incorporated the information endorsed in the letter dated April 23, 2010, from the VEGP applicant, that proposed ITAAC requiring the completion of a design report referencing the as-designed piping calculation packages, including the ASME Code, Section III, piping

analysis, support evaluations, and piping component fatigue analysis for Class 1 piping using the methods and criteria outlined in AP1000 DCD, Table 3.9-19.

3.12.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the pipe and support analysis are given in Section 3.12, Revision 1, of NUREG-0800.

3.12.4 Technical Evaluation

The NRC staff reviewed Section 3.9 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the piping design review. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and uses this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

The following portion of this technical evaluation section is reproduced from Section 3.12.4 of the VEGP SER:

Due to the significant amount of new information provided by both the VEGP applicant and Westinghouse on the piping design issues since the development

of the BLN SER for Section 3.12, the NRC staff decided not to use the BLN SER material as a starting point for the evaluation of these issues.

AP1000 COL Information Items

- STD COL 3.9-2

COL Information Item 3.9-2 states that design specifications and design reports for the ASME Code, Section III piping will be available for the NRC's review and that reconciliation of the piping is completed prior to fuel load in accordance with an ITAAC in AP1000 DCD Tier 1, Section 2. The discussion on STD COL 3.9-7 below addresses design specifications and design reports.

The staff acknowledged that an ITAAC in the AP1000 DCD Tier 1 addresses verification of this aspect of the design and that COL Information Item 3.9-2 has been addressed.

- STD COL 3.9-5

The staff reviewed STD COL 3.9-5 (surge line thermal monitoring) and determined that the proposed program did not provide sufficient information for the staff to determine reasonable assurance for safety. The staff issued RAI 3.12-2 to ask the applicant to provide additional information including a test abstract including stating the standard operating conditions in Chapter 14 that identifies the objective, prerequisites, test method, data required, and acceptance criteria for surge line thermal monitoring that complies with NRC Bulletin 88-11, "Pressurizer Surge Line Thermal Stratification." In this RAI, the staff also noted that:

For subsequent SCOLs, the design is such that assumptions are made that the layout will be the same such that monitoring of the follow-on plants is not required. However, all plants are required to comply with NRC Bulletin 88-11. Given that the heatup and cooldown procedures have not been developed and the affect on the plant, even with similar layout, will be different depending on the procedures used, subsequent plants will need to verify that they will be using the same heatup and cooldown procedures as the monitored plant to comply with NRC Bulletin 88-11.

In a letter dated July 2, 2010, the applicant provided its response to address the staff's concern. In the response, the applicant stated that VEGP COL FSAR Section 3.9.3.1.2 would be revised to add the following paragraph:

Subsequent AP1000 plants (after the first AP1000 plant) confirm that the heatup and cooldown procedures are consistent with the pertinent attributes of the first AP1000 plant surge line monitoring. In addition, changes to the heatup and cooldown procedures consider the potential impact on stress and fatigue analyses consistent with the concerns of NRC Bulletin 88-11.

In this letter, the applicant also added a new Section 14.2.9.2.22 to provide a test abstract. The test abstract included the purpose, prerequisites, general test methods, and acceptance criteria.

In a subsequent letter dated August 6, 2010, the applicant provided additional information for the location of test instruments. In the response, the applicant stated that VEGP COL FSAR Section 3.9.3.1.2 would be revised to add the following paragraph:

In addition to the existing permanent plant temperature instrumentation, temperature and displacement monitoring will be included at critical locations on the surge line. The additional locations utilized for monitoring during the hot functional testing and the first fuel cycle (see Subsection 14.2.9.2.22) are selected based on the capability to provide effective monitoring.

*The staff reviewed the RAI responses and concluded the position is acceptable to comply with NRC Bulletin 88-11. On this basis, the proposed program for surge line thermal monitoring is acceptable. The incorporation of the planned changes to the VEGP COL FSAR detailed in the applicant's July 2, 2010, and August 6, 2010, letters will be tracked as **Confirmatory Item 3.12-1**.*

Resolution of Standard Content Confirmatory Item 3.12-1

Confirmatory Item 3.12-1 is an applicant commitment to revise its FSAR Table 1.9-204 and Sections 3.9.3.1.2 and 3.9.8.5 for surge line monitoring testing. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 3.12-1 is now closed.

- **STD COL 3.9-7**

In letter dated April 23, 2010, the applicant proposes that the as-designed piping analysis is made available for NRC review. Additionally in this letter, License Condition 2, Item 3.9-7, proposed by the applicant, calls for the design to be made available for review prior to installation of the piping and adding a site-specific ITAAC in Table 3.8-# [where # is the next sequential number] of Part 10 of the VEGP COL application for verification of the ASME Code design reports. In this letter, the applicant also proposed adding Section 14.3.3.# [where # is the next sequential number] to the VEGP COL FSAR, describing the process to be followed to address closure of the piping DAC during the construction period, to complete the review of the piping design including an ITAAC to review the design, and an ITAAC to review reconciliation of the design after it is built.

The staff reviewed the applicant's proposed approach of including ITAAC for verification of the design and reconciliation of the design, and a license condition to address timing of when the initial design verification would occur. The approach, including the ITAAC and the license condition, is acceptable to the staff as it allows verification that the methodology described in the AP1000 DCD

and VEGP COL FSAR and the general requirements of the ASME Code, as specified in 10 CFR 50.55a, were met.

Proposed VEGP COL FSAR Section 14.3.3.# [where # is the next sequential number] also states that "The piping design completed for the first standard AP1000 plant will be available to subsequent standard AP1000 plants under the "one issue, one review, one position" approach for closure." Westinghouse letter dated August 17, 2010, as supplemented by letter dated August 23, 2010, stated that the ASME Code Class 1, 2 and 3 piping systems will be evaluated as part of the piping DAC for hard rock site to address hard rock site seismic issue. The standard AP1000 plant will have analysis that addresses both CSDRS and HRHF GMRS effect. Therefore, the one issue, one review, one position approach applies and the staff finds this acceptable for piping analysis.

*The incorporation of the planned changes to the VEGP COL application detailed in the applicant's April 23, 2010, letter and in response to hard rock seismic issues will be tracked as **Confirmatory Item 3.12-2**.*

Resolution of Standard Content Confirmatory Item 3.12-2

Confirmatory Item 3.12-2 is an applicant commitment to revise its FSAR Table 1.8-202, Section 3.9.8.2, Section 3.9.8.7, and Section 14.3.3.3 for pipe analysis and add an ITAAC (Table 3.8-2) for verification of the ASME Code design reports. The staff verified that the VEGP COL FSAR and Part 10 of the application (ITAAC Table 3.8-2) were appropriately updated. As a result, Confirmatory Item 3.12-2 is now closed.

Supplemental Information

- PTN SUP 3.7-1

Section 3.7.1.1.1 of the Turkey Point Units 6 and 7 COL FSAR states that a comparison of the Turkey Point Units 6 and 7 site-specific GMRS to the HRHF spectra and CSDRS is provided in Figures 2.0-201 and 2.0-202. These figures demonstrate that the Turkey Point Units 6 and 7 site-specific GMRS is enveloped by the AP1000 HRHF spectra. On this basis, the staff determined that the piping design with HRHF spectra input can be applied to Turkey Point Units 6 and 7 with adequate design margin.

3.12.5 Post-Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following ITAAC and license condition related to piping design analysis acceptable:

- The licensee shall perform and satisfy the piping design analysis ITAAC in SER Table 3-3.

- License Condition (3-10)—Before commencing installation of individual piping segments identified in AP1000 DCD, Revision 19, Section 3.9.8.7, and connected components in their final locations in the facility, the licensee shall complete the analysis of the as-designed individual piping segments and shall inform the Director of NRO, or the Director's designee, in writing, upon the completion of these analyses and the availability of the design reports for the selected piping packages.

3.12.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL application is acceptable and meets the NRC regulations. The staff based its conclusion on the following:

- STD COL 3.9-2 is acceptable because it meets the general requirements of the ASME Code, as specified by 10 CFR 50.55a.
- STD COL 3.9-5 is acceptable because it is consistent with pressurizer surge line monitoring discussed in 10 CFR Part 52, Appendix D, "Design Certification Rule for the AP1000 Design."
- STD COL 3.9-7 is acceptable because it meets the general requirements of the ASME Code, as specified by 10 CFR 50.55a.
- PTN SUP 3.7-1 is acceptable and meets the guidance in Section 3.12 of NUREG-0800 because the Turkey Point site-specific GMRS are enveloped by the HRHF spectra and, therefore, the AP1000 DCD design values for the CSDRS are acceptable for the Turkey Point site.

Table 3-3 Piping Design ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
The ASME Code, Section III piping is designed in accordance with the ASME Code, Section III requirements.	Inspection of the ASME Code Design Reports (NCA-3550) and required documents will be conducted for the set of lines chosen to demonstrate compliance.	The ASME Code Design Report(s) (NCA-3550) (certified, when required by the ASME Code) exist and conclude that the design of the piping for lines chosen to demonstrate all aspects of the piping design complies with the requirements of the ASME Code section.

5.0 REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS

5.1 Introduction

The reactor coolant system (RCS) consists of two heat transfer circuits, each with a steam generator, two reactor coolant pumps and a single hot leg and two cold legs for circulating reactor coolant. In addition, the system includes the pressurizer, interconnecting piping/valves and instrumentation for operational control and safeguards actuation. All RCS equipment is located in the reactor containment. The RCS is designed to transfer heat generated by the reactor core, located in the reactor vessel (RV), to the secondary side of the steam generators for plant power generation.

Section 5.1 of the Turkey Point Units 6 and 7 combined license (COL) Final Safety Analysis Report (FSAR), Revision 8, incorporates by reference, with no departures or supplements, Section 5.1 of Revision 19 of the AP1000 Design Control Document (DCD). The Nuclear Regulatory Commission (NRC) staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

5.2 Integrity of Reactor Coolant Pressure Boundary

5.2.1.1 *Compliance with 10 CFR 50.55a*

5.2.1.1.1 Introduction

Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, "Codes and standards," incorporates by reference the American Society of Mechanical Engineers (ASME) *Boiler & Pressure Vessel Code* (BPV Code) and ASME Code for Operation and Maintenance for Nuclear Power Plants (OM Code), including Editions and Addenda for ASME Class 1, 2, and 3 components, required for component design, construction, inservice inspection (ISI), and inservice testing (IST).

AP1000 DCD, Tier 2, Table 3.2-1 classifies the pressure-retaining components of the reactor coolant pressure boundary (RCPB) as ASME BPV Code, Section III, Class 1 components. These Class 1 components are designated quality group (QG) A in conformance with Regulatory Guide (RG) 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," Revision 3.

5.2.1.1.2 Summary of Application

Section 5.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 5.2 of the AP1000 DCD, Revision 19. Section 5.2 of the DCD includes Section 5.2.1.1.

¹ See Section 1.2.2 for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a design certification (DC).

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 5.2.1.1, the applicant provided the following:

AP1000 COL Information Item

- STD COL 5.2-1

The applicant provided additional information in Standard (STD) COL 5.2-1 to address COL Action Item 5.2.1.1-1 identified in NUREG-1793, Appendix F, "Combined License Action Items" and COL Information Item 5.2-1 discussed in Section 5.2.6.1, "ASME Code and Addenda," of the AP1000 DCD. The portion of STD COL 5.2-1 evaluated here applies to ASME BPV Code reconciliation. The portion applicable to Code cases is reviewed in Section 5.2.1.2 of this safety evaluation report (SER).

In particular, Turkey Point Units 6 and 7 COL FSAR Section 5.2.1.1 states:

If a later Code edition/addenda than the Design Certification Code edition/addenda is used by the material and/or component supplier, then a code reconciliation to determine acceptability is performed as required by the ASME Code, Section III, NCA-1140. The later Code edition/addenda must be authorized in 10 CFR 50.55a or in a specific authorization as provided in 50.55a(a)(3). Code Cases to be used in design and construction are identified in the DCD; additional Code Cases for design and construction beyond those for the design certification are not required.

Inservice inspection of the reactor coolant pressure boundary is conducted in accordance with the applicable edition and addenda of the ASME Boiler and Pressure Vessel Code Section XI, as described in Subsection 5.2.4. Inservice testing of the reactor coolant pressure boundary components is in accordance with the edition and addenda of the ASME OM Code as discussed in Subsection 3.9.6 for pumps and valves, and as discussed in Subsection 3.9.3.4.4 for dynamic restraints.

5.2.1.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the ASME BPV Code reconciliation are given in Section 5.2.1 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)."

The applicable regulatory requirements for the NRC staff's review of STD COL 5.2-1 are provided in 10 CFR 50.55a, as it relates to the establishment of the minimum quality standards for the design, fabrication, erection, construction, testing, and inspection of RCPB components and other safety-related fluid systems of pressurized-water reactor (PWR) nuclear power plants by compliance with appropriate editions of published industry codes and standards. The regulatory basis is also provided in 10 CFR Part 50, "Domestic licensing of production and utilization facilities," Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 1, "Quality Standards and Records," as it relates to requirements that

nuclear power plant structures, systems, and components (SSCs) important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety function to be performed.

5.2.1.1.4 Technical Evaluation

The NRC staff reviewed Section 5.2.1.1 of the Turkey Point Units 6 and 7 COL FSAR and the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to integrity of the RCPB. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the design certification (DC) and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant [VEGP], Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application. There was a change to the AP1000 DCD and NUREG-1793 referenced in the standard content material. This change is discussed in this SER.

The following portion of this technical evaluation section is reproduced from Section 5.2.1.1.4 of the VEGP SER:

AP1000 COL Information Item

- STD COL 5.2-1

The NRC staff reviewed STD COL 5.2-1 related to ASME BPV Code reconciliation included under Section 5.2.1.1 of the BLN COL FSAR.

The regulations in 10 CFR 50.55a(a)(3) provide requirements to authorize alternatives to the regulations in 10 CFR 50.55a, while 10 CFR 50.55a(f)(6)(i) and 10 CFR 50.55(g)(6)(i) provide requirements to grant requests for relief from impractical ASME Code requirements. In addition, NUREG-1793, Section 5.2.1.1 provides a discussion on the need for allowing changes to the ASME Code Edition and Addenda during plant construction to ensure consistency between design and construction requirements.

Section 5.2.1.1 of the NRC staff's NUREG-1793 states:

DCD Tier 2, Section 5.2.1.1, states that the baseline code used to support the AP1000 DCD is ASME Code, Section III, 1998 Edition, up to and including the 2000 Addenda. However, the ASME Code, Section III, 1989 Edition, 1989 Addenda will be used for Articles NB-3200, NB-3600, NC-3600, and ND-3600 in lieu of the later edition and addenda. The use of these editions and addenda meets the requirements of 10 CFR 50.55a(b) and the associated modifications in 10 CFR 50.55a(b)(1)(iii) and is, thus, acceptable. Any proposed change to the use of the ASME Code editions or addenda by a Combined License (COL) applicant will require NRC approval prior to implementation.

The issue was also captured as COL Action Item 5.2.1.1-1 in Appendix F of NUREG-1793. The NRC staff states in Section 5.2.1.1 of NUREG-1793:

The COL applicant should ensure that the design is consistent with the construction practices (including inspection and examination methods) of the ASME Code edition and addenda, as endorsed in 10 CFR 50.55a. DCD Tier 2, Section 5.2.6.1, "ASME Code and Addenda," contains a commitment that the COL applicant will address consistency of the design with the construction practices (including inspection and examination methods) of the later ASME Code edition and addenda. The staff finds this to be an acceptable commitment. This is COL Action Item 5.2.1.1-1.

Specifically, the AP1000 DCD in Section 5.2.6.1 identified a COL information item stating:

The Combined License applicant will address in its application the portions of later Code editions and addenda to be used to construct components that will require NRC staff review and approval. The Combined License applicant will address consistency of the design with the construction practices

(including inspection and examination methods) of the later ASME Code edition and addenda added as part of the Combined License application. The Combined License applicant will address the addition of ASME Code cases approved subsequent to design certification.

The staff reviewed conformance of BLN's resolution to COL Action Item 5.2.1.1-1 to the guidance in NUREG-0800, Section 5.2.1.1, "Compliance with the Codes and Standards Rule, 10 CFR 50.55a." ASME Code, Section III, NCA-1140, "Use of Code Editions, Addenda, and Cases," states that specific provisions within an Edition or Addenda later than those established in the design specifications may be used, provided that all the related requirements are met. NCA-1140(a)(1) also states:

Under the rules of this Section [Section III], the Owner or his designee shall establish the Code Edition and Addenda to be included in the Design Specifications. All items of a nuclear power plant may be constructed to a single Code Edition and Addenda, or each item may be constructed to individually specified Code Editions and Addenda.

Accordingly, a COL applicant should establish whether it plans to use a single Code Edition and Addenda consistent with the certified design or to use individually specified Code Editions and Addenda. If individually specified Code Editions and Addenda are used, then differences between those Editions and Addenda are required to be reconciled consistent with requirements in the ASME BPV Code, Section III, NCA-1140.

The NRC staff found that Revision 0 to the BLN COL FSAR did not address NCA-1140 in describing the use of later Code Editions and Addenda. Therefore, in request for additional information (RAI) 5.2.1.1-1, the staff requested that the applicant explain the methodology for the ASME BPV Code reconciliation consistent with NCA-1140.

In its response to RAI 5.2.1.1-1 (this also applies to RAI 5.2.1.2-1 and RAI 5.2.1.1-3), the COL applicant described a revision to the FSAR to address this issue. Revision 1 to BLN COL FSAR Section 5.2.1.1, specifies that the methodology used to ensure consistency of design and construction practices when using later Section III Code Editions and Addenda would conform to the provisions of NCA-1140, and that all related requirements of the Code case(s) would be met. The use of NCA-1140 addresses the provisions to be followed for reconciliation of later Editions/Addenda of the ASME BPV Code. As a result, RAI 5.2.1.1-1 and RAI 5.2.1.2-1 are closed.

Revision 0 of the BLN COL FSAR referred to the use of ASME BPV Code, Section XI, as part of the reconciliation process if a later-Code year/Addenda than the DC Code year/Addenda is used by the material and/or component supplier. In RAI 5.2.1.1-3, the staff requested that the applicant provide justification for the use of ASME BPV Code, Section XI, which addresses ISI at operating nuclear power plants, in the reconciliation process for new reactor designs.

In its response to RAI 5.2.1.1-3 (referring to the response to RAI 5.2.1.1-1), the applicant noted that ASME BPV Code, Section III components are being designed using the baseline ASME BPV Code defined in DCD Section 5.2.1.1. Design specifications for component and material procurement will specify the ASME BPV Code to be used for design and construction to be that identified in the DCD. The applicant also noted that the reference in FSAR Section 5.2.1.1 to the ASME BPV Code, Section XI reconciliation process for repair and replacement was inappropriate for the original design and construction. Therefore, the applicant stated that this reference would be corrected. Revision 1 to the BLN COL FSAR in Section 5.2.1.1 removes the reference to ASME BPV Code, Section XI, and states, if a later Code Edition/Addenda than the DC Code Edition/Addenda is used by the material and/or component supplier, then a Code reconciliation to determine acceptability is performed as required by the ASME Code, Section III, NCA-1140. The staff finds that Revision 1 to the BLN COL FSAR meets the requirements of 10 CFR 50.55a. As a result, RAI 5.2.1.1-3 is closed.

Revision 0 of the BLN COL FSAR referenced Revision 16 of the AP1000 DCD. AP1000 DCD, Revision 16 required the use of the 1989 Edition, 1989 Addenda for NB-3200, NB-3600, NC-3600 and ND-3600 for construction of components and piping. In RAI 5.2.1.1-5, the NRC staff requested that the applicant identify components that are designed and constructed using the 1989 ASME BPV Code and discuss whether these components will meet the requirements of the 1998 Edition through and including the 2000 Addenda ASME BPV Code, which is the Code of record for the AP1000 DCD. In its response to RAI 5.2.1.1-5, the applicant indicated that in a letter dated May 16, 2008, Westinghouse submitted a document (APP-GW-GLE-005) to address the limitation on the use of ASME Section III Code for seismic design in accordance with 10 CFR 50.55a(b)(1)(iii) as related to the use of the above four articles. The AP1000 DCD was accordingly changed in Revision 17 to limit the use of the 1989 Edition, 1989 Addenda to piping design only. Since BLN COL FSAR, Revision 1 incorporated by reference Revision 17 of AP1000 DCD, no components will be constructed using the 1989 Edition, 1989 Addenda Code and they will be used for piping design only. As a result, RAI 5.2.1.1-5 is closed.

AP1000 DCD, Section 5.2.1.1 discusses the application of ASME BPV Code, Section III, for the design and fabrication of RCPB components. In RAI 5.2.1.1-2, the NRC staff requested that the applicant discuss the application of other sections of the ASME BPV Code and the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code) not specified in the AP1000 DCD, Section 5.2.1.1. In its response to RAI 5.2.1.1-2, provided in a letter dated July 25, 2008, the applicant discussed other sections in the AP1000 DCD and the BLN COL FSAR that reference the ASME BPV Code and the ASME OM Code. In response to RAI 5.2.1.1-2, the applicant stated that BLN COL FSAR Section 5.2.1.1 would be revised to address this issue. Revision 1 to the BLN COL FSAR in Section 5.2.1.1, specifies that ISI of the RCPB will be conducted in accordance with the applicable Edition and Addenda of the ASME BPV Code, Section XI, as described in BLN COL FSAR Section 5.2.4, "Inservice Inspection and Testing of Class 1 Components." The BLN COL FSAR, Revision 1 also specifies that IST of the RCPB components will be performed in

accordance with the applicable Edition and Addenda of the ASME OM Code as discussed in BLN COL FSAR Section 3.9.6, "Inservice Testing of Pumps and Valves," and as discussed in BLN COL FSAR Section 3.9.3.4.4, "Inspection, Testing, Repair and/or Replacement of Snubbers." Revision 1 to the BLN COL FSAR clarified the application of other sections of the ASME BPV Code and the ASME OM Code in the design, construction, and operation of BLN Units 3 and 4. As a result, RAI 5.2.1.1-2 is closed.

As discussed in NUREG-1793, use of the ASME BPV Code for the AP1000 reactor is Tier 1 information while the specific Edition and Addenda are designated Tier 2 because of the continually evolving design and construction practices (including inspection and examination techniques) of the ASME BPV Code. The NRC staff finds that the design and construction of ASME BPV Code Class 1, 2, and 3 components and their supports will conform to the appropriate ASME BPV Code Editions and Addenda and, thus, meet the relevant NRC regulations governing the use of codes and standards. The use of Editions and Addenda of the ASME BPV Code, Section III issued subsequent to the AP1000 design code of record may be used provided the Edition and Addenda are incorporated by reference in the regulations, and NRC staff approval is obtained as required for Tier 2* changes to the AP1000 DC information. Generic NRC approval of the Tier 2* changes related to use of later Editions and Addenda during construction may be obtained by a COL applicant through NCA-1140(a)(1) for components other than piping. Further, the staff finds that quality standards used will be commensurate with the importance of the safety function of all safety-related components because the ASME BPV Code, Section III that is incorporated by reference into the NRC regulations will be used by the COL licensee to ensure consistency with design, construction, and inspection requirements. The staff finds this to be an acceptable basis for satisfying the requirements of GDC 1. Finally, STD COL 5.2-1 states that any proposed alternatives to the ASME BPV Code must be authorized by the NRC pursuant to 10 CFR 50.55a(a)(3). This meets the regulations and is, therefore, acceptable.*

Correction to the Standard Content Evaluation Text

The section of the technical evaluation above, which discusses the Tier 2* information is no longer valid. Westinghouse revised its DCD to change the Edition and Addenda of the ASME BPV Code from a Tier 2* designation to Tier 2. This change is evaluated in a supplement to NUREG-1793.

This change does not impact the conclusions of the BLN or VEGP standard content evaluations described above.

5.2.1.1.5 Post Combined License Activities

There are no post-COL activities related to this section.

5.2.1.1.6 Conclusion

The NRC staff reviewed the application and the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point

Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR 50.55a and GDC 1. The staff based its conclusion on the following:

- STD COL 5.2-1, as related to ASME Code reconciliation, is acceptable because the design and construction of ASME BPV Code Class 1, 2, and 3 components and their supports will conform to the appropriate ASME BPV Code Editions and Addenda and, thus, meet the relevant NRC regulations in 10 CFR 50.55a governing the use of codes and standards. Further, the staff finds that quality standards used will be commensurate with the importance of the safety function of all safety-related components and is an acceptable basis for satisfying the requirements of GDC 1. Also, STD COL 5.2-1 states that any proposed alternatives to the ASME BPV Code must be authorized by the NRC pursuant to 10 CFR 50.55a(a)(3).

5.2.1.2 Applicable Code Cases (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.1.2, "Compliance with Applicable ASME Code Cases")

5.2.1.2.1 Introduction

This section addresses the ASME Code cases to be used at Turkey Point Units 6 and 7. In general, a Code case is developed by ASME based on inquiries from the nuclear industry associated with Code clarification, modification or alternative to the Code. All Code cases will remain valid and available for use until annulled by the ASME BPV Standards Committee. ASME Code cases acceptable to the NRC staff are published in RG 1.84, "Design and Fabrication Code Case Acceptability, ASME Section III, Division 1"; RG 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1"; and RG 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code"; in accordance with requirements of 10 CFR 50.55a(b)(4), 10 CFR 50.55a(b)(5) and 10 CFR 50.55a(b)(6).

5.2.1.2.2 Summary of Application

Section 5.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 5.2 of the AP1000 DCD, Revision 19. Section 5.2 of the DCD includes Section 5.2.1.2.

Turkey Point Units 6 and 7 COL FSAR Section 5.2 does not include supplemental information in the incorporation by reference of Section 5.2.1.2 of the AP1000 DCD. However, Turkey Point Units 6 and 7 COL FSAR Section 5.2 specifies supplementary information in STD COL 5.2-1 that relates to applicable Code cases.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 5.2.1.1, the applicant provided the following:

AP1000 COL Information Item

- STD COL 5.2-1

The applicant provided additional information in STD COL 5.2-1 to address COL Action Item 5.2.1.1-1 identified in NUREG-1793 and COL Information Item 5.2-1 discussed in Section 5.2.6.1, "ASME Code and Addenda," of the AP1000 DCD. The portion of STD COL 5.2-1 evaluated here applies to applicable Code cases.

5.2.1.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the applicable Code cases are given in Section 5.2.1.2 of NUREG-0800.

The applicable regulatory requirements for the NRC staff's review of the Turkey Point Units 6 and 7 COL application are as follows:

GDC 1 in Appendix A to 10 CFR Part 50 and 10 CFR 50.55a, as related to the establishment of the minimum quality standards for the design, fabrication, erection, construction, testing, and inspection of nuclear power plant components, require conformance with appropriate editions of published industry codes and standards.

As one means of meeting the applicable NRC regulations, RG 1.84 lists ASME BPV Code, Section III Code cases oriented to design, fabrication, materials, and testing, which are acceptable with applicable conditions for implementation at nuclear power plants. RG 1.147 lists ASME BPV Code, Section XI Code cases, which are acceptable with applicable conditions for use in the ISI of nuclear power plant components and their supports. RG 1.192 lists Code cases related to the ASME OM Code oriented to operation and maintenance of nuclear power plant components, which are acceptable with applicable conditions for implementation at nuclear power plants.

5.2.1.2.4 Technical Evaluation

The NRC staff reviewed Section 5.2 of the Turkey Point Units 6 and 7 COL FSAR and the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to applicable Code cases. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In NUREG-1793 Section 5.2.1.2, the NRC staff states that the COL applicant may submit, with its COL application, future Code cases that are endorsed in RG 1.84 at the time of the application, provided that they do not alter the staff's safety findings on the AP1000 certified design. The staff also states that the COL applicant should submit those Code cases that are in effect at the time of the COL application and apply to operational programs involving ISI and IST. The supplement to NUREG-1793 describes the staff's technical evaluation of modifications to the list of ASME Code cases in Table 5.2-3 of Revision 19 to the AP1000 DCD.

The NRC staff followed the guidance provided in NUREG-0800, Section 5.2.1.2, "Applicable Code Cases," and RG 1.206, "Combined License Applications for Nuclear Power Plants

(LWR Edition),” Section C.III.1, Chapter 5, C.I.5.2.1.2, in evaluating Turkey Point Units 6 and 7 COL FSAR Section 5.2.1.2 for compliance with the NRC regulations.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 5.2.1.2.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 5.2-1*

Revision 0 to the BLN COL FSAR in Section 5.2.1.1 had referenced ASME BPV Code, Section XI, as part of the reconciliation process for the use of ASME Code cases other than those included in AP1000 DCD Table 5.2-3. In RAI 5.2.1.1-4, the staff requested that the applicant explain how this met 10 CFR 50.55a(a)(3), 10 CFR 50.55a(b)(4), 10 CFR 50.55a(b)(5), and 10 CFR 50.55a(b)(6).

In its response to RAI 5.2.1.1-4, the applicant noted that no Code cases other than those included in the DCD have been identified as necessary at this time. Code cases approved by the NRC in RG 1.147 may be used, and if so, they will be identified in a revision to the FSAR. The applicant also indicated that the FSAR statement regarding reconciliation of Code cases was incorrect and would be revised. Revision 1 to the BLN COL FSAR in Section 5.2.1.1 specifies that Code cases to be used in design and construction are identified in the DCD and that additional Code cases for design and construction beyond those for the DC are not required. The staff considers Revision 1 to the BLN COL FSAR Section 5.2.1.1 to be acceptable. As a result, RAI 5.2.1.1-4 is closed.

AP1000 DCD, Revision 17, Section 5.2.1.2 indicated that use of Code cases approved in revisions of the RGs issued subsequent to the DC may be used as discussed in Section 5.2.6.1 by using the process outlined for updating the ASME Code Edition and Addenda. Section 5.2.6.1 stated that the COL applicant will address in its application, the addition of ASME Code cases approved subsequent to DC. Similar to the Section III Code cases listed in DCD Table 5.2-3, in RAI 5.2.1.2-2, the staff requested that the applicant identify the ASME BPV Code, Section XI ISI and the ASME OM Code cases that are used for BLN design and construction. The applicant was also requested to confirm whether these Code cases are approved by the NRC as documented in RGs 1.147 and 1.192. If not, these Code cases must be submitted to the NRC for authorization pursuant to 10 CFR 50.55a(a)(3).

In its response to RAI 5.2.1.2-2, the applicant referred to its response to RAI 5.2.1.1-4 and noted that there are no additional Code cases used for design and construction beyond those identified in the DCD. In its RAI response, the applicant stated that the IST Program described in BLN COL FSAR Section 3.9.6 will utilize Code Case OMN-1, Revision 1, "Alternative Rules for the Preservice and In-service Testing of Certain Electric Motor-Operated Valve Assemblies in Light Water Reactor Power Plants," which establishes alternate rules and requirements for preservice and IST to assess the operational readiness of certain motor operated valves. The staff notes that the current revision to RG 1.192 at the time of this COL review conditionally accepts the use of Code Case OMN-1, Revision 0, and does not address Revision 1 to Code Case OMN-1. The applicant will need to submit a request under 10 CFR 50.55a for authorization to apply Revision 1 to Code Case OMN-1, if RG 1.192 is not updated to accept this revision to the Code case prior to development of the IST Program for BLN. The NRC staff's review of the use of OMN-1, Revision 1, for BLN is discussed in Section 3.9.6 of this SER. In its response to RAI 5.2.1.2-2, the applicant stated that no code cases other than those included in the DCD are used for BLN and the FSAR would be revised as indicated in response to RAI 5.2.1.1-4. As noted above, Revision 1 to the BLN COL FSAR resolved RAI 5.2.1.1-4. Therefore, RAI 5.2.1.2-2 is also closed.

Based on its review, the NRC staff has determined that BLN COL FSAR Section 5.2 appropriately incorporates by reference AP1000 DCD, Section 5.2.1.2, in satisfying the NRC regulations for the design, fabrication, erection, testing, and inspection of plant SSCs commensurate with the importance of the safety function to be performed by referencing the use of accepted ASME Code cases. As a result, the staff concludes that compliance by the applicant with the provisions of the ASME Code cases accepted in RGs 1.84, 1.147, and 1.192, or individually reviewed and accepted in NUREG-1793 or its supplements, will result in component quality that is commensurate with the importance of the safety functions of the components at BLN Units 3 and 4. This satisfies the requirements of GDC 1, and, therefore, is acceptable.

AP1000 DCD, Section 5.2.6.1 states, in part, that the COL applicant will address the addition of ASME Code cases approved subsequent to the DC. As noted above, the applicant has not identified any Code cases other than those included in the AP1000 DCD as necessary at this time for the design and construction of

BLN Units 3 and 4. If the applicant determines the need to apply other ASME Code cases in the future, it may apply those ASME Code cases in accordance with their acceptance in RG 1.84, RG 1.147, or RG 1.192, including any applicable conditions, or must request NRC authorization to use those Code cases.

5.2.1.2.5 Post Combined License Activities

There are no post-COL activities related to this section.

5.2.1.2.6 Conclusion

The NRC staff reviewed the application and the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR 50.55a and GDC 1, and complies with the provisions of the ASME Code cases accepted in RGs 1.84, 1.147, and 1.192. The staff based its conclusion on the following:

- STD COL 5.2-1, as related to applicable ASME Code cases, is acceptable because the NRC staff has determined that Turkey Point Units 6 and 7 COL FSAR Section 5.2 appropriately incorporates by reference AP1000 DCD Section 5.2.1.2, in satisfying the NRC regulations for the design, fabrication, erection, testing, and inspection of plant SSCs commensurate with the importance of the safety function to be performed by referencing the use of accepted ASME Code cases. As a result, the staff concludes that compliance by the applicant with the provisions of the ASME Code cases accepted in RGs 1.84, 1.147, and 1.192, or individually reviewed and accepted in NUREG-1793 or its supplements, will result in component quality that is commensurate with the importance of the safety functions of the components at Turkey Point Units 6 and 7. This satisfies the requirements of GDC 1, and, therefore, is acceptable.

5.2.1.3 Alternate Classification

In the standard plant design, Westinghouse applies an alternate classification for the chemical and volume control system (CVCS).

Section 5.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 5.2.1.3, "Alternate Classification," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

5.2.2 Overpressure Protection

RCS and steam system overpressure protection during power operation is provided by the pressurizer safety valves and the steam generator safety valves, in conjunction with the action of the reactor protection system. In addition, a relief valve in the suction line of the normal residual heat removal system (RNS) provides low-temperature overpressure protection (LTOP) for the RCPB during low-temperature operation of the plant (startup, shutdown).

Section 5.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 5.2.2, "Overpressure Protection," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

5.2.3 Reactor Coolant Pressure Boundary Materials

5.2.3.1 Introduction

Materials selected for RCS components must be compatible with reactor coolant water chemistry, thermal insulation materials, and the atmosphere. The specific processes (including heat treatment and welding practices) used to fabricate RCS components must maximize the corrosion resistance and fracture toughness of the components.

5.2.3.2 Summary of Application

Section 5.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 5.2 of the AP1000 DCD, Revision 19. Section 5.2 of the DCD includes Section 5.2.3.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 5.2.3.2.1, the applicant provided the following:

Supplemental Information

- STD SUP 5.2-1

The applicant provided supplemental (SUP) information to describe the monitoring program for primary water chemistry to be implemented at the plant during plant operation.

5.2.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the RCPB materials are given in Section 5.2.3 of NUREG-0800.

The applicable regulatory requirements for acceptance of the supplementary information on water chemistry monitoring is established in GDC 14, "Reactor Coolant Pressure Boundary," of Appendix A to 10 CFR Part 50, which requires that the RCPB shall be designed, fabricated,

erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture.

5.2.3.4 Technical Evaluation

The NRC staff reviewed Section 5.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to RCPB materials. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 5.2.3.4 of the VEGP SER:

Supplemental Information

- *STD SUP 5.2-1*

The NRC staff reviewed the standard supplementary information on water chemistry as discussed in Section 5.2.3.2.1 of the BLN COL FSAR. In its review of the supplemental information the staff used the applicable sections of NUREG-0800 and RG 1.206 as guidance. However, Section 5.2.3 of NUREG-0800 does not directly address PWR reactor coolant chemistry, but, rather, refers the reviewer to NUREG-0800, Section 9.3.4, "Chemical and

Volume Control System (PWR) Including Boron Recovery.” Section 9.3.4 of NUREG-0800 recommends that the Chemical and Volume Control System (CVCS) ensure that RCS chemistry meets GDC 14, by maintaining acceptable purity levels in the reactor coolant through the removal of insoluble corrosion products and dissolved ionic material by filtration and ion exchange. In addition, Section 9.3.4 of NUREG-0800 recommends that the CVCS maintain proper RCS chemistry by controlling total dissolved solids, pH, oxygen concentration, and halide concentrations within the acceptable ranges. RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.3.2 recommends that COL applications referencing PWR standard designs describe the chemistry of the reactor coolant and the additives (such as inhibitors), the water chemistry, including maximum allowable content of chloride, fluoride, sulfate, and oxygen and permissible content of hydrogen and soluble poisons, the methods to control water chemistry, including pH, the industry-recommended methodologies to be used to monitor water chemistry, and provide appropriate references. Additionally, RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.3.2 also states that “this section may reference the Electric Power Research Institute (EPRI) water chemistry guidelines to support the plant-specific program. However, this section should fully describe and discuss the plant-specific water coolant chemistry control program and its compatibility with the RCPB materials.”

The supplementary information in the BLN COL FSAR states that monitoring of water chemistry is implemented using the guidance of EPRI TR-1002884, “Pressurized Water Reactor Primary Water Chemistry Guidelines: Volume 1,” Appendix F (Revision 5, dated October 2003). The cited appendix pertains specifically to sampling of soluble and insoluble corrosion products from the RCS. Use of this appendix is consistent with the recommendation in NUREG-0800 that the CVCS system maintains acceptable purity levels in the reactor coolant through the removal of insoluble corrosion products and dissolved ionic material by filtration and ion exchange, and must maintain proper RCS chemistry by controlling total dissolved solids, pH, oxygen concentration, and halide concentrations within the acceptable ranges. Accurate sampling of corrosion products supports this recommendation.

Appendix F of the Primary Water Chemistry Guidelines only provides a recommended methodology for sampling RCS corrosion products, and does not provide acceptance criteria or methods for reducing/controlling RCS corrosion products. Further, other primary water chemistry parameters that NUREG-0800 and RG 1.206 recommend be addressed in the FSAR are not addressed by Appendix F, such as pH, oxygen, and halide concentrations. These parameters are addressed in DCD Section 5.2.3 and DCD Table 5.2.2, which provides maximum values of primary water chemistry parameters including oxygen, pH and halide concentration for the various plant operating modes. Referencing Appendix F only of the Primary Water Chemistry Guidelines does not add any more detail or specificity for these other parameters. Therefore, in a letter dated April 10, 2008, the staff requested additional information (RAI 5.2.3-1) from the applicant to address these items.

Specifically, the NRC staff requested that the applicant explain the rationale for referencing only Appendix F to the “Pressurized Water Reactor Primary Water Chemistry Guidelines” rather than referencing the entire guidelines document.

The applicant responded to RAI 5.2.3-1, in a letter dated May 23, 2008, stating that "the AP1000 Design Control Document (DCD) describes, in Section 5.2.3.2.1, the RCS chemistry specifications and the methods to control water chemistry. In addition, DCD Table 5.2-2 summarizes these specifications for conductivity, pH, oxygen, chloride, hydrogen, suspended solids (corrosion product particulates), pH control agent, boric acid, silica, aluminum, calcium, magnesium, and zinc."

The applicant's response further stated that FSAR Section 5.2 incorporates the aforementioned DCD section by reference and refers to Appendix F of EPRI TR-1002884 as the industry recommended methodology to be used to monitor water chemistry. As noted by the question, Appendix F of the EPRI document is limited to corrosion products and as such, is insufficient to address the remaining details of the program. As such, the text of FSAR Section 5.2.3.2.1 will be revised to reference the complete EPRI document which does address the requested program attributes not covered by the DCD.

The applicant also proposed changes to the BLN COL FSAR Chapter 5, Section 5.2.3.2.1. The following information is to replace the previous supplemental information:

The water chemistry program is based on industry guidelines as described in EPRI TR-1002884, "Pressurized Water Reactor Primary Water Chemistry." The program includes periodic monitoring and control of chemical additives and reactor coolant impurities listed in DCD Table 5.2-2. Detailed procedures implement the program requirements for sampling and analysis frequencies, and corrective actions for control of reactor water chemistry. The frequency of sampling water chemistry varies (e.g., continuous, daily, weekly, or as needed) based on plant operating conditions and the EPRI water chemistry guidelines. Whenever corrective actions are taken to address an abnormal chemistry condition, increased sampling is utilized to verify the effectiveness of these actions. When measured water chemistry parameters are outside the specified range, corrective actions are taken to bring the parameter back within the acceptable range and within the time period specified in the EPRI water chemistry guidelines. Following corrective actions, additional samples are taken and analyzed to verify that the corrective actions were effective in returning the concentrations of contaminants.

Chemistry procedures will provide guidance for the sampling and monitoring of primary coolant properties.

The staff finds the applicant's response, and the proposed COL application changes, acceptable because it meets the acceptance criteria in Section 9.3.4 of NUREG-0800 related to the evaluation of the proposed chemistry program using the latest version in the EPRI report series, "PWR Primary Water Guidelines." The staff verified that Revision 1 of the FSAR (STD SUP 5.2-1) adequately incorporates the above. As a result, RAI 5.2.3-1 is closed.

Additionally, the staff finds that the BLN FSAR meets the recommendation in RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.3.2 to fully describe the primary water chemistry control program in the FSAR by referencing the most recent version of the “EPRI PWR Primary Water Guidelines” in its entirety. Although Section 5.2 of the AP1000 DCD, Revision 17, provides maximum values (and in some cases, normal ranges) for the key primary water chemistry parameters, referencing the EPRI PWR Primary Water Guidelines provides a more detailed description of the chemistry control program because various action levels (at which varying levels of corrective action are required) are specified for the key parameters for different reactor operating modes, as well as the required periodicity for sampling the various parameters.

Although the staff does not formally review or issue a safety evaluation of the revisions to the EPRI water chemistry guidelines (including the PWR Primary Water Chemistry Guidelines), the guidelines are recognized as representing industry best practices in water chemistry control. Extensive experience in operating reactors has demonstrated that following the EPRI guidelines minimizes the occurrence of corrosion related failures. Further, the EPRI guidelines are periodically revised to reflect evolving knowledge with respect to best practices in chemistry control. Therefore, the staff accepts the use of the EPRI PWR Primary Water Chemistry Guidelines as a basis for a primary water chemistry program for a COL referencing a standard reactor design.

5.2.3.5 Post Combined License Activities

There are no post-COL activities related to this section.

5.2.3.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 14. The staff based its conclusion on the following:

- STD SUP 5.2-1 meets the relevant guidance in Section 9.3.4 of NUREG-0800 with respect to developing a water chemistry program consistent with the latest EPRI guidelines and is acceptable. Conformance with these guidelines provides an acceptable basis for satisfying, in part, the requirements of GDC 14.

5.2.4 Inservice Inspection and Testing of Class 1 Components (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.4, “Inservice Inspection and Testing of Reactor Coolant Pressure Boundary”)

5.2.4.1 Introduction

Components that are part of the RCPB must be designed to permit periodic inspection and testing of important areas and features to assess their structural and leaktight integrity. ISI programs are based on the requirements of 10 CFR 50.55a in that Code Class 1 components, as defined in Section III of the ASME BPV Code, meet the applicable inspection requirements set forth in Section XI of the ASME Code, “Rules for Inservice Inspection of Nuclear Power Plant Components.”

5.2.4.2 Summary of Application

Section 5.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 5.2 of the AP1000 DCD, Revision 19. Section 5.2 of the DCD includes Section 5.2.4. The advanced safety evaluation (ASE) with confirmatory items for Section 5.2.4 was based on the VEGP COL FSAR, Revision 2 and DCD Revision 17. After submitting DCD Revision 17 to the NRC, Westinghouse added a new COL Information Item (COL 5.3-7). This COL information item has been incorporated into Revision 18 of the DCD; however, the discussion of the COL information item below did not change.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 5.2.4, the applicant provided the following:

AP1000 COL Information Item

- STD COL 5.2-2

The applicant provided additional information in STD COL 5.2-2 to address COL Information Item 5.2-2. The information relates to plant-specific preservice inspection (PSI) and ISI programs.

- STD COL 5.3-7

In a letter dated August 27, 2010, the VEGP applicant proposed a new STD COL 5.3-7 to address AP1000 DCD COL Information Item 5.3-7 included in a Westinghouse letter dated August 3, 2010. The new information states that the COL holder will augment the plant-specific ISI program in VEGP COL FSAR Section 5.2.4.1, related to the Quickloc weld buildup on the reactor vessel head. In its letter dated April 20, 2011, the Turkey Point Units 6 and 7 applicant endorsed that VEGP letter as standard, thereby adopting STD COL 5.3-7 for the Turkey Point Units 6 and 7 COL application. The April 20, 2011 letter also stated that the information in the August 27, 2010, letter will be incorporated into the future revision to the Turkey Point Units 6 and 7 COL FSAR. Revision 5 of the Turkey Point Units 6 and 7 COL FSAR is appropriately revised.

Supplemental Information

- STD SUP 5.2-2

The applicant provided supplemental information regarding guidance for inspecting the integrity of bolting and threaded fasteners.

License Condition

- License Condition 6, regarding PSI/ISI program details

5.2.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for ISI are given in Section 5.2.4 of NUREG-0800.

The applicable regulatory requirements for acceptance of the resolution to COL Information Items 5.2-2 and 5.3-7 and supplementary information on ISI and testing of Class 1 components are established in GDC 32, "Inspection of Reactor Coolant Pressure Boundary," found in Appendix A to 10 CFR Part 50, as it relates to periodic inspection and testing of the RCPB, and 10 CFR 50.55a, as it relates to the requirements for inspecting and testing ASME Code Class 1 components of the RCPB.

The applicable policy for acceptance of COL Information Items 5.2-2 and 5.3-7, as it relates to fully describing an operational program, is found in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," dated October 28, 2005.

5.2.4.4 Technical Evaluation

The NRC staff reviewed Section 5.2.4 of the Turkey Point Units 6 and 7 COL FSAR and the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the RCPB ISI and testing. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In Section 5.2.4 of NUREG-1793, the staff concluded that the AP1000 ISI program for Code Class 1 components is acceptable and meets the requirements of 10 CFR 50.55a with regard to the preservice and inservice inspectability of these components. The specific version of the ASME Code, Section XI used as the baseline Code in the AP1000 certified design is the 1998 Edition up to and including the 2000 Addenda. It should be noted that the staff did not identify any portions of the AP1000 ISI program for Class 1, 2, and 3 components that were excluded from the scope of the staff's review of the AP1000 DC (as the staff did for IST of valves in AP1000 FSER Section 3.9.6.4). Therefore, the staff's conclusions regarding the acceptability of the AP1000 ISI program based on the 1998 Edition up to and including the

2000 Addenda of the ASME Code, Section XI with regard to preservice and inservice inspectability of Class 1 components remains unchanged with Revision 17 of the AP1000 DCD, except for the newly identified STD COL Information Item 5.3-7, which is addressed below. Accordingly, the staff's evaluation of this section focused on the acceptability of the COL applicant's supplemental information and responses to AP1000 COL information items and action items. The staff's evaluation in this section also addresses the operational program aspects of the ASME Code Class 1, 2, and 3 PSI and ISI programs.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 5.2.4.4 of the VEGP SER:

AP1000 COL Information Item

The following portion of this technical evaluation section is reproduced from Section 5.2.4.4 of the BLN SER:

- *STD COL 5.2-2*

The COL applicant added the following after the first paragraph in DCD Section 5.2.4:

The initial inservice inspection program incorporates the latest edition and addenda of the ASME Boiler and Pressure Vessel Code approved in 10 CFR 50.55a(b) on the date 12 months before the initial fuel load. Inservice examination of components and system pressure tests conducted during successive

120-month inspection intervals must comply with the requirements of the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) 12 months before the start of the 120-month inspection interval (or the optional ASEM [sic] Code cases listed in NRC Regulatory Guide 1.147, that are incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed in 10 CFR 50.55a(b).

10 CFR 50.55a(g) requires that inservice examinations of components and system pressure tests conducted during the initial 120-month inspection interval must comply with the requirements in the latest edition and addenda of the Code incorporated by reference in paragraph (b) of 10 CFR 50.55a on the date 12 months before the date scheduled for initial loading of fuel under a combined license under 10 CFR Part 52. The staff concludes that the supplemental information provided by the COL applicant meets the NRC's regulations and is, therefore, acceptable.

The COL applicant added the following at the end of DCD Section 5.2.4.1:

The Class 1 system boundary for both preservice and inservice inspection programs and the system pressure test program include those items within the Class 1 and Quality Group A (Equipment Class A [in accordance with] DCD Section 3.2.2 and DCD Table 3.2-3 boundary). Based on 10 CFR Part 50 and Regulatory Guide 1.26, the Class 1 boundary includes the following:

- reactor pressure vessel;*
- portions of the reactor system (RXS);*
- portions of the chemical and volume control system (CVS);*
- portion of the incore instrumentation system (IIS);*
- portions of the passive core cooling system (PXS);*
- portions of the reactor coolant system;*
- portions of the normal residual heat removal system.*

Those portions of the above systems within the Class 1 boundary are those items that are part of the RCPB as defined in Section 5.2 of the Bellefonte COL FSAR.

Exclusions

Portions of the systems within the reactor coolant pressure boundary [RCPB], as defined above, that are excluded from the Class 1 boundary in accordance with 10 CFR Part 50, Section 50.55a, are as follows:

- Those components where, in the event of postulated failure of the component during normal operation, the reactor can be shut down and cooled down in an orderly manner, assuming makeup is provided by the reactor coolant makeup system only; or*

- *Components that are or can be isolated from the reactor coolant system by two valves (both closed, both open, or one closed and other open). Each open valve is capable of automatic actuation and, assuming the other valve is open, its closure time is such that, in the event of postulated failure of the component during normal reactor operation each valve remains operable and the reactor can be shut down and cooled down in an orderly manner, assuming makeup is provided by the reactor coolant makeup system only.*

The NRC staff compared the proposed description of the system boundary subject to inspection and the exclusions with ASME Section XI and 10 CFR 50.55a. The staff found that the proposed system boundary and exclusions were in agreement with the ASME guidelines and regulations, and are therefore, acceptable. This portion of STD COL 5.2-2 is acceptable.

In Revision 0 of the BLN COL FSAR, the COL applicant states that NRC First Revised Order, EA-03-009, "Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," will be used to establish the required inspections of RPV heads and associated penetration nozzles to detect primary stress corrosion cracking. In addition, the COL applicant states that ASME Code Case N-729-1 (N-729-1), "Alternative Examination Requirements for Pressurized-Water Reactor (PWR) Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds," will be used. N-729-1, as modified by the NRC staff may be used to perform the inspection of the AP1000 RPV head. Finally, a visual inspection to identify potential boric acid leaks from pressure-retaining components above the RPV head is performed each refueling outage.

COL Information Item 5.2-2 includes a commitment that the COL applicant's PSI program will include specific preservice examinations of the RV closure head equivalent to those outlined in AP1000 DCD Tier 2, Section 5.3.4.7. The BLN COL FSAR added supplemental information to the end of Section 5.2.4.3.1, describing the design of the RV closure head as it pertains to meeting the PSI requirements. The staff could not determine from the information provided, the extent of PSI examinations. Based on the information provided by the applicant, the staff requested additional information in RAI 5.2.4-1.

In response to RAI 5.2.4-1, the COL applicant stated that the PSI related to the RV closure head and penetrations as discussed in DCD Section 5.3.4.7 includes the regions identified in the first revised order, EA-03-009. The design specification includes a requirement for PSIs consistent with the first revised order EA-03-009. As part of the RPV and integrated head package design finalization, the RV closure head design and the design of components connected to, and in the region of, the RV closure head was reviewed.

The COL applicant determined that the required PSI/ISI examinations can be performed as required by ASME Section III and Section XI. Based on the information provided by the COL applicant, the staff concludes that the PSI and

ISI examinations will be accomplished in accordance with the first revised order, EA-03-009, ASME Sections III and XI, and are, thus, acceptable. As a result, RAI 5.2.4-1 is closed.

*In Revision 1 to the BLN COL FSAR, the COL applicant states that its augmented inspection for the reactor vessel top head uses N-729-1 as modified by the NRC in the proposed rulemaking dated April 5, 2007 (72 FR 16740). The COL applicant further noted in response to RAI 5.2.4-5, that the wording in the final rule will be adopted when the final rule is issued. The final rule to amend 10 CFR 50.55a was issued on September 10, 2008 (73 FR 52730) and includes a requirement to inspect the RPV head in accordance with N-729-1 as amended by 10 CFR 50.55a(g)(6)(ii)(D). The COL applicant's methodology to inspect the RPV head in accordance with N-729-1, as amended by 10 CFR 50.55a(g)(6)(ii)(D) meets the regulations, and is therefore acceptable. The staff will verify that the next update of the BLN COL FSAR (Section 5.2.4.1) adequately incorporates reference to the final rule. This is **Confirmatory Item 5.2-1**.*

The COL applicant added the following after the second sentence of the first paragraph of DCD Section 5.2.4.4:

Because 10 CFR 50.55a(g)(4) requires 120-month inspection intervals, inspection Program B of IWB-2400 must be chosen. The inspection interval is divided into three periods. Each period can be extended up to one year to enable an inspection to coincide with a plant outage. The adjustment of period end dates shall not alter the rules and requirements for scheduling inspection intervals.

RG 1.206 recommends that inspection intervals be described in comparison with the ASME Code. The information provided by the COL applicant indicated that Inspection Program B of IWB-2400 would be used over a 10-year interval. The three periods would be three, four, and three years to comprise the interval and extensions of a period may be performed up to a year to coincide with a plant outage. The staff finds that the supplemental information provided by the COL applicant meets the requirements of the ASME Code, Section XI and the guidelines of RG 1.206, and is, thus, acceptable.

The COL applicant proposed adding the following section after the last paragraph of DCD Section 5.2.4.7:

5.2.4.8 Relief Requests

The specific areas where the applicable ASME Code requirements cannot be met are identified after the initial examinations are performed. Should relief requests be required, they will be developed through the regulatory process and submitted to the NRC for approval in accordance with 10 CFR 50.55a(a)(3) or 10 CFR 50.55a(g)(5). The relief requests

include appropriate justifications and proposed alternative inspection methods.

In addition to the above, the COL applicant stated at the end of Section 5.2.4.3:

The RPV nozzle-to-shell welds are 100 percent accessible for preservice inspection but might have limited areas that may not be accessible from the outer surface for inservice examination techniques. If accessibility is limited, an inservice inspection program relief request is prepared and submitted for review approval by the NRC.

The information lead [sic] the staff to believe that areas where preservice and inservice examination requirements cannot be met or where compliance with the ASME Code is impractical will result in a need for the licensee to submit a request for relief from impractical Code requirements pursuant to 10 CFR 50.55a(g)(5)(iii). This is not consistent with the regulations in 10 CFR 50.55a(g)(3)(i) which state that Class 1 components must be designed and provided with access to enable the performance of preservice and inservice examinations in accordance with the requirements of the ASME Code, Section XI. Furthermore, the information is not consistent with AP1000 DCD Section 5.2.4.2, which states that the components will be designed to eliminate any hindrances to performing preservice or inservice examinations. The only time a relief request for a newly designed system or component should occur is when the updated edition and addenda to the ASME Code, Section XI is selected 1 year before the initial fuel load date for the first 120-month ISI interval and during subsequent ISI intervals when later edition and addenda of the ASME Code, Section XI that are incorporated by reference in 10 CFR 50.55a(b) change the examination requirements or coverage.

The staff considers accessibility to perform ISI on both sides of austenitic and dissimilar metal welds critical to making its safety determination in order to monitor structural integrity of these welds due to their history of cracking. Cracking of these welds due to primary water stress corrosion cracking (PWSCC) or intergranular stress corrosion cracking (IGSCC) is a well-known occurrence and a safety significant issue. Consequently, the NRC staff is not expecting to grant requests for relief from ISIs of these susceptible welds on the basis of design, geometry or materials of construction, since these factors can be rectified at the design stage before the plant is constructed. Based on the above discussion, the staff requested additional information from the COL applicant in RAIs 5.2.4-2 and 5.2.4-3 on accessibility for nondestructive examinations of the RV head and austenitic/dissimilar metal welds.

The COL applicant stated in its response to RAI 5.2.4-2 that as part of the design-for-inspectability process, the capability of examining the RV welds was assessed. The result was that with ISI tooling design and consideration of the AP1000 RV design, examinations from the inside of the AP1000 pressure vessel, including examinations of the reactor nozzle-to-shell welds, can be completed without a need for the applicant to request relief from the ASME Code, Section XI examination requirements. Based on the response provided by the applicant, the staff concludes that the reactor nozzle-to-shell welds are adequately designed to

enable the performance of inservice examinations in accordance with 10 CFR 50.55a(g)(3)(ii), and is, thus, acceptable. As a result, RAI 5.2.4-2 is closed.

The COL applicant stated in its response to RAI 5.2.4-3 that as part of the design-for-inspectability process, the ASME Class 1 portion of welds are designed for two-sided access for austenitic stainless steel piping welds wherever possible. Where two-sided access is not feasible, such as branch connection examination for circumferential degradation, the weld crowns are ground flush for one-sided examinations. The COL applicant stated that the examination procedures, equipment and personnel for one-sided examinations of austenitic/dissimilar metal welds would be qualified in accordance with Appendix VIII, as modified by 10 CFR 50.55a(b)(2)(xv)(A)(2) and 10 CFR 50.55a(b)(2)(xvi)(B). Based on the response provided by the applicant, in instances where one-sided examinations have to be performed for austenitic/dissimilar metal welds, the examinations will be conducted with ultrasonic systems that have demonstrated the capability to detect flaws, and is, thus, acceptable. As a result, RAI 5.2.4-3 is closed.

The COL applicant proposed adding the following section after the last paragraph of DCD Section 5.2.4.7:

5.2.4.9 Preservice Inspection of Class 1 Components

Preservice examinations required by design specification and preservice documentation are in accordance with ASME Section III, NB-5281. Volumetric and surface examinations are performed as specified in ASME Section III, NB-5282. Components described in ASME Section III, NB-5283 are exempt from preservice examination.

RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.4 recommends that a preservice examination program that meets the standards of NB-5280 of ASME Code, Section III, Division 1, be described because it is an operational program and that the program implementation milestones should be fully described. The information indicated that preservice examinations and documentation are in accordance with ASME Code, Section III, NB-5281, and that volumetric and surface examinations are performed as specified in ASME Code, Section III, NB-5282. The information stated that components described in ASME Code, Section III, NB-5283 are exempt from preservice examination. The staff found that the information did not fully describe the preservice examination program, in scope and a level of detail, necessary for the staff to reach a reasonable assurance finding. Therefore, the staff requested additional information in RAI 5.2.4-4.

In its response to RAI 5.2.4-4, the applicant noted that AP1000 DCD Section 5.2.4.5, which is incorporated by reference in the COL FSAR, indicates PSI will meet the requirements in the ASME Code, Section XI, paragraph IWB-2200 consistent with NUREG-0800 acceptance criteria. FSAR Section 5.2.4.1 provides a discussion of the scope of the PSI and ISI programs by system. FSAR Section 5.2.4.3.1 describes the methods for examination for

both PSI and ISI. FSAR Section 5.2.4.3.1 [sic] [5.2.4.3.2] describes the qualification requirements of personnel performing ultrasonic examinations. In addition, DCD Section 5.2.4.5, incorporated by reference in the COL FSAR, indicates that PSIs of Class 1 components will meet the requirements of IWB-2200, and as indicated in the response to RAI 5.2.4-1, RV head preservice examinations are described in DCD Section 5.3.4.7, and are also incorporated by reference in the COL FSAR. These FSAR sections, combined with the DCD sections, provide a full description of the PSI program consistent with by SECY-05-0197. The response provided by the applicant addressed PSI program areas involving qualification requirements, scope, exemptions and methods of examination. The areas addressed meet the guidelines of Section 5.2.4 of NUREG-0800, and are therefore acceptable. Based on the information provided by the applicant, the staff concludes that the PSI program is fully described. As a result, RAI 5.2.4-4 is closed.

The COL applicant proposed adding the following section after the last paragraph of DCD Section 5.2.4.7:

5.2.4.10 Program Implementation

The milestones for preservice and inservice inspection program implementation are identified in Table 13.4-201.

RG 1.206 states that the detailed procedures for performing the examinations may not be available at the time of the COL application, and the COL applicant should make a commitment to provide sufficient information to demonstrate that the procedures meet ASME Code standards. This information should be provided at a predetermined time agreed upon by both parties. In the BLN COL FSAR, Part 10, "License Conditions and ITAAC," proposed License Condition 6, "Operational Program Readiness," the COL applicant states:

The licensee shall submit to the appropriate Director of the NRC, a schedule, no later than 12 months after issuance of the COL, that supports planning for and conduct of the NRC inspection of the operational programs listed in the operation program FSAR Table 13.4-201. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operation programs in the FSAR table have been fully implemented or the plant has been placed in commercial service.

The staff reviewed the BLN COL FSAR Table 13.4-201, and notes that both the PSI and ISI programs are listed as operational programs required by NRC regulations. The staff concludes that the commitment under proposed License Condition 6 meets the guidelines in RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.4.1, and is, thus, acceptable.

The COL applicant proposed to add the following paragraphs at the end of Section 5.2.4.3 of the AP1000 DCD:

Ultrasonic Examination of the Reactor Vessel

Ultrasonic (UT) examination for the RPV is conducted in accordance with the ASME Code, Section XI. The RPV shell welds are designed for 100 percent accessibility for both preservice and inservice examinations. The RPV nozzle-to-shell welds are 100 percent accessible for preservice examinations but might have limited areas that may not be accessible from the outer surface for inservice examination techniques. If accessibility is limited, an inservice inspection program relief request is prepared and submitted for review approval by the NRC.

Inner radius examinations are performed from the outside of the nozzle using several compound angle transducer wedges to obtain complete coverage of the required examination volume. Alternatively, nozzle inner radius examinations may be performed using enhanced visual techniques as allowed by 10 CFR 50.55a(b)(2)(xxi).

The staff finds that the information provided by the COL applicant meets ASME Section XI and is in compliance with 10 CFR 50.55a. With respect to relief requests and accessibility, see the staff evaluation of BLN COL FSAR Section 5.4.2.8.

The COL applicant added the following after the first sentence of DCD Section 5.2.4.5:

Class 1 piping supports will be examined in accordance with ASME Section XI, IWF-2500.

Preservice examinations required by design specifications and preservice documentation are in accordance with ASME Section III, NB-5280. Components exempt from preservice examination are described in ASME Section III, NB-5283.

The staff finds that the information provided by the COL applicant meets ASME Section XI and is in compliance with 10 CFR 50.55a. With respect to preservice inspection, see the staff evaluation of BLN COL FSAR Section 5.4.2.9.

The COL applicant proposed adding the following after the last sentence of DCD Section 5.2.4.5:

The preservice examination is performed once in accordance with ASME Section XI, IWB-2200, on all of the items selected for inservice examination, with the exception of the examinations specifically excluded by ASME Section XI from preservice requirements, such ASME Section XI VT-3 examination of valve body and pump casing internal surfaces (B-L-2 and B-M-2 examination categories, respectively) and the visual VT-2 examinations for category B-P.

The staff finds that the information provided by the COL applicant meets ASME Section XI and is in compliance with 10 CFR 50.55a. With respect to preservice inspection, see the staff evaluation of BLN COL FSAR Section 5.4.2.9.

The COL applicant proposed adding the following after the last sentence of DCD Section 5.2.4.3:

Visual Examination

Visual examination methods VT-1, VT-2, and VT-3 are conducted in accordance with ASME Section XI, IWA-2210. In addition, VT-2 examinations will meet the requirements of IWA-5240.

Where direct VT-1 examinations are conducted without the use of mirrors or with other viewing aids, clearance is provided where feasible for the head and shoulders of a man within a working arm's length of the surface to be examined.

Surface Examination

Magnetic particle (MT) and liquid penetrant (PT) examination techniques are performed in accordance with ASME Section XI, IWA-2221 and IWA-2222, respectively. Direct examination access for magnetic particle [MT] and liquid penetrant [PT] examination is the same as that required for direct visual (VT-1) examination (See Visual Examination), except that the additional access is provided as necessary to enable physical contact with the item in order to perform the examination. Remote MT and PT generally are not appropriate as a standard examination process; however, boroscopes and mirrors can be used at close range to improve the angle of vision.

Alternative Examination Techniques

As provided by ASME Section XI, IWA-2240, alternative examination methods, a combination of methods, or newly developed techniques may be substituted for the methods specified for a given item in this section, provided that they are demonstrated to be equivalent or superior to the specified methods, techniques, etc., which may result in improvements in examination reliability and reductions in personnel exposure. In accordance with 10 CFR 50.55a(b)(2)(xix), IWA-2240 as written in the 1997 Addenda of ASME Section XI must be used when applying these provisions.

5.2.4.3.2 Qualification of Personnel and Examination Systems for Ultrasonic Examination

Personnel performing examinations shall be qualified in accordance with ASME Section XI, Appendix VII. Ultrasonic examination systems shall be qualified in accordance with industry

accepted programs for implementation of ASME Section XI, Appendix VIII. Qualification to ASME Section XI, Appendix VIII, in compliance with the provisions of 10 CFR 50.55a is considered as a satisfactory alternative to Regulatory Guide 1.150.

The COL applicant also proposed adding the following at the end of AP1000 DCD Section 5.2.4.6:

Components containing flaws or relevant conditions and accepted for continued service in accordance with the requirements of IWB-3132.4 or IWB-3142.4 are subjected to successive period examinations in accordance with the requirements of IWB-2420. Examinations that reveal flaws or relevant conditions exceeding Table IWB-3410-1 acceptance standards are extended to include additional examinations in accordance with the requirements of IWB-2430.

10 CFR 50.55a requires that nondestructive testing procedures, methods, and techniques meet ASME Code standards, including ASME Section XI, Appendix VIII requirements for ultrasonic examinations and methodology for evaluation of flaws. The COL applicant indicated that the qualification of ultrasonic testing personnel and procedures would be in accordance with ASME Section XI, Appendices VII and VIII, respectively. Based on the information provided by the COL applicant, the staff concludes that the COL applicant referenced the appropriate sections of the ASME Code to describe visual, surface volumetric and alternative examinations.

The staff concludes that the PSI and ISI programs will conform to the guidelines and requirements provided under NUREG-0800, Order EA-03-009, and the ASME Code. Therefore, the staff finds that the COL applicant's proposed resolution to the COL information items and its supplementary information are acceptable on the basis that it meets GDC 32 of Appendix A to 10 CFR Part 50, as it relates to periodic inspection and testing of the RCPB and 10 CFR 50.55a.

Resolution of Standard Content Confirmatory Item 5.2-1

Confirmatory Item 5.2-1 required the applicant to update its FSAR to incorporate reference to the final rule. The NRC staff verified that the VEGP COL FSAR was appropriately updated to incorporate reference to 10 CFR 50.55a(g)(6)(ii)(D). As a result, Confirmatory Item 5.2-1 is now resolved.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from the BLN SER, Section 5.2.4.4, that requires correction. The BLN SER quotes an applicant-proposed addition to its FSAR stating, in part:

Qualification to ASME Section XI, Appendix VIII, in compliance with the provisions of 10 CFR 50.55a is considered as a satisfactory alternative to Regulatory Guide 1.150.

That quote is from Revision 0 of the BLN FSAR. The correct quote from Revision 1 of the BLN FSAR is:

Qualification to ASME Section XI, Appendix VIII, is in compliance with the provisions of 10 CFR 50.55a.

This error does not impact the conclusions of the BLN or VEGP evaluations.

- **STD COL 5.3-7**

The NRC reviewed the applicant's proposal submitted in a letter dated August 27, 2010, to include additional information which addresses newly identified COL Information Item 5.3-7 in the AP1000 DCD. The applicant proposes to add the following item, STD COL 5.3-7, to the end of Section 5.2.4.1 of the VEGP COL FSAR:

The in-service inspection program is augmented to include the performance of a 100 percent volumetric examination of the weld build-up on the reactor vessel head for the instrumentation penetrations (Quickloc) conducted once during each 120-month inspection interval in accordance with the ASME Code, Section XI. The weld build-up acceptance standards are those provided in ASME Code, Section XI, IWB-3514. Personnel performing examinations and the ultrasonic examination systems are qualified in accordance with ASME Code, Section XI, Appendix VIII. Alternatively, an alternative inspection may be developed in conjunction with the voluntary consensus standards bodies (i.e., ASME) and submitted to the NRC for approval.

*The proposed information, which will augment the plant-specific ISI program to include a 100 percent volumetric examination of the weld build-up on the reactor vessel head for the instrumentation penetrations (Quickloc) conducted once during each 120-month inspection interval in accordance with the ASME Code, Section XI, is acceptable to the NRC staff because a volumetric examination ensures that potential degradation of the inside surface of the weld build-up during plant operation will be detected before it progresses through-wall. In addition, the NRC staff finds it acceptable that any alternative inspection will be submitted to the NRC for approval because it will ensure that (1) the NRC staff is informed of changes to inservice inspection requirements established in the reference design certification and (2) licensee submittals for NRC authorization to use alternatives to the regulations in 10 CFR 50.55a will be reviewed by the NRC staff pursuant to 10 CFR 50.55a(a)(3). The NRC staff finds that this adequately addresses COL Information Item 5.3-7 and will ensure the integrity of the reactor coolant pressure boundary weld during service. The staff notes that since this information augments the ISI program, this augmentation is part of License Condition (5-1) described in SER Section 5.2.4.5. The incorporation of the changes associated with proposed STD COL 5.3-7 into a future revision of the VEGP COL FSAR is **Confirmatory Item 5.2-2**.*

Resolution of Standard Content Confirmatory Item 5.2-2

Confirmatory Item 5.2-2 is an applicant commitment to revise its FSAR Table 1.8-202 and Section 5.2.4.1 to address COL Information Item STD COL 5.3-7. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 5.2-2 is now closed.

The following portion of this technical evaluation section is reproduced from Section 5.2.4.4 of the BLN SER:

License Condition

- *License Condition 6, regarding PSI/ISI program details*

The BLN COL FSAR addresses implementation milestones for the PSI/ISI programs in Part 10, or the application “Proposed License Conditions (Including ITAAC).” As discussed in Part 10, Section 6, the applicant proposes a license condition for BLN for all operational programs requiring that the licensee shall submit to the appropriate Director of the NRC, a schedule, no later than 12 months after issuance of the COL, that supports planning for and conduct of NRC inspections of operational programs. This proposed license condition is consistent with the policy established in SECY-05-0197, and is therefore acceptable.

For PSI/ISI programs, the ASME Code, Section XI provides requirements for program implementation in Paragraph IWB-2200(a) for PSI programs and Paragraph IWA-2430(b) for ISI programs. As such, a license condition for program implementation requirements is not necessary in the BLN COL FSAR. However, submittal of the schedule for the program development is necessary to plan for and conduct NRC inspections during construction. The staff finds that the license condition complies with RG 1.206, and is therefore acceptable.

Operational programs are specific programs required by regulations. The COL application should fully describe operational programs as defined in SECY-05-0197. In addition, COL applicants should provide schedules for implementation milestones of these operational programs. The PSI and ISI programs are identified as operational programs in RG 1.206. This section of the SER addresses the PSI and ISI operational programs for ASME Code Class 1, 2, and 3 components.

As discussed in RG 1.206, a fully described PSI and ISI program should address: (1) system boundary subject to inspection; (2) accessibility; (3) examination categories and methods; (4) inspection intervals; (5) evaluation of examination results; (6) system pressure tests; (7) Code exemptions; (8) relief requests; and (9) ASME Code cases. For BLN, the applicant incorporated by reference the PSI and ISI programs descriptions from AP1000 DCD Sections 5.2.4 and 6.6. The DCD descriptions as supplemented by the BLN COL FSAR address these nine items and therefore fully describe the PSI/ISI operational programs.

Supplemental Information

- STD SUP 5.2-2

The COL applicant added the following text at the end of DCD Section 5.2.4.1:

The inservice inspection program, along with the boric acid corrosion control procedures, provides guidance for inspecting the integrity of bolting and threaded fasteners.

NUREG-0800, Section 3.13, "Threaded Fasteners – ASME Code Class 1, 2, and 3," acceptance criteria states that the inspection provisions are acceptable if they conform to ASME Section XI. In addition, the staff position in Generic Letter 88-05, "Staff Position on Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," specifically recommends inspection in accordance with a boric acid corrosion control program. GL 88-05 also recommends that a boric acid control program contain four elements consisting of inspections, discovery of leak path, assessment, and follow-up inspections. In its proposed changes to Section 5.2.4.1, the COL applicant described the boric acid corrosion control procedures. The staff noted that the program description was in compliance with the four elements described under GL 88-05. Based on compliance with both ASME Section XI and staff guidance, the staff concludes that the proposed change under STD SUP 5.2-2 is acceptable.

Exception to RG 1.65

The Bellefonte FSAR Appendix 1AA provides conformance discussions for Regulatory Guides (RGs) applicable to the Bellefonte COLA. RG 1.65, "Materials and Inspections for Reactor Vessel Closure Studs," was not addressed in Revision 0 of the FSAR. In a response to the staff's RAI-1-5, the COL applicant added a conformance discussion for RG 1.65 which takes an exception to RG position C.4. The exception states:

ASME XI ISI criteria for reactor vessel closure stud examinations are applied in lieu of the ASME Section III, NB-2545 and NB-2546 surface examinations. The volumetric examination currently required by ASME Section XI provides improved (since 1973) detection of bolting degradation.

The staff reviewed ASME Section XI, Table IWB-2500-1 examination requirements for the reactor vessel closure studs, Examination Category B-G-1, Item No. B 6.20. The subject table lists volumetric examination of the studs when in place. The staff finds that the COL applicant's proposed exception to RG 1.65 is in compliance with the 1998 Edition of the ASME Code with the 2000 Addenda, and is therefore, acceptable. This portion of RAI 1-5 is closed.

5.2.4.5 Post Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant

did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license condition acceptable:

- License Condition (5-1) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the operational programs listed in FSAR Table 13.4-201, including the associated estimated date for initial loading of fuel. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until all the operational programs listed in FSAR Table 13.4-201 have been fully implemented.

5.2.4.6 Conclusion

The NRC staff reviewed the application and the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR meets the relevant acceptance criteria provided in Section 5.2.4 of NUREG-0800, the policy established in SECY-05-0197, the guidelines addressed in RG 1.206, and the requirements of GDC 32, staff positions, and 10 CFR 50.55a. The staff based its conclusion on the following:

- STD COL 5.2-2, relating to the PSI and ISI programs, conforms to the guidelines provided under NUREG-0800, Order EA-03-009, and the ASME Code. Therefore, the staff finds that the COL applicant's proposed resolution to the COL information items is acceptable on the basis that it meets GDC 32 of Appendix A to 10 CFR Part 50, as it relates to periodic inspection and testing of the RCPB and 10 CFR 50.55a.
- STD SUP 5.2-2, relating to guidance for inspecting the integrity of bolting and threaded fasteners, is acceptable because it meets the relevant guidelines in the ASME Code Section XI; NUREG-0800, Section 3.13; and GL 88-05.
- STD COL 5.3-7, relating to the ISI program augmentation to include 100 percent volumetric examination of the weld build-up on the reactor vessel head for the Quick lock penetrations ensures that the integrity of the reactor coolant pressure boundary weld will be maintained. Therefore, the staff finds that the applicant's proposed resolution as stated in their letter, dated April 20, 2011, and as incorporated into the Turkey Point Units 6 and 7 COL FSAR, to COL Information Item 5.3-7 is acceptable on the basis that it meets GDC 32 of Appendix A to 10 CFR Part 50, as it relates to periodic inspection to ensure the integrity of the RCPB is maintained.

5.2.5 Detection of Leakage through Reactor Coolant Pressure Boundary (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.5, “Reactor Coolant Pressure Boundary Leakage Detection”)

5.2.5.1 Introduction

The RCPB leakage detection systems are designed to detect and, to the extent practical, identify the source of reactor coolant leakage.

5.2.5.2 Summary of Application

Section 5.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 5.2.5 of Revision 19 of the AP1000 DCD. The ASE with confirmatory items for Section 5.2.5 was based on the VEGP COL FSAR, Revision 2 and DCD Revision 17. After submitting DCD Revision 17 to the NRC, Westinghouse added a new COL Information Item (COL 5.2-3). This COL information item has been incorporated into Revision 19 of the DCD; however, the discussion of the COL information item below did not change.

In addition, the applicant proposed the following:

AP1000 COL Information Item

- STD COL 5.2-3

In a letter, dated August 5, 2010, the applicant for the reference COL (VEGP Units 3 and 4) provided additional information in the markups of VEGP COL FSAR Table 1.8-202, Section 5.2.6.3, and Section 5.2.5.3.5 to add STD COL 5.2-3 to address COL Information Item 5.2-3. The VEGP applicant provided additional information regarding the response to unidentified RCS leakage inside containment to deal with the prolonged low-level RCS leakage issue. In its letter dated April 20, 2011, the Turkey Point Units 6 and 7 applicant endorsed that VEGP letter as standard thereby adopting STD COL 5.2-3 for the Turkey Point Units 6 and 7 COL application.

5.2.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

The regulatory basis for raising the issue of prolonged low-level RCS leakage is in 10 CFR 52.79(a)(37), as it relates to “information necessary to demonstrate how operating experience insights have been incorporated into the plant design.” The applicable regulatory requirements for acceptance of the resolution to COL Information Item 5.2-3 are established in GDC 30, “Quality of Reactor Coolant Pressure Boundary,” found in Appendix A to 10 CFR Part 50, as it relates to detecting RCPB leakage. The guidance for the staff’s review is in RG 1.45, Revision 1, “Guidance on Monitoring and Responding to Reactor Coolant System Leakage.”

5.2.5.4 Technical Evaluation

Section 5.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 5.2.5 of Revision 19 of the AP1000 DCD. The NRC

staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section, with one exception. That exception is discussed in the standard content material below. The results of the NRC staff's technical evaluation of the information incorporated by reference in the VEGP COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 5.2.5.4 of the VEGP SER:

The exception, which the NRC staff identified in its review, pertains to the operating experiences at Davis Besse concerning prolonged low-level RCS leakage. The operating experiences at Davis Besse (NRC Bulletin 2002-01) indicated that prolonged low-level unidentified reactor coolant leakage inside containment could cause corrosion and material degradation such that it could compromise the integrity of a system leading to the gross rupture of the RCPB. Therefore, pursuant to 10 CFR 52.79(a) 37, "information necessary to demonstrate how operating experience insights have been incorporated into the plant design," the NRC staff requested additional information from both the DCD applicant (Westinghouse) and the COL applicant (Southern Nuclear Operating Company [SNC]) to address the issue of prolonged low-level RCS leakage. The NRC staff requested the COL applicant in VEGP RAI 5.2.5-1 and RAI 5.2.5-2 to address this issue as it relates to operating procedures. The NRC staff also asked Westinghouse in RAI-DCP-CN45-SBP-01 to address this issue as it related to Design Change Package (DCP) Change Number 45 for AP1000 DCD. The procedures should specify operator actions in response to prolonged

low-level unidentified reactor coolant leakage conditions that exist above normal leakage rates and below the Technical Specification (TS) limits to provide operators sufficient time to take action before the TS limit is reached. The procedures would include identifying, monitoring, trending, and managing prolonged low-level leakage.

In a letter, dated July 29, 2010, Westinghouse responded to RAI-DCP-CN45-SBP-01 by stating that Revision 18 of the AP1000 DCD would add new COL Information Item 5.2-3, and described the COL item in Section 5.2.6.3 of the AP1000 DCD to address the prolonged low-level RCS leakage. The staff's review of DCP 45 is in Chapter 23 of a supplement to NUREG-1793.

AP1000 COL Information Item

- STD COL 5.2-3

In a letter, dated August 5, 2010, SNC responded to VEGP RAI 5.2.5-1 and RAI 5.2.5-2 and provided additional information in the markups of VEGP COL FSAR Table 1.8-202, Section 5.2.6.3 and Section 5.2.5.3.5 to add STD COL 5.2-3 to address the COL information item. VEGP COL FSAR Section 5.2.6.3 states that the COL item is addressed in Section 5.2.5.3.5. The proposed Section 5.2.5.3.5 reads as follows:

5.2.5.3.5 Response to Reactor Coolant System Leakage

Operating procedures specify operator actions in response to prolonged low level unidentified reactor coolant leakage conditions that exist above normal leakage rates and below the Technical Specification (TS) limits to provide operators sufficient time to take action before the TS limit is reached. The procedures include identifying, monitoring, trending, and addressing prolonged low level leakage. The procedures for effective management of leakage, including low level leakage, are developed including the following operations related activities:

- *Trends in the unidentified leakage rates are periodically analyzed. When the leakage rate increases noticeably from the baseline leakage rate, the safety significance of the leak is evaluated. The rate of increase in the leakage is determined to verify that plant actions can be taken before the plant exceeds TS limits.*
- *Procedures are established for responding to leakage. These procedures address the following considerations to prevent adverse safety consequences from the leakage:*
 - *Plant procedures specify operator actions in response to leakage rates less than the limits set forth in the Technical Specifications. The procedures include actions for*

confirming the existence of a leak, identifying its source, increasing the frequency of monitoring, verifying the leakage rate (through a water inventory balance), responding to trends in the leakage rate, performing a walkdown outside containment, planning a containment entry, adjusting alarm setpoints, limiting the amount of time that operation is permitted when the sources of the leakage are unknown, and determining the safety significance of the leakage.

- Plant procedures specify the amount of time the leakage detection and monitoring instruments (other than those required by Technical Specifications) may be out of service to effectively monitor the leakage rate during plant operation (i.e., hot shutdown, hot standby, startup, transients, and power operation).*
- The output and alarms from leakage monitoring systems are provided in the main control room. Procedures are readily available to the operators for converting the instrument output to a common leakage rate. (Alternatively, these procedures may be part of a computer program so that the operators have a real-time indication of the leakage rate as determined from the output of these monitors.) Periodic calibration and testing of leakage monitoring systems are conducted. The alarm(s), and associated setpoint(s), provide operators an early warning signal so that they can take corrective actions, as discussed above, i.e., before the plant exceeds TS limits.*
- During maintenance and refueling outages, actions are taken to identify the source of any unidentified leakage that was detected during plant operation. In addition, corrective action is taken to eliminate the condition resulting in the leakage.*

The procedures described above will be available prior to fuel load.

The staff found in the RAI response that the COL applicant committed to develop operating procedures prior to fuel load, and the procedures include identifying, monitoring, trending, and managing the prolonged low-level RCS leakage. Further, the procedures include converting the instrument output to a common leakage rate and the alarm setpoints for early warning for the operators. Therefore, the staff determined that the RAI response addressed all the questions being asked in VEGP RAI 5.2.5-1 and RAI 5.2.5-2 regarding the procedures for the prolonged low-level RCS leakage. Further, the staff reviewed the description of the procedures in the proposed VEGP COL FSAR Section 5.2.5.3.5 and determined that it is consistent with the guidance in RG 1.45, Revision 1, pertaining to managing the prolonged low-level RCS leakage. Therefore, the staff finds that the RAI response is acceptable and concludes that GDC 30 is met based on the applicant's conformance to RG 1.45.

*The incorporation of the changes associated with proposed STD COL 5.2-3 into a future revision of the VEGP COL FSAR is **Confirmatory Item 5.2-3**.*

Resolution of Standard Content Confirmatory Item 5.2-3

Confirmatory Item 5.2-3 is an applicant commitment to revise its FSAR Table 1.8-202 and Section 5.2.5.3.5 to address COL Information Item STD COL 5.2-3. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 5.2-3 is now closed.

5.2.5.5 Post Combined License Activities

For the reasons discussed in the technical evaluation above, the following FSAR commitment is identified as the responsibility of the licensee:

- Prior to initial fuel load, the operating procedures, which include identifying, monitoring, trending, and managing the prolonged low-level RCS leakage, will be developed.

5.2.5.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 30. The staff based its conclusion on the following:

- STD COL 5.2-3 meets the relevant guidance in RG 1.45, Revision 1 with respect to operating procedures for the prolonged low-level RCS leakage detection. Conformance with these guidelines provides an acceptable basis for satisfying the requirements of GDC 30.

5.3 Reactor Vessel

5.3.1 Reactor Vessel Design

The RV, as an integral part of the RCPB, will be designed, fabricated, erected and tested to quality standards commensurate with the requirements set forth in 10 CFR Part 50, 10 CFR 50.55a, and GDC 1.

Section 5.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 5.3.1 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of

the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

5.3.2 Reactor Vessel Materials

5.3.2.1 Introduction

This section addresses material specifications, special processes used for manufacture and fabrication of components, special methods for nondestructive examination, special controls and special processes used for ferritic steels and austenitic stainless steels, fracture toughness, material surveillance (which will be referred to as the reactor vessel surveillance capsule program (RVSP) to avoid confusion with material surveillance programs that exist in other parts of a nuclear power plant), and RV fasteners. RCS components are addressed separately in Section 5.2.3 of this SER.

5.3.2.2 Summary of Application

Section 5.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 5.3 of the AP1000 DCD, Revision 19. Section 5.3 of the DCD includes Section 5.3.2.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 5.3.2.6, the applicant provided the following:

AP1000 COL Information Item

- STD COL 5.3-2

The applicant provided additional information in STD COL 5.3-2 to address COL Information Item 5.3-2 and COL Action Item 5.3.2.4-1 identified in Appendix F of NUREG-1793. The additional information discusses the RV material surveillance program.

License Conditions

- Part 10, License Condition 3.J.1, Reactor Vessel Material Surveillance

The COL Holder shall implement this operational program prior to initial criticality.

- Part 10, License Condition 6

The COL applicant shall provide an operational program schedule to support NRC inspections.

5.3.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the RV materials are given in Section 5.3.1 of NUREG-0800.

The applicable regulatory requirements and guidance for acceptance of the COL information item are as follows:

1. GDC 32 found in Appendix A to 10 CFR Part 50, as it relates to the design of the components of the RCPB to allow for an RVSP;
2. 10 CFR 50.60, "Acceptance criteria for fracture prevention measures for light water nuclear power reactors for normal operation," as it relates to compliance with the material surveillance program requirements of 10 CFR Part 50, Appendix G, "Fracture Toughness Requirements";
3. 10 CFR Part 50, Appendix G, as it relates to materials testing and acceptance criteria for fracture toughness;
4. 10 CFR 50.55a, as it relates to the requirements for testing and inspecting Code Class 1 components of the RCPB as specified in Section XI of the ASME Code;
5. SECY-05-0197, as it relates to fully describing an operational program; and
6. 10 CFR Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," as it relates to RVSP requirements.

5.3.2.4 Technical Evaluation

The NRC staff reviewed Section 5.3.2 of the Turkey Point Units 6 and 7 COL FSAR and the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the relevant information related to the RV materials. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 5.3.2.4 of the VEGP SER:

The NRC staff reviewed conformance of Section 5.3 of the BLN COL FSAR to the guidance in RG 1.206, Section C.III.1, Chapter 5, C.I.5.3.1, "Reactor Vessel Materials." The RG 1.206 sections related to Material Specifications, Special Processes Used for Manufacturing and Fabrication, Special Methods for Nondestructive Examination, Special Controls for Ferritic and Austenitic Stainless Steels, Fracture Toughness and Reactor Vessel Fasteners all state that the COL applicants that reference a certified design do not need to include additional information. These topic areas were previously addressed in the AP1000 DCD and evaluated in NUREG-1793, Section 5.3.2. No COL action items were identified in these topic areas. The remaining topic area, RVSP, has a COL action item that must be addressed by a COL applicant.

Appendix G to 10 CFR Part 50 specifies the fracture toughness requirements for ferritic materials of the pressure-retaining components of the RCPB. The RV beltline materials must have a Charpy Upper Shelf Energy (USE) in the transverse direction for base material and along the weld for weld material, of no less than 75 ft-lbs initially, and must maintain Charpy USE throughout the life of the vessel of no less than 50 ft-lbs. The fracture toughness tests required by ASME Code and by Appendix G to 10 CFR Part 50 provide reasonable assurance that adequate safety margins against the possibility of non-ductile behavior or rapidly propagating fracture can be established for all pressure-retaining components of the reactor coolant boundary. Appendix H to 10 CFR Part 50 presents the requirements for an RVSP to monitor the changes in the fracture toughness properties of the materials in the RV beltline region resulting from exposure to neutron irradiation and the thermal environment.

Operational programs are specific programs required by regulations. The COL application should fully describe operational programs as defined in SECY-05-0197. In addition, COL applicants should provide schedules for implementation milestones for these operational programs. The RVSP is identified as an operational program in RG 1.206. This section of the SER addresses the adequacy of the RVSP description as it relates to meeting the requirements of Appendix H to 10 CFR Part 50.

RG 1.206, Section C.III.1, Chapter 5, C.I.5.3.1.6, "Material Surveillance," provides guidelines for fully describing a material surveillance program. Specifically, this section states that the RVSP and its implementation must be described in sufficient detail to ensure that the program meets the requirements of Appendix H to 10 CFR Part 50.

In addition, the application should describe the method for calculating neutron fluence for the RV beltline and the surveillance capsules. RG 1.206 lists some of the topics that should be addressed in the description of the RVSP:

- *Basis for the selection of material in the program.*
- *Number and type of specimens in each capsule.*
- *Number of capsules and proposed withdrawal schedule in compliance with the edition of American Society for Testing Materials (ASTM) E-185 Annual Book of ASTM Standards, Part 30, referenced in Appendix H to 10 CFR Part 50.*
- *Neutron flux and fluence calculations for vessel wall and surveillance specimens.*
- *Projected radiation embrittlement on vessel wall.*
- *Location of capsules, method of attachment, and provisions to ensure that capsules are retained in position throughout the vessel lifetime.*

Section 5.3.2.6 of the AP1000 DCD addresses the description of the RVSP. The DCD states that the base metal specimens are oriented both parallel and normal to the principal rolling direction of the limiting base material located in the core region of the RV. In accordance with the current DCD, there are no welds in the beltline region. Therefore, the applicant has addressed the entire beltline region in their RVSP. The DCD also addresses the number and type of specimens by meeting the ASTM E-185 requirements and describing 8 capsules, along with their proposed withdrawal schedule, that contain 72 tensile specimens, 480 Charpy V-notch specimens, and 48 compact tension specimens.

The DCD states that the neutron fluence assessments of the AP1000 RV are conducted in accordance with the guidelines that are specified in RG 1.190. The vessel fracture toughness data are given in Table 5.3-3 of the AP1000 DCD, Revision 17. The end-of-life nil-ductility reference transition temperature (RT_{NDT}) and upper shelf energy projections were estimated using RG 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," for the end-of-life neutron fluence at the $\frac{1}{4}$ -thickness and inner-diameter RV locations.

Finally, BLN has addressed the location of the capsules, their method of attachment, and the provisions to ensure that capsules are retained in position throughout the vessel lifetime by referencing AP1000 DCD, Section 5.3.2.6, which states that the capsules are located in guide baskets welded to the outside of the core barrel and positioned directly opposite the center portion of the core. DCD Figure 5.3-4 shows the azimuthal locations of the capsules around the RV.

Information about the implementation of the BLN RVSP is provided in Part 10 of the BLN COL. Section 3 proposes the following license condition:

J. Initial Criticality – The licensee shall implement each operational program identified below prior to initial criticality.

J.1 – Reactor Vessel Material Surveillance

In addition, Section 6, “Operational Program Readiness,” states that the licensee will submit to the NRC a schedule, no later than 12 months after issuance of the COL, that supports the planning for and conduct of NRC inspections of operational programs, including RVSP.

AP1000 COL Information Item

- STD COL 5.3-2

The NRC staff reviewed STD COL 5.3-2 related to the COL information item included under Section 5.3.6.2 of the BLN COL FSAR, which states:

The Combined License applicant will address a Reactor Vessel Reactor Material Surveillance program based on Section 5.3.2.6.

The commitment was also captured as COL Action Item 5.3.2.4-1 in Appendix F of the NRC staff’s FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will provide its Reactor Vessel Material Surveillance program.

RG 1.206 clarifies the intent of the COL information item. RG 1.206 Section C.III.1, Chapter 5, C.I.5.3.1.6, provides guidelines for addressing an RVSP. The applicant should fully describe the program and identify the implementation milestones. As previously discussed, the applicant references Section 5.3.2 of the AP1000 DCD, which addresses the topics listed in RG 1.206 that should be included in the description of the RVSP. The applicant provided License Condition 3.J.1 to implement the RVSP and License Condition 6 to support scheduling of NRC staff inspections, consistent with SECY-05-0197.

In addition, the applicant provided supplemental information in its FSAR to address COL Information Item 5.3-2 regarding the RVSP. The applicant added text between the first and second paragraphs of Section 5.3.2.6 to the AP1000 DCD, Revision 17 to reference the milestone of initial criticality for RVSP implementation. The applicant also added a new Section 5.3.2.6.3, “Report of Test Results,” to the AP1000 DCD, Revision 17 to outline the reporting criteria associated with the RVSP. When each capsule is withdrawn, a summary technical report of the data required by ASTM E-185-82 and the results of the fracture toughness tests conducted on the beltline materials in the irradiated and unirradiated conditions will be submitted to the NRC within one year of the date of capsule withdrawal.

In its review of the FSAR, the staff noted that the information provided in Section 5.3.2 of the DCD, in addition to the RVSP program implementation

information provided in Part 10 of the BLN COL application, meets the minimum guidelines in RG 1.206 for a description of the RVSP and its implementation. However, the staff determined that more information was needed to fully describe the RVSP in accordance with SECY-05-0197 to reach a resolution of the COL information item. A description of the process for preparing the capsule specimens must confirm that the materials selected for the capsules are samples of the same materials used in the fabrication of the RV. Therefore, the staff must receive this information before the vessel is fabricated. Other information, such as the capsule environment and the material types of the capsule specimens, can be provided after the RV has been procured. Thus, the staff requested additional information in RAI 5.3.1-1 to complete its review.

First, the staff requested additional information about the RVSP description. The purpose of the RVSP, as described in ASTM E-185, is to monitor radiation effects on RV materials under operating conditions. Section C.III.1, Chapter 5, C.I.5.3.1.6 of RG 1.206 states, "because the material surveillance program is an operational program, as discussed in SECY-05-0197, the applicant must describe the program and its implementation in sufficient scope and level of detail for the staff to make a reasonable assurance finding on its acceptability." The NRC staff recognizes that certain information about the program, such as actual material properties of the RV, is not currently known, but in order to complete its review of the adequacy of the RVSP, the staff requested that the applicant describe its process for preparing the capsule specimens. This description should confirm that the materials selected for the capsules are samples of those materials most likely to limit the operation of the RV.

Secondly, the staff requested additional information about the RVSP. The COL applicant must fully describe its RVSP to ensure that it meets ASTM E-185 and other requirements listed in 10 CFR Part 50, Appendix H. Specifically, the NRC staff requested detailed information on the RVSP associated with the AP1000 design, including, but not limited to, the capsule environment and the material types of the capsule specimens.

In RAI 5.3.1-1, the staff requested that the applicant describe the process for preparing the capsule specimens and to include detailed information on the capsule environment and material types of the capsule specimens. The applicant responded with a detailed description of the capsule specimen preparation process to be incorporated into the next revision of the BLN COL FSAR. The applicant also stated that the capsule environment and the material types of the capsule specimens are addressed in AP1000 DCD, Section 5.3.2.6 which is incorporated by reference.

The staff finds that the response to RAI 5.3.1-1 is acceptable, provided that the BLN COL FSAR is revised as stated by the applicant, and that the applicant confirms the staff's understanding that the surveillance capsules are backfilled with inert gas. Therefore, the staff identifies **Confirmatory Item 5.3-1** to confirm that the BLN COL FSAR is revised as stated, and to confirm the staff's understanding that the surveillance capsules are backfilled with inert gas.

Generic Letter 92-01

Generic Letter (GL) 92-01, "Reactor Vessel Structural Integrity," addressed NRC concerns regarding compliance with the requirements of Appendices G and H to 10 CFR Part 50, which address fracture toughness requirements and RVSP requirements, respectively. Specifically, NRC had concerns about Charpy USE predictions for end-of-life for the limiting beltline weld and the plate or forging, RVs constructed to an ASME Code earlier than the Summer 1972 Addenda of the 1971 Edition, and use of RG 1.99, Revision 2, to estimate the embrittlement of the materials in the RV beltline. These topics have been addressed in the AP1000 DCD, Revision 17, which is incorporated by reference in the BLN COL FSAR.

The AP1000 DCD, Revision 17, also states that end-of-life RT_{NDT} and USE projections were estimated using RG 1.99. The construction of the RV to an ASME Code earlier than the Summer 1972 Addenda of the 1971 Edition is not a concern for new reactors, including BLN. In the BLN COL FSAR Section 5.3.2.6.3, the applicant provides additional information, which states that when each capsule is withdrawn, a summary technical report of the data required by ASTM E-185-82 and the results of the fracture toughness tests conducted on the beltline materials in the irradiated and unirradiated conditions will be submitted to the NRC within one year of the date of capsule withdrawal.

On the basis of the information discussed above, the NRC staff concludes that the applicant has adequately addressed the issues in GL 92-01.

Resolution of Standard Content Confirmatory Item 5.3-1

The NRC staff verified that the VEGP FSAR was updated to include a detailed description of the capsule specimen preparation process and to document that the surveillance capsules are backfilled with inert gas. As a result, Confirmatory Item 5.3-1 is resolved.

5.3.2.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff finds the following license conditions related to the RV Material Surveillance program acceptable:

- License Condition (5-2) – The licensee shall implement the RV Material Surveillance program prior to initial criticality.
- License Condition (5-3) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO a schedule that supports planning for and conduct of NRC inspections of the RV Material Surveillance program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the RV Material Surveillance program has been fully implemented.

5.3.2.6 Conclusion

The NRC staff reviewed the application and the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the relevant regulatory guidance provided in Section 5.3.1 of NUREG-0800 and RG 1.206, the policy established in SECY-05-0197, and the requirements of Appendices G and H to 10 CFR Part 50. The staff based its conclusion on the following:

- STD COL 5.3-2, relating to the RV material surveillance program, is acceptable because the program is consistent with the relevant guidelines addressed in Section 5.3.1 of NUREG-0800 and in RG 1.206, Section C.III.1, Chapter 5, C.I.5.3.1. Conformance with these guidelines provides an acceptable basis for satisfying, in part, the requirements of Appendices G and H to 10 CFR Part 50.

5.3.3 Pressure Temperature Limits (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.3.2, "Pressure-Temperature Limits, Pressurized Thermal Shock, and Charpy Upper-Shelf Energy Data and Analyses")

5.3.3.1 Introduction

Pressure Temperature (P-T) limits are required as a means of protecting the RV during startup and shut down to minimize the possibility of fast fracture. The methods outlined in Appendix G of Section XI of the ASME Code are employed in the analysis of protection against nonductile failure. Beltline material properties degrade with radiation exposure and this degradation is measured in terms of the adjusted reference temperature, which includes a reference nil-ductility temperature shift, initial RT_{NDT} , and margin.

5.3.3.2 Summary of Application

Section 5.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 5.3 of the AP1000 DCD, Revision 19. Section 5.3 of the AP1000 DCD includes Section 5.3.3.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 5.3.6.1, the applicant provided the following:

AP1000 COL Information Item

- STD COL 5.3-1

The applicant provided additional information in STD COL 5.3-1 to address COL Information Item 5.3-1 of the AP1000 DCD and COL Action Item 5.2.2.2-1 in NUREG-1793. The information relates to plant-specific P-T curves.

Supplemental Information

- STD SUP 5.3-1

The applicant provided supplemental information related to development of operating procedures as required by Technical Specification (TS) 5.6.6.

License Condition

- Part 10, License Condition 2, Item 5.3-1

The license condition related to COL Information Item 5.3-1 sets the implementation milestone for development of plant-specific P-T curves.

5.3.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for P-T limits are given in Section 5.3.2 of NUREG-0800.

5.3.3.4 Technical Evaluation

The NRC staff reviewed Section 5.3.3 of the Turkey Point Units 6 and 7 COL FSAR and the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to P-T limits. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 5.3.3.4 of the VEGP SER:

AP1000 COL Information Item

- STD COL 5.3-1

The NRC staff reviewed STD COL 5.3-1 related to COL Information Item 5.3-1 included under Section 5.3.6.1 of the COL FSAR. The applicant proposes to replace the text in AP1000 DCD Section 5.3.6.1 with the following:

The pressure-temperature curves shown in DCD Figures 5.3-2 and 5.3-3 are generic curves for AP1000 reactor vessel design, and they are limiting curves based on copper and nickel material composition. Plant-specific curves will be developed based on material composition of copper and nickel. Use of plant-specific curves will be addressed during procurement and fabrication of the reactor vessel. As noted in the bases to Technical Specification 3.4.14, use of plant-specific curves requires evaluation of the LTOP system. This includes an evaluation of the setpoint pressure for the RNS relief valve to determine if the setpoint pressure needs to be changed based on plant-specific pressure-temperature curves. The development of the plant-specific curves and evaluation of the setpoint pressure are required prior to fuel load.

In addition, in Section 5.3.3.2 of NUREG-1793, the staff identified related COL Action Item 5.2.2.2-1 in which the COL applicant will address the use of plant-specific curves during procurement of the RV.

The COL applicant stated that the P-T limits shown in DCD Figures 5.3-2 and 5.3-3 are generic curves for AP1000 RV design, and they are limiting curves based on copper and nickel material composition. The applicant committed to provide P-T limits using the plant-specific material composition after the combined license is issued and when the RV is procured. The applicant also stated that the development of the plant-specific P-T limits is required prior to fuel load. The staff found that a more specific implementation milestone for completing the plant-specific P-T limits was needed. Thus, the following additional information was requested.

In RAI 5.3.2-1, the staff noted Westinghouse's plan to: a) submit a generic PTLR [pressure temperature limits report] for the AP1000 RV using the bounding properties for NRC staff review and approval; and b) update the AP1000 DCD to include the use of the generic AP1000 PTLR by all COL applicants. The NRC

staff requested that Part 10 of the BLN COL, proposed license conditions, Section 2, COL holder items, and COL Information Item 5.3-1 be revised by adding the following statement:

The COL Holder shall update the P/T limits using the PTLR methodologies approved in the AP1000 DCD, and using the plant-specific material properties. The COL Holder will inform the NRC of the updated P/T limits.

The approach described above is consistent with that used for all operating reactors where licensees using PTLRs (reference: GL 96-03) inform the NRC staff of any subsequent change in P-T limits with no NRC approval necessary when there are no changes to the approved PTLR methodology. Subsequently, in a letter dated May 30, 2008, Westinghouse submitted a generic PTLR for AP1000 plants. The NRC staff reviewed the PTLR and approved its use for AP1000 RVs in a safety evaluation (ML083470258) dated December 30, 2008.

In response to RAI 5.3.2-1, the applicant proposed to modify the COL application Part 10, Proposed Combined License Conditions, Section 2, COL Holder Item 5.3-1. Accordingly, the modified license condition states, "The COL Holder shall update the P/T limits using the PTLR methodologies approved in the AP1000 DCD using plant-specific material properties or confirm that the reactor vessel material properties meet the specifications and use the Westinghouse generic PTLR curves."

The staff finds that the applicant's modification to the proposed license condition is adequate and the staff verified that the revision to Part 10 of the application incorporates the above. As a result, RAI 5.3.2-1 is closed.

Supplemental Information

- STD SUP 5.3-1

Development of plant operating procedures as required by TS 5.6.6 ensures that P-T limits are adhered to during normal and abnormal operating conditions and system tests and is therefore, acceptable.

5.3.3.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff finds the following license condition related to P-T limits acceptable:

- License Condition (5-4) – Before initial fuel load, the licensee shall update the P-T limits using the pressure-temperature limits report (PTLR) methodologies approved in the AP1000 DCD using the plant-specific material properties or confirm that the RV material properties meet the specifications and use the Westinghouse generic PTLR curves.

5.3.3.6 Conclusion

The NRC staff reviewed the application and the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the regulatory basis addressed in NUREG-1793. Specifically, the relevant regulatory basis includes Section 5.3.2 of NUREG-0800; GL 96-03, "Relocation of the Pressure Temperature Limit Curves and Low Temperature Overpressure Protection System Limits"; and Appendix G to 10 CFR Part 50. The staff based its conclusion on the following:

- STD COL 5.3-1, relating to plant-specific P-T curves, is acceptable because the program is consistent with the guidelines addressed in Section 5.3.2 of NUREG-0800. Conformance with these guidelines provides an acceptable basis for satisfying in part, the requirements of Appendix G to 10 CFR Part 50.
- STD SUP 5.3-1, relating to development of operating procedures, is acceptable because it ensures that P-T limits are adhered to during normal and abnormal operating conditions and system tests.

5.3.4 Reactor Vessel Integrity (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.3.3 "Reactor Vessel Integrity")

5.3.4.1 Introduction

Section 5.3.4 of the AP1000 DCD describes the RV integrity. The RV is the RCPB used to support and enclose the reactor core. It provides flow direction with the reactor internals through the core and maintains a volume of coolant around the core. The vessel is fabricated by welding together the lower head, the transition ring, the lower shell, and the upper shell. The upper shell contains the penetrations from the inlet and outlet nozzles and direct vessel injection nozzles.

As part of the RV integrity, this section also addresses the pressurized thermal shock (PTS) for the PWR RV. PTS events are potential transients in a PWR RV that can cause severe overcooling of the vessel wall, followed by repressurization. The thermal stresses, caused when the inside surface of the RV cools rapidly, combined with high-pressure stresses, will increase the potential for fracture if a flaw is present in a low-toughness material. The materials most susceptible to PTS are the materials in the RV beltline where neutron radiation gradually embrittles the material over time.

5.3.4.2 Summary of Application

Section 5.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 5.3 of the AP1000 DCD, Revision 19. Section 5.3 of the DCD includes Section 5.3.4.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 5.3.6, the applicant provided the following:

AP1000 COL Information Item

- STD COL 5.3-4

The applicant provided additional information in STD COL 5.3-4 to address COL Information Item 5.3-4 and related COL Action Item 5.3.4.3-1. The applicant proposed to verify the plant-specific beltline material properties consistent with the requirements in DCD Section 5.3.3.1 and DCD Tables 5.3-1 and 5.3-3 prior to fuel load. The applicant also proposed in STD COL 5.3-4 to perform a PTS evaluation based on as procured RV material data and the projected neutron fluences for the plant design objective of 60 years.

License Condition

- Part 10, License Condition 2, Item 5.3-4

The milestone for the implementation of the proposed actions related to RV material properties will be prior to initial fuel load.

5.3.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the RV integrity are given in Section 5.3.3 of NUREG-0800.

In addressing the COL information item, PWRs are required, in part, to have the pressurized thermal shock reference temperature (RT_{PTS}), evaluated for the end-of-life fluence for each of the RV beltline materials in accordance with requirements of 10 CFR 50.61, "Fracture toughness requirements for protection against pressurized thermal shock events."

5.3.4.4 Technical Evaluation

The NRC staff reviewed Section 5.3.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to RV integrity. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP

Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 5.3.4.3 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 5.3-4*

The NRC staff reviewed STD COL 5.3-4 related to COL Information Item 5.3-4 and related COL Action Item 5.3.4.3-1. The applicant proposed to verify the plant-specific beltline material properties consistent with the requirements in DCD Section 5.3.3.1 and DCD Tables 5.3-1 and 5.3-3 prior to fuel load. The applicant also proposed in STD COL 5.3-4 to perform a PTS evaluation based on as procured RV material data and the projected neutron fluences for the plant design objective of 60 years.

License Condition

- *Part 10, License Condition 2, Item 5.3-4*

In response to the COL information item, the applicant proposed a license condition (Part 10, Item 2, COL Information Item 5.3-4) that a plant-specific PTS evaluation would be performed by the COL holder using as-procured RV material data and submitted for NRC review prior to initial fuel loading.

The as-procured RV material properties will be available to the COL holder after the acceptance of the RV. In order to provide sufficient time for NRC review of the PTS evaluation using the as-procured RV material properties as required by 10 CFR 50.61, the staff requested a more specific and timely milestone for submitting the PTS evaluation to the NRC be established. Therefore, the staff requested that the proposed license condition for COL Information Item 5.3-4 be

revised to state that, within a reasonable period of time following acceptance of the RV, the COL holder submit to the NRC staff the plant-specific PTS evaluation, for example, one year after the acceptance of the RV. This was identified in RAI 5.3.3-1.

In response to RAI 5.3.3-1, the applicant proposed that the licensee shall submit to the appropriate Director of the NRC, a schedule, no later than 12 months after the issuance of the COL, that supports planning for and conduct of NRC inspections of operational programs listed in the operational program FSAR Table 13.4-201. This schedule shall include a submittal schedule for the RV pressurized thermal shock evaluation at least 18 months prior to initial fuel load. Accordingly, the applicant will revise the COL application, Part 10, proposed License Condition 6.

The staff finds that Revision 1 of the application incorporates the proposed change to the proposed License Condition 6, and therefore the applicant's response to COL Information Item 5.3-4 meets the implementation requirements of 10 CFR 50.61, and is therefore acceptable. As a result, RAI 5.3.3-1 is closed.

5.3.4.5 Post Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license condition acceptable:

- License Condition (5-5) – Before initial fuel load, the licensee shall verify that plant-specific belt line material properties are consistent with the properties given in AP1000 DCD Rev. 19, Section 5.3.3.1 and Tables 5.3-1 and 5.3-3. The verification must include a pressurized thermal shock (PTS) evaluation based on as-procured reactor vessel material data and the projected neutron fluence for the plant design objective. Submit this PTS evaluation report to the Director of NRO, or the Director's designee, in writing, at least 18 months before the latest date set forth in the schedule for completing the inspections, tests, and analyses in the ITAAC submitted in accordance with 10 CFR 52.99(a).

5.3.4.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR meets the relevant acceptance criteria provided in Section 5.3.3 of NUREG-0800, and the requirements of Appendix B to 10 CFR Part 50 and 10 CFR 50.61. The staff based its conclusion on the following:

- STD COL 5.3-4, relating to plant-specific beltline material properties, is acceptable because the applicant's proposed resolution meets the relevant acceptance criteria addressed in Section 5.3.3 of NUREG-0800 and thus provides an acceptable basis for satisfying, in part, the requirements of Appendix B to 10 CFR Part 50 and 10 CFR 50.61.

5.3.5 Reactor Vessel Insulation

RV insulation is provided to minimize heat losses from the primary system. Nonsafety-related reflective insulation similar to that in use in current PWRs is utilized.

Section 5.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 5.3.5 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

5.4 Component and Subsystem Design (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.4, "Reactor Coolant System Component and Subsystem Design")

5.4.1 Introduction

This section pertains to the design of various components and subsystems within, or associated with, the RCS. Principal components or subsystems include the following:

- Reactor coolant pumps (RCPs)
- Steam generators (SGs), including materials and ISI
- RCS piping and valves
- Main steam line flow restriction
- Pressurizer and pressurizer relief discharge
- Automatic depressurization system valves
- Normal Residual Heat Removal System (RNS)
- RCS pressure relief devices
- Component supports
- RCS high point vents
- Core makeup tank
- Passive residual heat removal heat exchanger

The majority of the design-related information in the DCD is incorporated by reference in the COL application. Regarding the SGs, a program is developed by the COL applicant to ensure tube structural and leakage integrity will be maintained at a level comparable to that of the original design requirements. An effective program depends on both the program and the design features of the SGs.

The RNS is a nonsafety-related system. Since the RNS is not required to operate to mitigate design-basis events, it is not credited in the Chapter 15 safety analysis. However, the RNS is considered an important system because the RNS provides residual heat removal capability to several reactor systems. These major RNS nonsafety-related functions include the RCS

shutdown heat removal, RCS LTOP, RCS and refueling cavity purification during refueling operations, in-containment refueling water storage tank (IRWST) cooling, low pressure makeup to the RCS, and post-accident heat removal recovery. In addition, the RNS provides safety-related functions that include containment isolation of the RNS lines penetrating the containment, preservation of the RCS pressure boundary, and long term post-accident makeup to the containment inventory.

5.4.2 Summary of Application

Section 5.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 5.4 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 5.4, the applicant provided the following:

Departures

- PTN DEP 3.2-1 and PTN DEP 6.3-1

The applicant provided additional information in Turkey Point Units 6 and 7 COL FSAR Section 5.4 about PTN DEP 3.2-1 and PTN DEP 6.3-1 related to design modifications to the condensate return portion of the Passive Core Cooling System and quantifying the duration that the passive residual heat removal heat exchanger (PRHR-HX) can maintain safe shutdown conditions, respectively. This information, as well as related PTN DEP 3.2-1 and PTN DEP 6.3-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.1 of this SER.

- PTN DEP 2.0-3

In the Turkey Point Units 6 and 7 COL application, Part 7, and Turkey Point Units 6 and 7 COL FSAR Section 5.4.7.1, the applicant proposed a site-specific ambient design wet bulb air temperature of 87.4°Fahrenheit (F) as the basis for the component cooling water temperature to the RNS heat exchangers. That temperature exceeds the site parameter value for maximum safety wet bulb (noncoincident) air temperature specified in the DCD.

In Turkey Point Units 6 and 7 COL FSAR Section 5.4.7.1, the applicant replaced the second bulleted item regarding RNS cooling of the IRWST in DCD Section 5.4.7.1.2.3 with the following information:

The component cooling water system supply temperature to the normal residual heat removal system heat exchangers is based on an ambient design wet bulb temperature of no greater than 87.4°F (100 year return estimate of 2-hour duration). The 87.4°F value is assumed for normal conditions and transients that start at normal conditions.

The exemption request related to the AP1000 DCD maximum safety wet bulb (noncoincident) air temperature involves an exemption to 10 CFR Part 52, "Licenses, certifications, and approvals for nuclear power plants," Appendix D, "Design Certification Rule for the AP1000 Design," Section IV.A.2.d. Specifically, the Turkey Point Units 6 and 7 applicant requested an exemption from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1 for the maximum safety wet bulb (noncoincident) air temperature. The exemption request is evaluated in Section 9.2.2 of this SER.

AP1000 COL Information Item

- STD COL 5.4-1

The applicant provided additional information in STD COL 5.4-1 to address COL Information Item 5.4-1 as described in Section 5.4.15 of the AP1000 DCD. The information in STD COL 5.4-1 provides the SG program description, references the applicable ASME BPV Code, Section XI requirements and industry guidelines, and refers to the TS for the program requirements.

The detailed inspection and reporting requirements are provided in Turkey Point Units 6 and 7 COL FSAR, Part 4, "Technical Specifications," Sections 1.1 ("Definitions"), 3.4.7 ("RCS Operational Leakage"), 3.4.18 ("Steam Generator (SG) Tube Integrity"), 5.5.4 ("Steam Generator (SG) Program"), 5.6.8 ("Steam Generator Tube Inspection Report"), and in the associated bases sections of the TS.

5.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the component and subsystem design are given in Section 5.4.2 of NUREG-0800.

The applicable regulatory requirements for acceptance of the COL information item are 10 CFR 50.55a, as it relates to periodic inspection and testing of the RCPB as detailed in Section XI of the ASME Code, and 10 CFR Part 50, Appendix A, GDC 32, as it relates to the accessibility of SG tubes for periodic testing. In addition, 10 CFR 50.55a(b)(2)(iii) states that if the TS include SG surveillance requirements that are different than those in Article IWB-2000 of the ASME Code, Section XI, then the SG tube inspection requirements are governed by the TS.

The regulatory basis for evaluating the RNS is documented in Section 5.4.7 of NUREG-1793 and its supplements. While the RNS is a nonsafety-related system, it is considered to be important to safety because it provides the first line of defense during an accident to prevent unnecessary actuation of the passive core cooling systems. Regulatory oversight of the active nonsafety systems in passive plant designs is subject to a staff evaluation of the regulatory treatment of nonsafety systems (RTNSS). Chapter 22 of NUREG-1793 provides a detailed evaluation of the RTNSS issue in accordance with the Commission's policy for passive reactor plant designs. Nonsafety-related systems that provide defense-in-depth capabilities for the AP1000 design includes the RNS. For this defense-in-depth system to operate, the associated systems and structures to support these functions must also be operable, including nonsafety-related component cooling water system and the service water system. The staff's evaluation of the changes that are proposed focused primarily on confirming that the changes will not adversely affect safety-related SSCs or those that satisfy the criteria for RTNSS. Therefore, the proposed changes were evaluated using the guidance provided by NUREG-0800, Section 5.4.7, as it pertains to these considerations. Acceptability was determined based on conformance with the existing AP1000 licensing basis, the guidance specified by NUREG-0800, Section 5.4.7 (10 CFR Part 50, Appendix A, GDC 34, "Residual

Heat Removal,” as it relates to requirements for a RNS system), and the Commission’s policy with respect to RTNSS as discussed in SECY-94-084, “Policy and Technical Issues Associated With the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs,” and SECY-95-132, “Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs (SECY-94-084).”

5.4.4 Technical Evaluation

The NRC staff reviewed Section 5.4 of the Turkey Point Units 6 and 7 COL FSAR and the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff’s review confirmed that the information in the application and incorporated by reference addresses the required information relating to RCS component and subsystem design. The results of the NRC staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAls.
- The staff confirmed that all responses to RAls identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 5.4.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 5.4-1*

In AP1000 DCD Section 5.4.15, Westinghouse identified COL Information Item 5.4-1 for the COL applicant to address the SG tube integrity with an SG Tube Surveillance Program and address the need to develop a program for

periodic monitoring of degradation of steam generator internals. Similarly, in NUREG-1793, Section 5.4.2.2.2, the staff identified COL Action Item 5.4.2.2.3-1 and noted that an SG tube surveillance program is necessary to address the concerns raised in GL 97-06, "Degradation of Steam Generator Internals."

In Revision 17 of the AP1000 DCD, Westinghouse proposed changes to the AP1000 generic TS related to adopting TS Task Force Traveler (TSTF) 449, Revision 4, "Steam Generator Tube Integrity." TSTF 449 is incorporated in the current Westinghouse Owners Group Standard Technical Specifications (STS), NUREG-1431, Revision 3.1, December 1, 2005. The TS and bases sections listed above for SG tube integrity in the BLN SER are identical to those in Revision 17 of the AP1000 DCD.

With respect to the information provided in STD COL 5.4-1, the staff reviewed the description in Chapter 5 of the FSAR using the guidelines in RG 1.206, Section C.III.1, Chapter 5, C.I.5.4.2.2; Section 5.4.2.2 of NUREG-0800; and the TS proposed in the AP1000 DCD (which are based on NUREG-1431, Revision 3.1 and are the STS for Westinghouse operating plants). The staff confirmed tube inspection will meet the requirements of Section XI of the ASME Code, and that the applicant referenced an acceptable method (RG 1.121) for determining the tube repair criteria for maintaining structural integrity. The staff determined the TS proposed for BLN Nuclear Plant, Units 3 and 4 are consistent with the approved STS and the leakage limits and SG tube integrity requirements are appropriate as they apply to BLN, and are therefore acceptable. In addition, the applicant took exception to the guidance contained in Regulatory Guide 1.83, Revision 1 and stated that the applicant's program will be implemented according to Nuclear Energy Institute (NEI) 97-06 ("Steam Generator Program Guidelines") and EPRI SG guidelines, which are referenced in the STS and, thus, provide acceptable methods for implementing ASME Code requirements. With respect to tube integrity considerations, the Model Delta-125 SG planned for the BLN units closely resembles the Model Delta-75 installed as replacement SGs at some operating plants.

According to Section 5.4.2.2 of NUREG-0800, because the SG program is part of the ISI requirements, it is an operational program that should be fully described, with implementation milestones listed in the appropriate table in Chapter 13 of the FSAR. In response to RAI 5.4.2.2-1 from the staff, in a letter dated June 5, 2008, the applicant proposed revising FSAR Chapter 13, Table 13.4-201 to add Section 5.4.2.5 ("Steam Generator Inservice Inspection") as one of the FSAR sections addressed by the operational program titled "Inservice Inspection Program." Similarly, in response to RAI 5.4.2.2-2, the applicant proposed revising Table 13.4-201 to add Section 5.4.2.5 as one of the FSAR sections addressed by the operational program titled "Preservice Inspection Program." These proposed revisions are acceptable because they make the SG tube ISI part of the operational programs and ensure PSIs will be performed, consistent with the acceptance criteria in Section 5.4.2.2 of NUREG-0800 and RG 1.206. The staff verified that Revision 1 of Table 13.4-201 adequately incorporates the above. As a result, RAI 5.4.2.2-1 and RAI 5.4.2.2-2 are closed.

Tier 1 and Tier 2 Departure

- PTN DEP 2.0-3

PTN DEP 2.0-3 proposes to increase the maximum safety wet bulb (noncoincident) air temperature from 86.1°F to 87.4°F. This change impacts the performance of various structures, systems, and components (SSCs) described in the AP1000 DCD. The staff's evaluation of this proposed change is also discussed in Sections 2.0, 2.3.1, 6.2, 6.4, 9.1.3, 9.2.2, and 9.2.7 of this SER.

The maximum safety noncoincident wet bulb temperature, referred to as the ambient design wet bulb temperature in Section 5.4.7, for the Turkey Point Units 6 and 7 site was recently reevaluated by Westinghouse and increased from the standard AP1000 DCD value to reflect expected site maximum temperature conditions. This change requires that an evaluation be performed for the various plant performance requirements and commitments affected by this parameter to confirm that the performance of the plant's nonsafety-related systems remains within the bounds described in the AP1000 DCD with respect to the ambient design wet bulb temperature. As described in AP1000 DCD Section 5.4.7.1.2.3, RNS cooling of the IRWST to maintain the IRWST temperature to within the temperature criteria during normal and abnormal conditions is dependent upon the RNS heat removal capacity to the component cooling water system (CCS). Since the CCS ambient design wet bulb temperature increased from the standard AP1000 DCD value used in nonsafety-related system analysis, the departure was reflected in a revision to the Turkey Point Units 6 and 7 COL application. For that reason, the staff considered the RNS as one of the systems that could be impacted by this change in that the ability to transfer heat to the CCS would be reduced.

The staff evaluated this departure and determined that additional information was needed to support this change regarding the RNS heat removal capability of cooling the IRWST. Therefore, the staff generated RAI 5403, Question 09.02.02-1 and RAI 5492, Question 09.02.02-2 to acquire additional information related to this change in the maximum safety design wet bulb temperature and the overall effects to various systems including the RNS heat transfer interface with CCS. These RAIs are discussed in chapter 9 of this SER.

In support of PTN DEP 2.0-3, maximum safety wet bulb (noncoincident) air temperature, the Turkey Point applicant provided a similar level of detail in revision 5 of Turkey Point Units 6 and 7 COL FSAR section 5.4.7.1 as did a previous AP1000 applicant addressing the same maximum safety wet bulb departure. The component cooling water system supply temperature to the normal residual heat removal system heat exchangers is based on an ambient design wet bulb temperature of no greater than 87.4°F (100 year return estimate of 2-hour duration). The 87.4°F value is assumed for normal conditions and transients that start at normal conditions.

The steaming prevention function is evaluated assuming the ambient wet bulb temperature is at the maximum safety value for the site. During plant operation, maximum IRWST temperature is reduced below 120°F whenever necessary by circulating IRWST water through one of the RNS heat exchangers, and removing the heat through the CCS and service water system SWS.

Since the RNS heat exchangers are not being used to remove decay heat with the plant at power, at least one is available for IRWST heat removal. Only one train of CCS (pump and heat exchanger) and one train of SWS (pump, strainer, and cooling tower cell) are normally in operation with the plant at power. There is sufficient margin in CCS pump flow capacity and

motor size, and in CCS heat exchanger overall heat transfer coefficient and effective heat transfer area (UA), to valve in one of the RNS heat exchangers and remove IRWST heat by directing CCS flow through the heat exchanger and transferring the excess heat to the SWS cooling tower. CCS temperature rises slightly above the normal full power CCS temperature during this evolution, but does not approach the maximum allowable value of 100°F.

Prevention of IRWST steaming following high-pressure heat removal operations with the Passive Residual Heat Removal (PRHR) heat exchanger is accomplished in the same manner, by lining up both RNS heat exchangers to the CCS and the IRWST. CCS is delivered to the RNS heat exchangers at a temperature consistent with the maximum safety ambient wet bulb temperature and the CCS and SWS heat duty and flow rates. Cooling is assumed to begin two hours after reactor trip, with decay heat appropriate for that time after the event. Calculations performed to determine the maximum IRWST temperature achieved following a high pressure heat removal event using the PRHR heat exchanger assumed CCS temperature is determined by use of a maximum safety ambient wet bulb temperature value of 87.4°F. The maximum predicted IRWST liquid temperature is 201°F. Therefore, it can be concluded that IRWST cooling performance (prevention of steaming) is acceptable.

The staff finds that during normal power plant operations, the maximum IRWST temperature is kept below 120 °F by removing the IRWST heat through one train of the RNS, CCS and SWS. This heat removal process can be performed since the RNS, CCS, and SWS are not being used to remove decay heat with the plant at power.

During high pressure operation events, the calculation of the CCS temperature is determined by the use of the maximum safety ambient wet bulb temperature and not the maximum normal wet bulb temperature. As related to RNS and its ability to support defense in depth, RTNSS, and cooling of the IRWST, the RNS performance is dependent upon the maximum normal wet bulb temperature. Therefore, the staff finds the applicant's response acceptable with regard to maintaining the IRWST temperature below 120 °F during normal operation and prevention of IRWST steaming during high-pressure heat removal operational events.

In summary, the staff concludes that the proposed change in the maximum safety noncoincident wet bulb temperature does not impact the RNS capacity to perform its functions as described in DCD Section 5.4.7.

5.4.5 Post Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license condition acceptable:

- License Condition (5-6) – No later than 12 months after the issuance of the COL, the licensee shall submit to the Director of NRO a schedule that supports planning for and conduct of NRC inspections of the PSI/ISI program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the PSI/ISI program has been fully implemented.

5.4.6 Conclusion

The NRC staff reviewed the application and the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the relevant regulatory requirements provided in Appendix A to 10 CFR Part 50, GDC 32 and 10 CFR 50.55a, and the regulatory guidance addressed in RG 1.206 and RG 1.121. The staff based its conclusion on the following:

- PTN DEP 3.2-1 and PTN DEP 6.3-1, related to design modifications to the condensate return portion of the Passive Core Cooling System and quantifying the duration that the passive residual heat removal heat exchanger can maintain safe shutdown conditions, respectively, are reviewed and found acceptable by the staff in Section 21.1 of this SER.
- PTN DEP 2.0-3 relating to IRWST temperature control with RNS cooling capacity is acceptable because the RNS cooling performance is determined based on the maximum safety wet bulb temperature and the cooling capability of the CCS to the RNS heat exchangers was evaluated and determined to provide sufficient cooling at the proposed ambient design wet bulb temperature. Therefore, the staff concludes that the Turkey Point Units 6 and 7 RNS, as described in Section 5.4.7 of the FSAR, is acceptable because GDC 34, as related to the requirements of a residual heat removal system, was not impacted by the proposed revision.
- STD COL 5.4-1 relating to the SG Program, is acceptable because it meets the relevant guidelines of RG 1.206, Section C.III.1, Chapter 5, C.I.5.4.2.2 and RG 1.121. Conformance with these guidelines provides an acceptable basis for satisfying, in part, the requirements of Appendix A to 10 CFR Part 50, GDC 32, and 10 CFR 50.55a including the specific modification provided in 10 CFR 50.55a(b)(2)(iii).

6.0 ENGINEERED SAFETY FEATURES

6.0 Engineered Safety Features

Engineered safety features (ESF) protect the public in the event of an accidental release of radioactive fission products from the reactor coolant system (RCS). The ESF function is to localize, control, mitigate, and terminate such accidents, and to maintain radiation exposure levels to the public below applicable limits and guidelines.

Section 6.0 of the Turkey Point Units 6 and 7 Combined License (COL) Final Safety Analysis Report (FSAR), Revision 8, incorporates by reference, with no departures or supplements, Section 6.0, "Engineered Safety Features," of Revision 19 of the AP1000 design control document (DCD). The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that there is no outstanding issue related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

6.1 Engineered Safety Features Materials

This section provides the evaluation of the materials used in the fabrication of ESF components and of the provisions to avoid material interactions that could impair the operation of the ESF. The design information in Turkey Point Units 6 and 7 COL FSAR, Section 6.1 is divided into two sections, Section 6.1.1, "Metallic Materials"; and Section 6.1.2, "Organic Materials." The staff's evaluation of these two FSAR sections is provided below.

6.1.1 Metallic Materials

6.1.1.1 *Introduction*

In this section, the staff reviews metallic materials used in ESF components to ensure that they are compatible with one another and with ESF fluids. The compatibility of fluids in ESF systems should ensure that there is a low probability of causing abnormal leakage, of rapidly propagating failure, and of gross rupture of reactor coolant pressure boundary components. Metallic materials and fluids should also be compatible with the auxiliary systems that directly support ESF systems.

6.1.1.2 *Summary of Application*

Section 6.1 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 6.1 of the AP1000 DCD, Revision 19. Section 6.1 of the AP1000 DCD includes Section 6.1.1.

¹ See Section 1.2.2 for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a design certification (DC). This footnote will be referenced in several places throughout the chapter of this Safety Evaluation.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 6.1.1, the applicant provided the following:

AP1000 COL Information Item

- STD COL 6.1-1

The applicant provided additional information in Standard (STD) COL 6.1-1 to resolve COL Information Item 6.1-1. STD COL 6.1-1 describes quality assurance measures for special processes in fabricating austenitic stainless steels. In a letter dated April 7, 2010, the DCD applicant, Westinghouse, proposed to revise Appendix 1A of the AP1000 DCD to remove stated exceptions to conformance with Regulatory Guide (RG) 1.44, "Control of the Use of Sensitized Steel," Revision 0. The staff's review of STD COL 6.1-1 includes the information in the Westinghouse letter. The COL applicant did not submit additional information in response to this proposed DCD revision.

6.1.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the metallic materials are given in Section 6.1.1, Revision 2, of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)."

The regulatory basis of the COL information item is Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," as it relates to the quality assurance requirements for the design, fabrication, and construction of safety-related structures, systems, and components (SSCs). Guidance for the COL information item is described in RG 1.31, "Control of Ferrite Content in Stainless Steel Weld Metal," Revision 3, and RG 1.44.

6.1.1.4 Technical Evaluation

The staff reviewed Section 6.1.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to metallic materials. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy the NRC used to perform one technical review for each standard issue outside the scope of the DC and used this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL

application (Vogtle Electric Generating Plant [VEGP], Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Plant (BLN) Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 6.1.1.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 6.1-1*

The NRC staff reviewed STD COL 6.1-1 related to COL Information Item 6.1-1 included under Section 6.1.1.2 of the BLN COL FSAR, which addresses the COL information item identified in AP1000 DCD Section 6.1.3.1 related to the fabrication requirements for austenitic stainless steel.

The COL information item identified in AP1000 DCD Section 6.1.3.1 states:

The Combined License applicants referencing the AP1000 will address review of vendor fabrication and welding procedures or other quality assurance methods to judge conformance of austenitic stainless steels with Regulatory Guides 1.31 and 1.44.

This commitment was also documented as COL Action Item 6.1.1-1 in the NRC staff's FSR for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will review vendor fabrication and welding procedures or other quality assurance methods to ensure that austenitic stainless steels meet the guidelines of RGs 1.31 and 1.44.

The COL information in the FSAR that is to be added to AP1000 DCD Section 6.1.1.2 states:

In accordance with Appendix B to 10 CFR Part 50, the quality assurance program establishes measures to provide control of special processes. One element of control is the review and acceptance of vendor procedures that pertain to the fabrication, welding, and other quality assurance methods for safety related component [sic] to determine both code and regulatory conformance. Included in this review and acceptance process are those vendor procedures necessary to provide conformance with the requirements of Regulatory Guides 1.31 and 1.44 for engineered safety features components as discussed in DCD Section 6.1 and reactor coolant system components as discussed in DCD Section 5.2.3.

The staff finds the COL information provided by the applicant meets the quality assurance guidelines for austenitic stainless steels specified in RG 1.31 (weld metal ferrite content) and RG 1.44 (the use of sensitized stainless steel). The staff's conclusion is based on the applicant's statement affirming that its Appendix B quality assurance program will address the concerns of these RGs. It is also based on Appendix 1A of the AP1000 DCD, as modified by a letter dated April 7, 2010, from the AP1000 applicant. The modified DCD appendix will be incorporated by reference in a future version of the BLN COL FSAR and will indicate full conformance with these RGs. In addition, the discussions in AP1000 DCD Sections 6.1.1.2 and 5.2.3.4 provide details about how conformance will be accomplished.

6.1.1.5 Post Combined License Activities

There are no post-COL activities related to this section.

6.1.1.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of 10 CFR Part 50, Appendix B, and the guidance provided in RGs 1.31 and 1.44. The staff based its conclusion on the following:

- STD COL 6.1-1 is acceptable because the Appendix B quality assurance program proposed by the applicant provides adequate controls over vendor fabrication and welding procedures to ensure that austenitic stainless steels meet the guidelines of RGs 1.31 and 1.44.

6.1.2 Organic Materials

6.1.2.1 Introduction

Protective coatings are applied for corrosion prevention to the interior and exterior surfaces of the containment vessel, radiologically controlled areas outside containment, and the remainder of the plant. The considerations for protective coatings differ for these four areas and the coatings selection process accounts for these differing considerations. The AP1000 design considers the function of the coatings, their potential failure modes, and their requirements for maintenance.

Other organic materials that may be present in the containment are associated with the specific type of equipment and the supplier selected to provide it. Materials are evaluated for potential interaction with the ESF to provide confidence that the performance of the ESF is not unacceptably affected.

6.1.2.2 Summary of Application

Section 6.1 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 6.1 of the AP1000 DCD, Revision 19. Section 6.1 of the AP1000 DCD includes Section 6.1.2.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 6.1.2, the applicant provided the following:

AP1000 COL Information Item

- STD COL 6.1-2

The applicant provided additional information in STD COL 6.1-2 to resolve COL Information Item 6.1-2. STD COL 6.1-2 discusses a program to control procurement, application, inspection, and monitoring of Service Level I and Service Level III coatings. In a letter dated March 31, 2010, the DCD applicant, Westinghouse, proposed revisions to COL Information Item 6.1-2 in Section 6.1.3.2 of the AP1000 DCD to address Service Level II coatings. Turkey Point Units 6 and 7 COL FSAR, Revision 7 revises the FSAR to address the updated COL Information Item 6.1-2.

6.1.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for protective coatings are given in Section 6.1.2, Revision 3, of NUREG-0800.

The applicable regulatory basis for the resolution of the COL information item is 10 CFR Part 50, Appendix B, as it relates to the quality assurance requirements for the design, fabrication, and construction of safety-related SSCs. Guidance for the resolution of the COL

information item is described in RG 1.54, "Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants," Revision 1.

6.1.2.4 Technical Evaluation

The staff reviewed Section 6.1.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to protective coatings and other organic materials inside containment. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application. Although the staff concluded that the evaluation performed for the standard content is directly applicable to the Turkey Point Units 6 and 7 COL application, there is a difference in how the VEGP applicant addressed STD COL 6.1-2 and how the BLN applicant addressed this review item. This difference, which is based on a change proposed in the AP1000 DCD, is evaluated by the staff below, following the standard content material for STD COL 6.1-2. The two confirmatory items in the standard content material retain the number assigned in the VEGP SER, and are also addressed in the standard content material.

The following portion of this technical evaluation section is reproduced from Section 6.1.2.4 of the VEGP SER:

AP1000 COL Information Item

- STD COL 6.1-2

The NRC staff reviewed STD COL 6.1-2 included under Section 6.1.2.1.6 of the BLN COL FSAR related to COL Information Item 6.1-2. COL Information Item 6.1-2 states:

The Combined License applicants referencing the AP1000 will provide a program to control procurement, application, and monitoring of Service Level I and Service Level III coatings. The program for the control of the use of these coatings will be consistent with [DCD] subsection 6.1.2.1.6.

This commitment was also captured as COL Action Item 6.1.2-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will prepare a program to control procurement, application, and monitoring of Service Level I and Service Level III coatings.

The added information in the BLN COL FSAR replaces the third paragraph under the section titled, "Service Level I and Service Level III Coatings," in AP1000 DCD Section 6.1.2.1.6 with the following:

During the design and construction phase the coatings program associated with selection, procurement and application of safety related coatings is performed to applicable quality standards. Regulatory Guide 1.54 and [American Society for Testing and Materials] ASTM D5144 form the basis for the coating program. During the operations phase, the coatings program is administratively controlled in accordance with the quality assurance program implemented to satisfy 10 CFR Part 50, Appendix B, and 10 CFR Part 52 requirements. The coatings program provides direction for the procurement, application, and monitoring of safety related coating systems. Coating system monitoring requirements for the containment coating systems are based on ASTM D5163, "Establishing Procedures to Monitor the Performance of Coating Service Level I Coating Systems in an Operating Nuclear Power Plant," and ASTM D7167, "Establishing Procedures to Monitor the Performance of Safety-Related Coating Service Level III Lining Systems in an Operating Nuclear Power Plant." Any anomalies identified during coating monitoring are resolved in accordance with applicable quality assurance requirements.

The AP1000 DCD, which the applicant incorporates by reference, includes the following description of the quality assurance program:

The quality assurance program for Service Level I and Service Level III coatings conforms to the requirements of [American

Society of Mechanical Engineers] ASME NQA-1-1983 as endorsed in Regulatory Guide 1.28 ["Quality Assurance Program Criteria (Design and Construction)"]. Safety related coatings meet the pertinent provisions of 10 CFR Part 50 Appendix B to 10 CFR Part 50. The service level classification of coatings is consistent with the positions given in Revision 1 of Regulatory Guide 1.54, "Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants." Service Level I and Service Level III coatings used in the AP1000 are tested for radiation tolerance and for performance under design basis accident conditions. Where decontaminability is desired, the coatings are evaluated for decontaminability. The coating applicator submits and follows acceptable procedures to control surface preparation, application of coatings and inspection of coatings. The painters are qualified and certified, and the inspectors are qualified and certified.

The inorganic zinc coating used on the inside surface (Service Level I coatings) and outside surface (Service Level III coatings) of the containment shell is inspected using a non-destructive dry film thickness test and a MEK rub test. These inspections are performed after the initial application and after recoating. Long term surveillance of the coating is provided by visual inspections performed during refueling outages. Other inspections are not required.

Section 6.1.2 of NUREG-0800 references RG 1.54 as providing an acceptable method of complying with the quality assurance requirements in regard to protective coatings applied to ferritic steels, aluminum, stainless steel, zinc-coated (galvanized) steel, concrete, or masonry surfaces of nuclear facilities. RG 1.54 lists a number of ASTM standards that provide guidance on practices and programs that are acceptable to the NRC staff for the selection, application, qualification, inspection, and maintenance of protective coatings applied in nuclear power plants. Section 6.1.2 of NUREG-0800 also states that a coating system to be applied inside the containment vessel is acceptable if it meets the regulatory positions of RG 1.54 and the standards of ASTM D5144-00 and ASTM D3911-03. By contrast, the AP1000 DCD references RG 1.54, but only with respect to classification of coating service level as I, II, or III.

The AP1000 DCD text to be replaced with the COL information item stated that the procurement, application, and monitoring of Service Level I and Service Level III coatings are controlled by a program prepared by the COL applicant. The information provided clarified that the applicant's coatings program, with respect to procurement, application, inspection, and monitoring, will be consistent with the recommendations of RG 1.54, which is endorsed in Section 6.1.2 of NUREG-0800 as an acceptable method of meeting the quality assurance requirements of 10 CFR Part 50, Appendix B for safety-related and nonsafety-related coatings. However, the information provided by the applicant to resolve the COL information item merely states that the protective coatings program complies with RG 1.54, when, in fact, the program was not yet

developed. Therefore, the COL applicant had not provided a coatings program as committed in COL Information Item 6.1-2.

To resolve this issue, in request for additional information (RAI) 6.1.2-1, the staff requested the following information:

1. The applicant should describe the standards to be applied to maintenance of the protective coatings in the program description. The description of the proposed coatings program should also describe the standards to be applied to selection and qualification of coatings, if the applicant intends to use coatings systems different than those described in the AP1000 DCD, either during construction or after plant operation commences.
2. The program description should describe the administrative controls that will be applied to the coatings program.
3. Provide the schedule for full implementation of the coatings program with respect to major milestones in the construction of the plant; for example, prior to application of coatings, prior to preparation of surfaces to be coated, or prior to procurement of coatings materials.

In a letter dated May 23, 2008, the applicant provided the following response:

- Item 1) The coating program will be based on Revision 1 of RG 1.54 and the referenced ASTM standards in ASTM D5144. Also, the guidance provided in ASTM D5163, "Establishing Procedures to Monitor the Performance of Coating Service Level I Coating Systems in an Operating Nuclear Power Plant," and in ASTM D7167, "Establishing Procedures to Monitor the Performance of Coating Service Level III Coating Systems in an Operating Nuclear Power Plant," will be used to specify monitoring (maintenance) requirements for the safety-related coating systems pertaining to containment. While a change in coating systems (from those described in the AP1000 DCD) is not anticipated, if a different safety-related coating system is needed, it will be evaluated in accordance with the appropriate change process, i.e., 10 CFR 50.59 or 10 CFR Part 52, Appendix D, Section VIII.
- Item 2) FSAR Section 6.1.3.2, Coating Program, will be revised to indicate compliance with 10 CFR Part 50, Appendix B, and 10 CFR Part 52 requirements implemented by the quality assurance program for the plant (see FSAR Chapter 17 and Part 11 of the COL application) for design, construction, and operation of the units.
- Item 3) During the design and construction phase, the requirements for the coating program will be contained in certified drawings and/or standards and specifications controlling the coating processes of the designer (Westinghouse); these design documents will be available prior to the

procurement and application of the coating material by the constructor of the plant. Prior to initial fuel loading, a consolidated plant coating program will be in place to address procurement, application, and monitoring (maintenance) of those coating system(s) for the life of the plant.

The staff finds the applicant's response to Item 1 acceptable because, pursuant to RG 1.54, ASTM D5163 provides guidelines that are acceptable to the NRC staff for establishing an in-service coatings monitoring program for Service Level I coating systems in operating nuclear power plants and for Service Level II and other areas outside containment (as applicable). The applicant also specified ASTM D7167 for monitoring (maintenance) requirements for the safety-related coating systems pertaining to containment. Although ASTM D7167 is not listed in RG 1.54 or ASTM D5144, the staff finds it an appropriate standard because it addresses maintenance of Service Level III coatings. Additionally, ASTM D7167 references ASTM D4541 and ASTM D3359, which are listed in RG 1.54 as acceptable standards for maintenance of protective coatings in nuclear power plants. Further, if a change in any of the originally specified coatings systems is necessary, the applicant will use an appropriate process, either the 10 CFR 50.59 or 10 CFR Part 52, Appendix D, Section VIII process, to evaluate the change. The staff finds the application of these regulations an appropriate alternative to control of the selection of coatings by the consolidated coatings program.

The BLN application references later versions of ASTM D5144 and ASTM D5163 than those referenced in RG 1.54, Revision 1. The use of the 2008 revision of ASTM D5144 is acceptable because it provides detailed requirements through reference to other coatings standards applicable to BLN. In this regard, it is not changed with respect to the 2000 revision referenced in the RG 1.54, Revision 1. Similarly, the 2005 revision of ASTM D5163 is referenced in the BLN COL application rather than the 1996 revision referenced in RG 1.54, Revision 1. The staff finds this acceptable because the NRC staff has accepted the 2005 revision of ASTM D5163 as the basis for the Aging Management Program XI.S8 in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Volume 2, Revision 2 (license renewal). With respect to simulated design-basis accident qualification testing for coatings, the staff notes that the applicable version of ASTM D3911 is the 1995 revision, as indicated in Appendix 1A of the AP1000 DCD.

In response to Item 2, the applicant stated that the administrative controls spelled out in its Quality Assurance Program Document (QAPD) will be applied to the coatings program. The staff finds that this will ensure compliance with the requirements of 10 CFR Part 50, Appendix B, which is a regulatory acceptance criterion of Section 6.1.2 of NUREG-0800. However, the staff notes that the QAPD references ASME NQA-1-1994 as an acceptable means to implement the requirements of 10 CFR Part 50, Appendix B, rather than ASME NQA-1-1983 as referenced by AP1000 DCD Section 6.1.2.1.6. ASME NQA-1-1994 is used as the basis for NUREG-0800 Section 17.5, "Quality Assurance Program Description - Design Certification, Early Site Permit and New License

Applicants,” which is applicable to the quality assurance program for a COL. Therefore, the staff finds the use of ASME NQA-1-1994 acceptable with respect to quality assurance requirements for coatings.

The staff finds the response to Item 3 acceptable because the applicant indicated the consolidated plant coating program will be in place to address procurement, application, and monitoring (maintenance) of those coating system(s) for the life of the plant, prior to initial fuel loading. During the construction phase, the requirements for the coating program will be contained in certified drawings and/or standards and specifications controlling the coating processes, which meets the requirements of 10 CFR Part 50, Appendix B, Criterion III with respect to design control and instructions, Criterion IV with respect to procurement document control, and Criterion V with respect to procedures and drawings.

*The applicant also provided proposed changes to BLN COL FSAR Section 6.1.2.1.6 to incorporate the information included in the response to RAI 6.1.2-1. The staff confirmed that FSAR Section 6.1.2.1.6 has been revised to include information on the quality assurance program. However, since the information proposed to be added does not include the detailed information on control of coatings during the design and construction phase, the staff identified **Open Item 6.1.2-1** to ensure that BLN COL FSAR Section 6.1.2.1.6 is revised to include the information from the response to RAI 6.1.2-1, Item 3, related to control of the coating program during the design and construction phase and the schedule for full implementation of the consolidated coatings program.*

Resolution of Standard Content Open Item 6.1.2-1

Standard Content Open Item 6.1.2-1 was identified by the staff because the information the BLN applicant provided about the control of coatings during the design and construction phase, although acceptable, was not included in the BLN COL FSAR. In the July 2, 2010, letter, the VEGP applicant proposed inserting the three paragraphs below in Section 6.1.2.1.6 of the VEGP FSAR. These paragraphs would replace the third paragraph under “Service Level I and Service Level III Coatings” in DCD Section 6.1.2.1.6.

During the design and construction phase, the coatings program associated with selection, procurement and application of safety related coatings is performed to applicable quality standards. The requirements for the coatings program are contained in certified drawings and/or standards and specifications controlling the coating processes of the designer (Westinghouse) (these design documents will be available prior to the procurement and application of the coating material by the constructor of the plant). Regulatory Guide 1.54 and ASTM D5144 ([FSAR] Reference 201) form the basis for the coatings program.

During the operations phase, the coatings program is administratively controlled in accordance with the quality assurance program implemented to satisfy 10 CFR Part 50,

Appendix B, and 10 CFR Part 52 requirements. The coatings program provides direction for the procurement, application, inspection, and monitoring of safety related coating systems. Prior to initial fuel loading, a consolidated plant coatings program will be in place to address procurement, application, and monitoring (maintenance) of those coating system(s) for the life of the plant.

Coating system monitoring requirements for the containment coating systems are based on ASTM D5163 ([FSAR] Reference 202), "Standard Guide for Establishing Procedures to Monitor the Performance of Coating Service Level I Coating Systems in an Operating Nuclear Power Plant," and ASTM D7167 ([FSAR] Reference 203), "Standard Guide for Establishing Procedures to Monitor the Performance of Safety-Related Coating Service Level III Lining Systems in an Operating Nuclear Power Plant." Any anomalies identified during coating inspection or monitoring are resolved in accordance with applicable quality assurance requirements.

*As discussed above in the portion of the staff's evaluation reproduced from Section 6.1.2.4 of the BLN SER, the staff finds the COL information related to control of coatings during the design and construction phase acceptable. Subsequently, the staff finds the FSAR revisions proposed above consistent with the information reviewed for the BLN SER and applicable to VEGP. Therefore, the staff finds the FSAR revisions proposed in the July 2, 2010, letter acceptable for closing Open Item 6.1.2-1. The incorporation of these proposed revisions is being tracked as **Confirmatory Item 6.1-1**.*

Resolution of Standard Content Confirmatory Item 6.1-1

Confirmatory Item 6.1-1 is an applicant commitment to revise its FSAR Section 6.1.2.1.6 to provide information regarding Service Level I and Service Level III coatings. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 6.1-1 is now closed.

Evaluation of Additional Design Information

As discussed above, AP1000 DCD Section 6.1.3.2 requires the COL applicants to provide a program for procurement, application, and monitoring of Service Level I and Service Level III coatings consistent with DCD Section 6.1.2.1.6. However, DCD Section 6.1.2.1.6 also states that COL applicants will also address the program for Service Level II coatings, and that coatings programs for Service Level I, II, and III will include inspection. Therefore, in a letter dated March 31, 2010, the AP1000 DCD applicant proposed the following revision to DCD Section 6.1.3.2:

The Combined License applicants referencing the AP1000 will provide programs to control procurement, application, inspection,

and monitoring of Service Level I, Service Level II, and Service Level III coatings. The programs for the control of the use of these coatings will be consistent with subsection 6.1.2.1.6.

In letters dated July 2 and August 13, 2010, the VEGP applicant addressed the addition of Service Level II to the COL information item by proposing the following additions to Section 6.1.2.1.6 of the VEGP COL FSAR. The first is a new second paragraph under "Service Level II Coatings" in DCD Section 6.1.2.1.6.

Such safety-related Service Level II coatings used inside containment are procured to the same standards as Service Level I coatings with regard to radiation tolerance and performance under design basis accident conditions as discussed below.

The second addition replaces the second sentence of the third paragraph under "Service Level II Coatings" in DCD Section 6.1.2.1.6.

Coating system application, inspection, and monitoring requirements for the Service Level II coatings used inside containment will be performed in accordance with a program based on ASTM D5144 ([FSAR] Reference 201), "Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants," and the guidance of ASTM D5163 ([FSAR] Reference 202), "Standard Guide for Establishing Procedures to Monitor the Performance of Coating Service Level I Coating Systems in an Operating Nuclear Power Plant." Any anomalies identified during coating inspection or monitoring are resolved in accordance with applicable quality requirements.

The NRC staff finds it acceptable to procure Service Level II coatings in containment to the same standards as Service Level I coatings because the staff, through RG 1.54, has endorsed the use of these standards to procure safety-related coatings inside containment. The staff also finds it acceptable to use ASTM D5144 and D5163 as a basis for application, inspection, and monitoring requirements for Service Level II coatings. As discussed in RG 1.54, ASTM D5144 is a top-level standard that provides general guidance on coating programs and detailed guidance by reference to other ASTM standards. Since it contains a single set of application requirements for all coatings, the staff finds it an acceptable basis for Service Level II coatings application and inspection. The staff finds ASTM D5163 acceptable for monitoring Service Level II coatings in containment because the use of ASTM D5163 conforms to the guidance in RG 1.54 for monitoring the performance of safety-related (Service Level I) coatings in containment, and there is no separate standard for Service Level II coatings. The incorporation of the proposed revisions to address Service Level II coatings into a future revision of the VEGP COL FSAR is being tracked as
Confirmatory Item 6.1-2.

Resolution of Standard Content Confirmatory Item 6.1-2

Confirmatory Item 6.1-2 is an applicant commitment to revise its FSAR Section 6.1.2.1.6 to provide information regarding the procurement of Service Level II coatings. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 6.1-2 is now closed.

6.1.2.5 Post Combined License Activities

There are no post-COL activities related to this section.

6.1.2.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR Part 50, Appendix B, and the guidance provided in RG 1.54. The staff based its conclusion on the following:

- STD COL 6.1-2 is acceptable because the Appendix B quality assurance program, with the additional guidance provided in RG 1.54, provides adequate controls over the programs to control procurement, application, inspection, and monitoring of Service Level I, Service Level II, and Service Level III coatings.

6.2 Containment Systems

6.2.1 Introduction

The containment systems (CSs), which include the primary containment, passive cooling system (heat removal system), isolation system, hydrogen control system, and leak rate test system, are discussed in this section. The containment encloses the reactor system and is the final barrier against the release of significant amounts of radioactive fission products in the event of an accident. The containment structure must be capable of withstanding, without loss of function, the pressure and temperature conditions resulting from postulated loss-of-coolant, steam line break, or feed water line break accidents. The containment structure must also maintain functional integrity in the long term following a postulated accident; i.e., it must remain a low leakage barrier against the release of fission products for as long as postulated accident conditions require.

6.2.2 Summary of Application

Section 6.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 6.2 of the AP1000 DCD, Revision 19. Section 6.2 of the DCD includes Sections 6.2.1,

“Containment Functional Design”; 6.2.2, “Passive Containment Cooling System”; 6.2.3, “Containment Isolation System”; 6.2.4, “Containment Hydrogen Control System”; and 6.2.5, “Containment Leak Rate Test System.” DCD Section 6.2.5 is evaluated by the staff in Section 6.2.6 of NUREG-1793. NUREG-1793 also includes the staff’s evaluation of the following issues:

- Fracture prevention of the containment pressure boundary in accordance with NUREG-0800, Section 6.2.7
- In-containment refueling water storage tank (IRWST) hydrodynamic loads

There are no COL information items associated with the review of either of these issues. The staff’s evaluation of the sections that address fracture prevention of the containment pressure boundary is found in Section 3.8 of this SER. With respect to the hydrodynamic loads, the staff’s evaluation is found in Section 6.2.8 of NUREG-1793.

The staff’s evaluation of the containment cleanliness program associated with Generic Safety Issue (GSI)-191, “Assessment of Debris Accumulation on PWR Sump Performance,” is evaluated in Section 6.3 of this SER.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 6.2, and in Parts 7 and 10 of the Turkey Point Units 6 and 7 COL application, the applicant provided the following:

Tier 1 and Tier 2 Departure and Exemption Request

The applicant proposed the following Tier 1 and Tier 2 departure (DEP) from the AP1000 DCD:

- PTN DEP 2.0-3

The Tier 1 departure request is from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1 for the maximum safety wet-bulb (noncoincident) air temperature, which is 30.78 °Celsius (C) (87.4 °Fahrenheit (F)). The Tier 2 departure request is because this site parameter value is also listed as the maximum safety wet-bulb (noncoincident) air temperature in AP1000 DCD Tier 2, Table 2-1.

The applicant added PTN DEP 2.0-3 to the Turkey Point Units 6 and 7 COL FSAR, revising Sections 6.2.1 and 6.2.2 to add information on the impact of the increased maximum safety wet-bulb temperature on CSs.

The exemption request related to the AP1000 DCD maximum safety wet-bulb (noncoincident) air temperature involves an exemption to 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” Appendix D, “Design Certification Rule for the AP1000 Design,” Section IV.A.2.d. Specifically, the Turkey Point Units 6 and 7 applicant requested an exemption from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1 for the maximum safety wet-bulb (noncoincident) air temperature. The exemption request is evaluated in Section 9.2.2 of this SER.

Departures

- PTN DEP 6.2-1

The applicant provided additional information about PTN DEP 6.2-1 related to changes to the acceptance criteria applied to a specific ITAAC design commitment and associated inspection, test, or analysis in Tier 1, Table 2.3.9-3, Item 3 (for control of containment hydrogen concentration for beyond-design-basis accidents) to establish consistency with the current detailed design of the plant. This information, as well as related PTN DEP 6.2-1 information appearing in other chapters of the FSAR, is evaluated in Section 21.4 of this SER.

AP1000 COL Information Item

- STD COL 6.2-1

The applicant provided additional information in STD COL 6.2-1 to address COL Information Item 6.2-1 and COL Action Item 6.2.6-1, which addresses the containment leak rate test program. In addition, Turkey Point Units 6 and 7 COL FSAR Table 1.9-203, "Listing of Unresolved Safety Issues and Generic Safety Issues," includes a line item for Task Action Plan Item A-23, "Containment Leak Testing." This item is addressed in Turkey Point Units 6 and 7 COL FSAR, Section 6.2.5.1, STD COL 6.2-1.

License Conditions

- Part 10, License Condition 3, Item G.8

This proposed license condition states that the COL holder shall implement the containment leakage rate testing program before initial fuel load, as stated in Turkey Point Units 6 and 7 COL FSAR Table 13.4-201, "Operational Programs Required by NRC Regulations."

- Part 10, License Condition 6

This proposed license condition states that the COL holder shall provide an operational program implementation schedule to support NRC inspections.

6.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

The acceptance criteria associated with the relevant requirements of the NRC regulations for containment functional design are given in Section 6.2.1.1A, Revision 3, of NUREG-0800. The regulatory requirements related to this section are 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criteria (GDC) 16, "Containment Design"; GDC 38, "Containment Heat Removal"; and GDC 50, "Containment Design Basis."

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for containment leak rate testing are given in Section 6.2.6, Revision 3, of NUREG-0800. The regulatory requirements related to this section are GDC 52, "Capability for Containment Leakage Rate Testing"; GDC 53, "Provisions for Containment Testing and Inspection," GDC 54, "Piping System Penetrating Containment"; and 10 CFR Part 50,

Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors."

Conformance with the requirements of Option A of Appendix J, or the requirements of Option B of Appendix J and the provisions of RG 1.163, "Performance-Based Containment Leak-Test Program," constitutes an acceptable basis for satisfying the requirements of the GDC applicable to containment leakage rate testing. In addition, the staff used guidance found in Nuclear Energy Institute (NEI) 94-01, as endorsed and modified by RG 1.163, "Performance-Based Containment Leak-Test Program."

The staff used the guidelines of NuStart Technical Report, AP-TR-NS01-A, Revision 2, "Containment Leak Rate Test Program," dated April 4, 2007, to review the operational program, Containment Leakage Rate Testing Program.

6.2.4 Technical Evaluation

The staff reviewed Section 6.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the CSs. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

Tier 1 and Tier 2 Departure (DEP)

- PTN DEP 2.0-3

PTN DEP 2.0-3 proposes to increase the maximum safety wet-bulb (noncoincident) air temperature from 30.06 °C (86.1 °F) to 30.78 °C (87.4 °F). This change affects the performance of various SSCs described in the AP1000 DCD. The staff's evaluation of this proposed change is also discussed in Sections 2.0, 2.3.1, 5.4, 6.4, 9.1.3, 9.2.2, and 9.2.7 of this SER.

The applicant stated that PTN DEP 2.0-3, which increased the maximum safety wet-bulb (noncoincident) external air temperature from 86.1 °F to 87.4 °F, had no impact on the performance of the safety system because the peak containment pressure remains bounded by the current AP1000 analysis. In their June 24, 2011, response to RAI 5403, Question 09.02.02-1, the applicant described a sensitivity analysis based on the NRC-approved AP1000 GOTHIC containment model. In this analysis, when the wet-bulb temperature was increased to 87.4 °F (which envelopes the PTN DEP 2.0-3 value of 87.4 °F), there was no increase to containment peak pressure resulting from a double-ended cold leg guillotine (DECLG) loss-of-coolant accident (LOCA), which is the limiting break identified in the DCD. The staff audited the supporting analysis, TPG-GW-GSC-001, Revision 0, "WGOthic Containment Peak Pressure Analysis for the Evaluation of FP&L COL Maximum Wet Bulb Temperature Departure from DCD," and found it to be conservative. The initial conditions in the AP1000 containment pressure analyses are the maximum dry-bulb temperature of 115 °F and maximum coincident wet-bulb temperature of 86.1 °F. As shown in Turkey Point Units 6 and 7 COL FSAR Table 2.0-201, the plant-specific values for both of these parameters are less than the AP1000 DCD values. However, because the maximum noncoincident safety wet-bulb temperature did increase, the applicant combined the maximum dry-bulb temperature from the AP1000 DCD with the maximum noncoincident wet-bulb temperature from PTN DEP 2.0-3, and demonstrated that this extreme combination did not change the values reported in the DCD for a DECLG LOCA. The staff ran confirmatory analyses using the CONTAIN model of the AP1000 containment. The results demonstrated there were no changes to the peak pressures (reported to the first decimal place) resulting from a main steam line break (MSLB) or DECLG LOCA or in the pressure 24 hours after the DECLG LOCA.

The following portion of this technical evaluation section is reproduced from Section 6.2.4 of the VEGP SER:

AP1000 COL Information Item

- STD COL 6.2-1

The NRC staff reviewed STD COL 6.2-1 related to COL Information Item 6.2-1 included under Section 6.2.5 of the BLN COL FSAR regarding the text added to Section 6.2.6 of the COL application. The added text references the program, which was reviewed and approved by the NRC in a letter from Stephanie Coffin, NRC, to Marilyn Kray, NuStart, "Final Safety Evaluation for AP1000 Technical Report No. AP-TR-NS01, Containment Leak Rate Test Program (TAC No. MD5136)," dated October 25, 2007.

License Conditions

- Part 10, License Condition 3, Item G.8
- Part 10, License Condition 6

The portion of License Conditions 3 and 6 relevant to this SER section is the containment leakage rate testing program listed in BLN COL FSAR Table 13.4-201. As noted in Section 13.4 of this SER, the containment leakage rate testing program meets the criteria for an operational program as specified in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria." Therefore, the NRC staff finds License Conditions 3 and 6 acceptable, with respect to the inclusion of the containment leakage rate testing program in Table 13.4-201.

Due to discrepancies in the implementation milestones provided in various locations in the BLN COL application, RAI 6.2.6-1 was forwarded to the applicant. The applicant's response was that the milestones were meant to reflect the implementation of an approved testing program and when the tests were actually to be performed. However, the applicant agreed that this was not consistently reflected. The discrepancies have been addressed in BLN COL FSAR, Table 13.4-201, sheet 2 of 7, and Part 10, License Conditions and ITAAC. The changes indicate that the containment leak rate testing program will be implemented prior to initial fuel load. This RAI is closed.

6.2.5 Post-Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff proposes to include the following license conditions related to the containment leakage rate testing program:

- License Condition (6-1)—The licensee shall implement the containment leakage rate testing program before initial fuel load.
- License Condition (6-2)—No later than 12 months after issuance of the COL, the licensee shall submit to the appropriate Director of the Office of New Reactors (NRO) a schedule that supports planning for and conduct of NRC inspections of the containment leakage rate testing program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the containment leakage rate testing program has been fully implemented.

6.2.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and complies with the regulations listed in Sections 6.2.1, Revision 3, and 6.2.6, Revision 3, of NUREG-0800. The staff based its conclusion on the following:

- PTN DEP 2.0-3 is acceptable based on the analysis provided by Turkey Point Units 6 and 7 and the confirmatory analysis run by the staff demonstrating the containment functional capability described in the AP1000 DCD is unchanged by the increase in maximum safety wet-bulb (noncoincident) external air temperature to 30.8 °C (87.4 °F).
- PTN DEP 6.2-1, related to changes to the acceptance criteria applied to a specific ITAAC design commitment and associated inspection, test, or analysis in Tier 1, Table 2.3.9-3, Item 3 (for control of containment hydrogen concentration for beyond-design-basis accidents) to establish consistency with the current detailed design of the plant, is reviewed and found acceptable by the staff in Section 21.4 of this SER.
- STD COL 6.2-1, as related to the containment leak rate testing program, is acceptable because the staff has determined that the requirements of 10 CFR Part 50, Appendix J, have been met.

6.3 Passive Core Cooling System (Related to RG 1.206, Section C.III.1, Chapter 6, C.I.6.3, “Emergency Core Cooling System”)

6.3.1 Introduction

The passive core cooling system is designed to provide emergency core cooling to mitigate design-basis events that involve a decrease in the reactor coolant system (RCS) inventory, such as a LOCA, a decrease in heat removal by the secondary system, such as a feedwater system piping failure, or an increase in heat removal by the secondary system, such as a steam system piping failure. It also provides core cooling for shutdown events, such as a loss of the normal residual heat removal system during a shutdown operation. The passive core cooling system is designed to perform the following safety-related functions:

- emergency core decay heat removal
- RCS emergency makeup and boration
- safety injection
- containment sump pH control

During long-term operation, the AP1000 passive core cooling system must withstand the effects of debris loading on the containment recirculation screens, IRWST screens and the fuel assemblies. The concern that debris may lead to unacceptable head loss for the recirculating flow was raised in GSI-191 and it is the topic of Bulletin (BL) 2003-01, “Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors,” and Generic Letter (GL) 2004-02, “Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors.” Section 6.3 of the AP1000 DCD includes an evaluation of this issue and Section 6.2.1.8 of NUREG-1793 includes the staff’s review, which was performed in accordance with the NRC-approved evaluation methodology.

6.3.2 Summary of Application

Section 6.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 6.3 of the AP1000 DCD, Revision 19. Section 6.3 of the DCD includes Section 6.3.2.2.7, "IRWST and Containment Recirculation Screens"; Section 6.3.8.1, "Containment Cleanliness Program"; and Section 6.3.8.2, "Verification of Water Sources for Long-Term Recirculation Cooling Following a LOCA."

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 6.3.8.1, the applicant provided the following:

Departures

- PTN DEP 3.2-1 and PTN DEP 6.3-1

The applicant provided additional information about PTN DEP 3.2-1 and PTN DEP 6.3-1 related to design modifications to the condensate return portion of the Passive Core Cooling System and quantifying the duration that the PRHR-HX can maintain safe shutdown conditions, respectively. This information, as well as related PTN DEP 3.2-1 and PTN DEP 6.3-1 information appearing in other chapters of the FSAR, is evaluated in Section 21.1 of this SER.

AP1000 COL Information Items

- STD COL 6.3-1

The applicant provided additional information in STD COL 6.3-1 to address COL Information Item 6.3-1 identified in AP1000 DCD Table 1.8-2, "Summary of AP1000 Standard Plant Combined License Information Items." STD COL 6.3-1 requires the applicant to develop a containment cleanliness program to limit the amount of debris that might be left in the containment following refueling and maintenance outages.

Section 1.9 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 1.9, "Compliance with Regulatory Criteria," of the AP1000 DCD. Section 1.9 of the DCD includes Section 1.9.4.2.3, "New Generic Issues," and Section 1.9.5.5, "Operational Experience."

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 1.9, the applicant provided the following information related to the effect of debris accumulation on long-term cooling:

- STD COL 1.9-3

The applicant provided additional information in STD COL 1.9-3 to address the review of GSI-191.

- STD COL 1.9-2

The applicant provided additional information in STD COL 1.9-2 to address the review of BL 03-01 and GL 04-02.

6.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In conducting its review of STD COL 6.3-1, the staff used the guidance and staff positions of RG 1.82, Revision 3, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," and NEI 04-07, "Pressurized Water Reactor Sump Performance Evaluation Methodology," Revision 0, Volume 1, and in the "Safety Evaluation by the Office of Nuclear Reactor Regulation Related to NRC Generic Letter 2004-02," in NEI 04-07, Revision 0, Volume 2.

6.3.4 Technical Evaluation

The staff reviewed Section 6.3 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the passive core cooling system. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

AP1000 COL Information Items

The following portion of this technical evaluation section is reproduced from Section 6.3.4 of the VEGP SER:

AP1000 COL Information Items

- STD COL 6.3-1

The applicant provided additional information in STD COL 6.3-1 to address COL Action Item 6.2.1.8.1-1 identified in NUREG-1793 and COL Information Item 6.3-1 identified in Table 1.8-2 of the AP1000 DCD. The applicant added information to BLN COL FSAR Section 6.3.8.1, "Containment Cleanliness Program," providing details of the program and procedures to minimize the amount of debris that might be left in containment following refueling and maintenance outages, including requirements for cleanliness inspections and limits on materials introduced into containment. TVA states that the cleanliness program will be consistent with the evaluation discussed in the AP1000 DCD.

In its June 9, 2009, response to RAI 6.2.2-1, the applicant addressed the changes made to Revision 17 of the AP1000 DCD in APP-GW-GLE-002 and staff questions on cleanliness measurements with a modification to STD COL 6.3-1. This included adding that the cleanliness program will meet the DCD limits on latent debris, that housekeeping procedures will be implemented to return work areas to original conditions upon completion of work, and that a sampling program will be used to quantify the amount of latent debris. The sampling program is stated to be consistent with NEI 04-07 Volumes 1 (guidance report) and 2 (NRC safety evaluation). The sampling will be done after containment exit cleanliness inspections, prior to start up, and the results will be evaluated post-start up. Any non-conforming results will be addressed in the Corrective Action Program.

*The resulting cleanliness program is consistent with the RG 1.82 recommendation that procedures be in place to regularly clean the containment and to control and remove foreign materials from containment. The sampling program included in STD COL 6.3-1 is required to demonstrate that the latent debris found in containment is within the AP1000 DCD specified limits of 130 pounds, of which, up to 6.6 pounds may be fibrous material. The DCD specified limits were demonstrated to be acceptable through scale testing and analysis. Thus, STD COL 6.3-1 is consistent with the RG 1.82 recommendation that the cleanliness program be correlated to the amount of debris used in the long term cooling analysis. It is appropriate that the sampling program be in accordance with NEI 04-07, Volumes 1 and 2, because these documents contain the most recent NRC-approved evaluation methodology for cleanliness programs. The response to RAI 6.2.2-1 is acceptable and incorporation of the changes to STD COL 6.3-1 in the BLN FSAR will be tracked as **Confirmatory Item 6.3-1**.*

The staff reviewed the following information in the BLN COL FSAR as it relates to the effect of debris accumulation on long term cooling:

- STD COL 1.9-3

The applicant added information to Section 1.9.4.2.3, "New Generic Issues," regarding Issue 191. The applicant states that the design aspects are addressed by the AP1000 DCD and the COL applicant portions are the protective coatings program discussed in BLN COL FSAR Section 6.1.2.1.6 and the containment cleanliness program discussed in BLN COL FSAR Section 6.3.8.1. The staff agrees that these are the only two COL items identified in the staff's review of GSI-191 from Section 6.2.1.8 of NUREG-1793.

- STD COL 1.9-2

The applicant added line items for Bulletin 03-01 and GL 04-02 in Table 1.9-204, "Generic Communications Assessment." The new information states that the design aspects are addressed in the AP1000 DCD and that the COL applicant aspects are addressed in BLN COL FSAR Section 6.3 for Bulletin 03-01 and BLN COL FSAR Section 6.3.8.1 for GL 04-02. The staff agrees that the design aspects of these generic communications are addressed in the staff's review of GSI-191 from Section 6.2.1.8 of NUREG-1793. The COL applicant aspects are addressed in the staff's review of BLN COL FSAR Section 6.1.2.1.6 and BLN COL FSAR Section 6.3.8.1.

Resolution of Standard Content Confirmatory Item 6.3-1

Confirmatory Item 6.3-1 required the applicant to update its FSAR to include the information related to the cleanliness program provided in the BLN applicant's above-mentioned June 9, 2009, response to RAI 6.2.2-1 (which was endorsed by the VEGP applicant). The NRC staff verified that the VEGP COL FSAR was appropriately updated with this information. As a result, Confirmatory Item 6.3-1 is resolved.

6.3.5 Post-Combined License Activities

There are no post-COL activities related to this section.

6.3.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the regulatory requirements and guidance discussed in Section 6.3.3 of this SER. The staff based its conclusion on the following:

- PTN DEP 3.2-1 and PTN DEP 6.3-1, related to design modifications to the condensate return portion of the Passive Core Cooling System and quantifying the duration that the PRHR-HX can maintain safe shutdown conditions, respectively, are reviewed and found acceptable by the staff in Section 21.1 of this SER.
- STD COL 6.3-1 is acceptable because it meets 10 CFR 50.46(b)(5) requirements as it pertains to having sufficient water sources for long term recirculation cooling following a LOCA. The containment cleanliness program complies with the guidance in RG 1.82.
- STD COL 1.9-3, related to GSI-191, is acceptable because the only two items that need to be addressed by the COL applicant have been resolved. The protective coatings program is evaluated in SER Section 6.1.2, and the containment cleanliness program is evaluated under STD COL 6.3-1.
- STD COL 1.9-2, related to BL 03-01 and GL 04-02, is acceptable because the only two items that need to be addressed by the COL applicant have been resolved. The protective coatings program is evaluated in SER Section 6.1.2, and the containment cleanliness program is evaluated under STD COL 6.3-1.

6.4 Habitability Systems

6.4.1 Introduction

The design and operation of a set of systems provide habitability functions for the AP1000 design. These systems include the nuclear island non-radioactive ventilation system (VBS), the main control room (MCR) emergency habitability system (VES), the radiation monitoring system (RMS), the plant lighting system (ELS), and the fire protection system (FPS).

6.4.2 Summary of Application

Section 6.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 6.4 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 6.4, the applicant provided the following:

Tier 1 and Tier 2 Departure and Exemption Request

The applicant proposed the following Tier 1 and Tier 2 departure from the AP1000 DCD:

- PTN DEP 2.0-3

The Tier 1 departure request is from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1 for the maximum safety wet-bulb (noncoincident) air temperature, which is 30.06 °C

(86.1 °F). The Tier 2 departure request is because this site parameter value is also listed as the maximum safety wet-bulb (noncoincident) air temperature in AP1000 DCD Tier 2, Table 2-1.

The applicant added PTN DEP 2.0-3 to the Turkey Point Units 6 and 7 COL FSAR, revising Section 6.4 to add information on the effect of the increased maximum safety wet-bulb temperature on habitability systems.

The exemption request related to the AP1000 DCD maximum safety wet-bulb (noncoincident) air temperature involves an exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.d. Specifically, the Turkey Point Units 6 and 7 applicant requested an exemption from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1 for the maximum safety wet-bulb (noncoincident) air temperature. The exemption request is evaluated in Section 9.2.2 of this SER.

Departures

- PTN DEP 6.4-1

The applicant provided information about PTN DEP 6.4-1 related to design changes affecting habitability of the MCR and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this report.

- PTN DEP 6.4-2

The applicant provided information about PTN DEP 6.4-2 related to design changes affecting habitability of the MCR and changes to the maximum temperatures and heat generated in the MCR. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR, is reviewed in Section 21.3 of this report.

AP1000 COL Information Items

- STD COL 6.4-1

The applicant provided a list of onsite chemicals in Turkey Point Units 6 and 7 COL FSAR Table 6.4-201 to supplement the list of chemicals identified in Table 6.4-1 of the AP1000 DCD. The chemicals in Table 6.4-201 associated with STD COL 6.4-1 (as annotated in the left margin) include: hydrogen (both in a gas and liquid form), nitrogen, carbon dioxide, hydrazine, morpholine, sulfuric acid, sodium hydroxide, fuel oil, sodium molybdate, sodium hexametaphosphate, sodium hypochlorite, and ammonium comp polyethoxylate. In a letter dated April 20, 2011, the Turkey Point Units 6 and 7 applicant endorsed the July 30, 2010, letter from the VEGP applicant that proposed modifications to the COL FSAR related to the size and stated location of the liquid hydrogen storage tank.

- STD COL 6.4-2

The applicant provided additional information in STD COL 6.4-2 to address COL Information Item 6.4-2 regarding the procedures and training for control room (CR) habitability in accordance with the resolution of GSI-83, "Control Room Habitability."

- PTN COL 6.4-1 and PTN COL 9.4-1b

The applicant provided PTN COL 6.4-1 and COL 9.4-1b to address COL Information Item 6.4-1. The local toxic gas services are evaluated to determine the need for monitoring for CR habitability.

Supplemental Information

- STD SUP 6.4-1

The applicant provided supplemental information in STD SUP 6.4-1 to address CR doses for accident analyses in the downwind unit of a dual unit site.

- PTN SUP 6.4-2

The applicant provided supplemental information in PTN SUP 6.4-2 to address radiological dose(s) at Turkey Point Units 6 and 7 due to Design Basis Accident (DBA) from Units 3 and 4. This information is discussed in Section 2.2.3.1.6.1 of this SER.

6.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for habitability systems are given in Section 6.4, Revision 4, of NUREG-0800.

MCR habitability is addressed in the following regulations and guidance:

- GDC 4, "Environmental and Dynamic Effects Design Bases," as it relates to SSCs important to safety being designed to accommodate the effects of and to be compatible with the environmental conditions associated with postulated accidents.
- GDC 5, "Sharing of Structures, Systems and Components," as it relates to ensuring that sharing SSCs important to safety among nuclear power units will not significantly impair their ability to perform safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining unit(s).
- GDC 19, "Control Room," as it relates to maintaining the nuclear power unit in a safe condition under accident conditions and providing adequate radiation protection.
- 10 CFR 50.34(f)(2)(xxviii), as it relates to evaluations and design provisions to preclude certain MCR habitability problems.
- 10 CFR 52.80(a), which requires that a COL application address the proposed inspections, tests, and analyses, including those applicable to emergency planning, that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses

are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the COL, the provisions of the Atomic Energy Act, and the NRC's regulations.

- NUREG-0737, "Clarification of TMI Action Plan Requirements," TMI Action Plan, Item III.D.3.4, "Control Room Habitability."
- RG 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," Revision 1.
- RG 1.52, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants," Revision 3, June 2001.
- RG 1.196, "Control Room Habitability at Light Water Nuclear Power Reactors," May 2003.

6.4.4 Technical Evaluation

The staff reviewed Section 6.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to habitability systems. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR, except for the evaluation of STD SUP 6.4-2 and STD COL 6.4-1. For these two items, the staff compared the BLN COL FSAR, Revision 2 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER. Confirmatory items that are first identified in this SER section have a Turkey Point Units 6 and 7 designation.

Tier 1 and Tier 2 Departure

- PTN DEP 2.0-3

PTN DEP 2.0-3 proposes to increase the maximum safety wet-bulb (noncoincident) air temperature from 30.06 °C (86.1 °F) to 30.78 °C (87.4 °F). This change affects the performance of various SSCs described in the AP1000 DCD. The staff's evaluation of this proposed change is also discussed in Sections 2.0, 2.3.1, 5.4, 6.2, 9.1.3, 9.2.2, and 9.2.7 of this SER.

Analysis of the maximum wet-bulb (noncoincident) air temperature at a bounding value of 87.4 °F has been performed by the applicant. The staff evaluated the effect of this departure on the habitability systems using the guidance in Section 6.4 of NUREG-0800 to demonstrate compliance with GDC 4.

The VBS is potentially affected by the departure, because the low capacity chilled water subsystem (LCCWS) uses the maximum safety temperature limits (dry and wet-bulb) as its design-basis temperatures. The applicant's calculation note APP-GW-M1C-002, "AP1000 High Humidity HVAC Systems Design Evaluation," assesses the effect of changes in both maximum safety and maximum normal ambient wet-bulb temperature on the design and performance of the LCCWS.

The applicant's conclusion, documented in the response to RAI 5403, Question 09.02.02-1, dated June 24, 2011, is that the increased heat load produced by operation at the higher Turkey Point Units 6 and 7 maximum safety ambient wet-bulb temperature of 87.4 °F can be accommodated within the available capacity margin of the chiller units, without affecting the LCCWS or supporting systems design or plant operation.

The applicant noted, and the staff agrees, that the cooling coil design calculations have shown, during operation at the standard plant design temperatures (115 °F dry-bulb, 86.1 °F wet-bulb), the VBS air handling units have margin. As a result, at the Turkey Point Units 6 and 7 site, design temperatures of 112 °F dry-bulb and 87.4 °F wet-bulb, the off coil temperature for VBS will be identical to the off coil temperature of the standard design based on the results of supplier coil performance calculations. The staff audited APP-GW-M1C-002 and found that the calculation package has accurate inputs and reasonable calculation methods.

The passive heat sinks associated with the MCR VES control the auxiliary building safety-related room temperatures post-accident. The temperature profiles of these rooms are affected only by ambient dry-bulb temperature. The Turkey Point Units 6 and 7 maximum ambient dry-bulb temperature (112 °F) is enveloped by the current AP1000 as well.

Therefore, the staff finds that the applicant's conclusion, documented in the response to RAI 5403, Question 09.02.02-1 acceptable that the habitability at the higher Turkey Point Units 6 and 7 site outside air wet-bulb temperature will be maintained.

AP1000 COL Information Items

The following portion of this technical evaluation section is reproduced from Section 6.4.4 of the VEGP SER:

- STD COL 6.4-1

The following portion of this technical evaluation section is reproduced from Section 6.4.4 of the BLN SER. The staff notes that Table 6.4-202 in the BLN FSAR, Revision 2, is equivalent to Table 6.4-201 in the VEGP COL FSAR. Information in the BLN COL FSAR having a left margin annotation STD SUP 6.4-2 was assigned a left margin annotation of STD SUP 6.4-3 in the VEGP COL FSAR, and revisions proposed by the applicant, described below, combined the information from STD SUP 6.4-3 and STD COL 6.4-1 under a single left margin annotation of STD COL 6.4-1. Therefore, the evaluation of STD COL 6.4-1 in this SER includes references to material identified as STD SUP 6.4-2 in the BLN COL FSAR.

AP1000 COL Information Items

- STD COL 6.4-1

STD COL 6.4-1 information also provides the chemical names, state of the chemical, quantity and location of the chemicals. The chemicals include: nitrogen, carbon dioxide, and ammonium comp polyethoxylate.

Subsequent to the issuance of Section 2.2.3 of this report, the staff reviewed the applicant's inventory of chemicals listed in STD COL 6.4-1, and screened out the toxic chemicals that do not pose a threat to CR habitability. The staff has determined that with the exception of carbon dioxide the STD COL 6.4-1 chemicals do not warrant additional analysis because they do not exceed the IDLH limit at ground level at the location of the CR.

Regarding carbon dioxide, analysis with the HABIT computer code (RG 1.78) finds that carbon dioxide will not exceed the IDLH limit at ground level. This analysis is based on a temperature of 25 °C and a wind speed of 1 m/sec, with meteorology F class, which are the conditions used by the applicant and RG 1.78. Hence, it is determined that the carbon dioxide contained in STD COL 6.4-1 will not pose a threat to CR habitability.

*The staff notes that the chemical analysis relied on by the COL applicant includes assumptions associated with design features, such as the intake location for the CR ventilation system. In RAI 6.4-8, the staff asked if any of the analyses of the chemicals in Table 6.4-202 credit design features, such as an elevated CR intake, to keep the chemical concentration in the CR below the IDLH levels, in which case a description of the design features credited in the safety analyses should be provided in the FSAR. This is **Open Item 6.4-1**.*

Resolution of Standard Content Open Item 6.4-1

*In a letter dated June 17, 2010, the applicant proposed modifications to Table 6.4-201 in the VEGP COL FSAR to address Open Item 6.4-1. The proposed modifications included addition of a column entitled “MCR Habitability Impact Evaluation” to the table that indicated when design features were considered in the impact evaluation, including either the MCR intake height or other design details beyond the intake height. The staff determined that the modifications sufficiently described the design assumptions considered by the applicant, and Open Item 6.4-1 is resolved. The incorporation of this modification to Table 6.4-201 into a future revision of the VEGP COL FSAR is being tracked as **Confirmatory Item 6.4-1**.*

Resolution of Standard Content Confirmatory Item 6.4-1

Confirmatory Item 6.4-1 is an applicant commitment to revise its FSAR Table 6.4-201 to add a column entitled “MCR Habitability Impact Evaluation” that will indicate when design features are considered in the impact evaluation, including either the MCR intake height or other design details beyond the intake height. The staff verified that VEGP COL FSAR Table 6.4-201 was appropriately revised. As a result, Confirmatory Item 6.4-1 is now closed.

Evaluation of Additional Revisions to STD COL 6.4-1

In the letter dated June 17, 2010, the applicant proposed additional voluntary revisions to Table 6.4-201 in the VEGP COL FSAR regarding the storage of standard chemicals described under STD COL 6.4-1. The proposed revisions included changes to the chemical quantities, evaluated distances, and storage locations, as well as changes to the table organization, column headings, and table notes. The proposed revisions also included combining the chemicals listed under separately STD COL 6.4-1 and STD SUP 6.4-3 under a single left margin annotation of STD COL 6.4-1, thereby eliminating STD SUP 6.4-3.

In a letter dated July 30, 2010, the applicant proposed additional revisions to STD COL 6.4-1 related to the evaluated maximum quantity and location of the liquid hydrogen storage tank.

On April 14 and June 7, 2010, the NRC staff audited the applicant’s proprietary calculation notes, APP-VES-M3C-006, entitled “Main Control Room Emergency Habitability from Toxic Chemical Effluents,” Revision 0 and Revision 1 to verify the information supporting STD COL 6.4-1 and VEGP COL FSAR Table 6.4-201. As a result of these audits, the staff issued RAI 6.4-5. The applicant subsequently prepared calculation notes APP-PGS-M3C-011, entitled “AP1000 Gas Spill or Release Effects on Control Room Habitability,” Revision 0 and Revision 1 that were audited by the staff on July 26 and August 23, 2010. In a letter dated September 3, 2010, the applicant proposed the following changes to the FSAR and provided the following additional information about calculated concentrations of chemicals that would occur at the MCR intake to address RAI 6.4-5:

- *Proposed to change the evaluated minimum distance between the MCR and the storage locations for liquid hydrogen, nitrogen, and carbon dioxide.*
- *For hydrogen, nitrogen, and carbon dioxide, proposed to indicate that MCR design details were considered in evaluating the potential impact to the MCR.*
- *Proposed to clarify that the MCR design details considered included MCR volume, envelope boundaries, ventilation systems, and occupancy factor.*
- *Provided information about how the analysis considered the effect of wind speeds less than 1 meter (m)/second.*
- *Provided information about concentrations occurring at the MCR intake more than two minutes after a potential release occurs.*
- *For hydrogen, nitrogen, and carbon dioxide, provided information about concentrations occurring at the MCR intake when no building wake effects are considered.*
- *For carbon dioxide, provided information about concentrations occurring in the MCR based on a corrected conservative value for the MCR outside air exchange rate.*

In the evaluation presented in Section 2.2.3 of this SER, the staff reviewed the applicant's revised chemical inventory information listed in STD COL 6.4-1, and screened out the toxic chemicals that do not pose a threat to MCR habitability. The staff determined that, with the exception of hydrazine and carbon dioxide, the STD COL 6.4-1 chemicals do not warrant additional analysis for MCR habitability because they would not exceed the IDLH limit at ground level below the MCR ventilation intake. Hydrazine and carbon dioxide are evaluated below.

Regarding hydrazine, the NRC staff used the HABIT computer code (as referenced in RG 1.78) to confirm that hydrazine concentration may exceed the IDLH limit at ground level below the MCR intake. The staff then conducted an additional analysis showing that the hydrazine concentration at the MCR intake and inside the MCR would not exceed the IDLH limit when crediting the design of the MCR ventilation intake located at the auxiliary building (which is located 17.37 m (57 feet (ft)) above ground). The applicant annotated "IH" in VEGP COL FSAR Table 6.4-201 to indicate that the credit of MCR ventilation intake height had been taken in the safety analysis.

Regarding carbon dioxide, the NRC staff has used the HABIT computer code to confirm that the carbon dioxide concentration may exceed the IDLH limit at the MCR intake. The staff then conducted an additional analysis showing that the carbon dioxide concentration inside the MCR would remain below the IDLH limit.

Based on the FSAR revisions proposed and additional information provided by the applicant and the confirmatory analyses performed by the staff, the staff determined that the hydrazine and carbon dioxide would not pose a threat to MCR habitability, and RAI 6.4-5 is closed.

*The incorporation of the revisions to STD COL 6.4-1 Table 6.4-201 into a future revision of the VEGP COL FSAR, as proposed in letters from the applicant dated June 17, July 30, and September 3, 2010, is being tracked as **Confirmatory Item 6.4-2**.*

Resolution of Standard Content Confirmatory Item 6.4-2

Confirmatory Item 6.4-2 is an applicant commitment to revise its FSAR Table 6.4-201 to revise information related to standard chemicals. The staff verified that VEGP COL FSAR Table 6.4-201 was appropriately revised. As a result, Confirmatory Item 6.4-2 is now closed.

The following portion of this technical evaluation section is reproduced from Section 6.4.4 of the BLN SER:

- *STD COL 6.4-2*

The NRC staff reviewed STD COL 6.4-2, related to COL Information Item 6.4-2 and COL Action Item 6.4-1, included under Section 6.4.3 of the BLN COL FSAR. The applicant stated that procedures and training for CR habitability are written in accordance with Section 13.5 for CR operating procedures, and Section 13.2 for operator training. In Section 6.4.3 of the FSAR, the applicant states that the procedures and training will be verified to be consistent with the intent of GSI-83.

However, the level of detail provided in the standard portion of BLN COL FSAR Section 6.4.3 is not adequate to determine if the regulatory requirements are met. As a result, the staff issued RAI 6.4-7, which asked the applicant to provide in the FSAR the essential elements of the training and procedures necessary to demonstrate that the regulatory requirements are met. The staff questioned what the operators would be directed and trained to do to meet the recommendations in RG 1.196. Specifically, in RAI 6.4-7, the staff requested information addressing the following:

- *RG 1.78, Regulatory Position C.5, "Emergency Planning"*
- *RG 1.196, Regulatory Position 2.5, "Hazardous Chemicals"*
- *RG 1.196, Regulatory Position 2.2.1, "Comparison of System Design, Configuration, and Operation with the Licensing Basis"*
- *RG 1.196, Regulatory Position 2.7.1, "Periodic Evaluations and Maintenance"*

*The resolution of RAI 6.4-7 is identified as **Open Item 6.4-2**.*

Resolution of Standard Content Open Item 6.4-2

*The BLN response to RAI 6.4-7 dated January 5, 2010, stated that the operational aspects of the identified guidance had been met as documented in BLN COL FSAR Appendix 1AA. The BLN applicant's response also stated that the additional information would be provided in a future revision to BLN COL FSAR Section 6.4.3, addressing how procedures, testing and training related to CR habitability would be consistent with the above stated regulatory positions in RG 1.78 and RG 1.196. The VEGP applicant endorsed the BLN response to RAI 6.4-7 in a letter dated June 17, 2010, and committed to appropriately update Section 6.4.3 of the VEGP COL FSAR. Therefore, Standard Content Open Item 6.4-2 is resolved for the VEGP application, and the incorporation of the proposed revision to Section 6.4.3 of the VEGP COL FSAR is being tracked as **Confirmatory Item 6.4-3**.*

Resolution of Standard Content Confirmatory Item 6.4-3

Confirmatory Item 6.4-3 is an applicant commitment to revise its FSAR Section 6.4.3 to include information regarding procedures, testing and training related to CR habitability. The staff verified that VEGP COL FSAR Section 6.4.3 was appropriately revised. As a result, Confirmatory Item 6.4-3 is now closed.

- PTN COL 6.4-1 and PTN COL 9.4-1b

The staff reviewed PTN COL 6.4-1 and PTN COL 9.4-1b, related to COL Information Item 6.4-1 included under Section 6.4.4 of the Turkey Point Units 6 and 7 COL FSAR. As part of PTN COL 6.4-1, Table 6.4-201 of the Turkey Point Units 6 and 7 COL FSAR provides information on the chemical names, physical states, quantities, locations, evaluated minimum distance between the chemical storage location and the MCR, and how the evaluation of MCR habitability impacts for each chemical was performed.

While reviewing the applicant's chemical spill calculations, it was understood that the control room fresh air exchange rate was 0.74 exchanges per hour. The staff issued RAI 7080, Question 06.04-2 requesting the applicant to explain how this air exchange rate was determined. The applicant responded, letter dated September 18, 2012, by revising its chemical spill calculations, selecting a value of 1.0 for the air exchange rate (consistent with the air exchange rate value used in DCD Table 6.4-1).

In the evaluation presented in Section 2.2.3 of this SER, the staff reviewed the applicant's chemical inventory information, and screened out the toxic chemicals that do not pose a threat to MCR habitability. The staff determined that, with the exception of the Turkey Point Units 1-5 chemicals ammonium hydroxide and chlorine and the Turkey Point Units 6-7 chemicals sodium hypochlorite (Reclaimed Water Treatment Facility) and sodium hypochlorite (cooling tower), the on-site and off-site chemicals do not warrant additional analysis for MCR habitability. Based on the revised air exchange rate, the staff performed confirmatory calculations using computer code ALOHA on these four selected chemicals as discussed below.

The staff's calculations show that the ammonium hydroxide, chlorine, and sodium hypochlorite (Reclaimed Water Treatment Facility) concentrations at the CR intake and inside the CR are less than the Immediately Dangerous to Life and Health (IDLH) limit. The staff's calculations show that the sodium hypochlorite (cooling tower) has concentrations above IDLH limit at the CR intake, but below IDLH limit inside the CR. Therefore, the staff determined that above four selected chemicals would not pose a threat to MCR habitability.

The applicant is taking credit for the virtual distance in its puddle area liquid chemical calculations. Area sources can be approximated by assuming that the source is further away from the receptor by a virtual distance, such that the width of the plume will be equal to the actual width at the source location. The procedure to calculate the virtual distance is recommended in the EPA report "D. Turner, Workbook of Atmospheric Dispersion Estimates, 1970," which the staff finds acceptable.

The ALOHA computer code is limited to calculating for a control room located one hour or less downwind of the source. Some Turkey Point Units 6 and 7 chemicals are affected by this situation. RG 1.78, Section C.1.1 states that chemicals stored or situated at distances greater than 5 miles from the plant need not be considered because, if a release occurs at such a distance, atmospheric dispersion will dilute and disperse the incoming plume to such a degree that either toxic limits will never be reached or there would be sufficient time for the control room operators to take appropriate action. In addition, RG 1.78 states that the probability of a plume remaining within a given sector for a long period of time is quite small. RG 1.78 allows use of a wave hazard analysis when hazardous chemicals are within a 5-mile radius of the plant. It is understood that the applicant's "60 minutes" screening criteria is different from RG 1.78's "5 miles" screening criteria. The staff believes that the essence of RG 1.78's "5 miles" screening criteria is captured in the applicant's "60 minutes" screening criteria. Therefore the staff has no further concern on the applicant's treatment.

The staff reviewed this COL information item 6.4-1 regarding the text added to Section 6.4 of the COL application and concluded PTN COL 6.4-1 is acceptable.

Supplemental Information

The following portion of this technical evaluation section is reproduced from Section 6.4.4 of the VEGP SER:

- *STD SUP 6.4-1*

The NRC staff reviewed STD SUP 6.4-1 related to the evaluation of CR doses in the other unit of a dual unit plant included under Section 6.4.4 of the BLN COL FSAR. The staff concludes that STD SUP 6.4-1 is acceptable because the dose to the CR operators at an adjacent AP1000 due to a radiological release from another unit is bounded by the dose to CR operators on the affected unit. Further, simultaneous accidents at multiple units at a common site are not considered to be a credible event, unless there is a reliance on shared systems between the two units. This is not the case for the AP1000 design.

The following supplemental information is site-specific for Turkey Point Units 6 and 7.

- PTN SUP 6.4-2

The applicant provided supplemental information in PTN SUP 6.4-2 to address radiological dose(s) at Turkey Point Units 6 and 7 due to DBA from Turkey Point Units 3 and 4. This information is discussed in FSAR Section 2.2.3.1.6.1. On March 28, 2012, the staff issued RAI 6340, Question 06.04-1, asking the applicant to address the potential impact on Turkey Point Units 6 and 7 CR habitability of an accident at Turkey Point Units 3 or 4, two operating nuclear units at the site. In letters dated May 23, 2012, and August 23, 2012, the applicant provided results of its dose calculation based on a postulated design basis LOCA at Turkey Point Unit 3 or 4, at uprated power conditions and using the alternative source term methodology consistent with the guidance in RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors." The calculation is conservative because it does not credit any dose reduction resulting from CR filtration or shielding, and assumes a 100 percent occupancy factor. Using these assumptions, which are more conservative than the methodology accepted by NRC in RG 1.183, the applicant calculates that the postulated Turkey Point Unit 3 or 4 DBA would result in doses at the Turkey Point Units 6 and 7 control rooms of about 0.01 Sv (1 rem) total effective dose equivalent (TEDE). The staff finds this acceptable because the applicant used more conservative methodology than would be acceptable to NRC to show that estimated doses in the Turkey Point Unit 6 or 7 control room would be below the 0.05 Sv (5 rem) TEDE dose criterion in GDC 19 for a DBA at the adjacent Turkey Point Units 3 and 4.

6.4.5 Post-Combined License Activities

For the reasons discussed in the technical evaluation above, the following FSAR commitment is identified as the responsibility of the licensee:

- FSAR Commitment 6.4-1. The licensee's CR operator training program shall address the following:
 - Regulatory Position C.5, "Emergency Planning," of RG 1.78
 - Regulatory Position 2.5, "Hazardous Chemicals," of RG 1.196
 - Regulatory Position 2.2.1, "Comparison of System Design, Configuration, and Operation with Licensing Basis," of RG 1.196
 - Regulatory Position 2.7.1, "Periodic Evaluations and Maintenance," of RG 1.196

6.4.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the acceptance criteria associated with the relevant requirements of the Commission regulations for habitability systems given in Section 6.4, Revision 3, of NUREG-0800. The staff based its conclusions on the following:

- PTN DEP 2.0-3 is acceptable because, at the increased maximum safety wet-bulb (noncoincident) air temperature 30.78 °C (87.4 °F), the performance of VBS will not change based on the results of supplier coil performance calculations, using the guidance in Section 6.4 of NUREG-0800.
- PTN DEP 6.4-1, relating to design changes affecting habitability of the MCR and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.
- PTN DEP 6.4-2, related to design changes affecting habitability of the MCR and changes to the maximum temperatures and heat generated in the MCR, is reviewed and found acceptable by the staff in Section 21.3 of this SER.
- STD COL 6.4-1 is acceptable because the chemicals do not exceed the IDLH limit at the intake of the MCR, using the regulatory guidance in RG 1.78.
- STD COL 6.4-2 is acceptable because the procedures, testing and training related to MCR habitability will be consistent with the stated regulatory positions in RG 1.78 and RG 1.196.
- PTN COL 6.4-1 and PTN COL 9.4-1b are acceptable because the plant-specific chemicals do not exceed the IDLH limit at the intake of the MCR, using the regulatory guidance in RG 1.78.
- STD SUP 6.4-1 is acceptable because the dose to the MCR operators at an adjacent AP1000 due to a radiological release from another unit is bounded by the dose to MCR operators on the affected unit, using the regulatory guidance in Section 6.4 of NUREG-0800.
- PTN SUP 6.4-2 is acceptable because the dose to the MCR operators at Turkey Point Units 6 or 7 due to a radiological release from either Turkey Point Units 3 or 4 meets the requirements of GDC 19, using regulatory guidance in Section 6.4 of NUREG-0800.

6.5 Fission Product Removal and Control Systems

In the event of a design-basis LOCA, there is an assumed core degradation that results in a significant release of radioactivity to the containment atmosphere. This activity would consist of noble gases, particulates, and a small amount of elemental and organic iodine. Fission product removal and control systems are considered to be those systems for which credit is taken in reducing accidental release of fission products. The AP1000 design has no active system to control fission products in the containment after a postulated accident. The fission product control system is the primary containment. AP1000 DCD, Appendix 15B, "Removal of Airborne Activity from the Containment Atmosphere Following a LOCA," discusses satisfactory removal

of airborne activity (elemental iodine and particulates) from the containment atmosphere by natural removal processes (e.g., deposition and sedimentation) without the use of containment spray.

Section 6.5 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 6.5 of Revision 19 of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that there is no outstanding issue related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

6.6 Inservice Inspection of Class 2, 3, and MC Components (Related to RG 1.206, Section C.III.1, Chapter 6, C.I.6.6, "Inservice Inspection of Class 2 and 3 Components")

6.6.1 Introduction

Inservice inspection (ISI) programs must meet requirements of 10 CFR 50.55a, "Codes and standards," in which Section XI of the ASME Boiler and Pressure Vessel Code (ASME Code) is incorporated by reference. This section addresses the ISI of ASME Code Class 2 and 3 components. ASME Code Class 2 and 3 components must meet the applicable inspection requirements set forth in Subsections IWC and IWD of Section XI of the ASME Code, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components." Subsection IWC and IWD also include requirements for preservice examinations prior to initial plant startup as provided in Subarticles IWC-2200 and IWD-2200.

6.6.2 Summary of Application

Section 6.6 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 6.6 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 6.6, the applicant provided the following:

AP1000 COL Information Items

- STD COL 6.6-1

The applicant provided additional information in STD COL 6.6-1 to address COL Information Item 6.6-1. The information relates to plant-specific preservice inspection (PSI) and ISI programs.

- STD COL 6.6-2

The applicant provided additional information in STD COL 6.6-2 to address COL Information Item 6.6-2. The information relates to preservation of component accessibility design considerations during the construction phase.

Supplemental Information

- STD SUP 6.6-1

The applicant provided supplemental information related to the design stage consideration of component accessibility to enable the performance of ISI examinations.

License Condition

- Part 10, License Condition 6

This proposed license condition states that the COL holder shall provide an operational (PSI/ISI) program schedule to support NRC inspections.

6.6.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for ISI of Class 2 and 3 components are given in Section 6.6, Revision 2, of NUREG-0800.

The applicable regulatory requirements for acceptance of the resolution of COL information items and supplementary information on ISI and testing of Class 2 and 3 components are established in GDC 45, "Inspection of Cooling Water System" found in 10 CFR Part 50, Appendix A, as it relates to periodic inspection of important components, such as heat exchangers and piping to assure the integrity and capability of the system.

The applicable policy for acceptance of COL information items, as it relates to fully describing an operational program, is found in SECY-05-0197.

6.6.4 Technical Evaluation

The staff reviewed Section 6.6 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the ISI of Class 2 and 3 components. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAI.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 6.6.4 of the VEGP SER:

AP1000 COL Information Items

- *STD COL 6.6-1*

In Section 6.6 of the NRC staff FSER (NUREG-1793, dated September 2004), the staff concluded that the AP1000 ISI program for ASME Code Class 2 and 3 components is acceptable and meets the requirements of 10 CFR 50.55a with regard to the preservice and inservice inspectability of these components. The specific version of the ASME Code, Section XI used as the baseline Code in the AP1000 certified design, is the 1998 Edition up to and including the 2000 Addenda. It should be noted that the staff did not identify any portions of the AP1000 ISI program for Class 1, 2 and 3 components that were excluded from the scope of the staff's review of the AP1000 DC (as the staff did for inservice testing of valves in AP1000 FSER Section 3.9.6.4). Therefore, the staff's conclusions regarding the acceptability of the AP1000 ISI program based on the 1998 Edition up to and including the 2000 Addenda of the ASME Code, Section XI with regard to preservice and inservice inspectability of Class 2 and 3 components remains unchanged. The staff's evaluation of the operational program aspects of the ASME Code Class 2 and 3 ISI program is addressed with Class 1 ISI in Section 5.2.4 of this SER. The review of the COL applicant's supplemental information also includes the adequacy of the ISI program for reactor containment (Class MC). In Revision 17 of the AP1000 DCD, Class MC components were added to the DCD, Section 6.6, as being within the scope of the ISI Program. The COL applicant incorporated DCD Section 6.6 in its entirety under Revision 1 of its FSAR. Accordingly, the staff's evaluation of this section focused on the acceptability of the COL applicant's supplemental information and responses to AP1000 COL information items and action items as they relate to ISI of ASME Code Class 2, 3, and MC components.

As part of STD COL 6.6-1, the COL applicant added to the end of DCD Section 6.6.2 words to state that the initial ISI program will incorporate the latest Edition and Addenda of the ASME Code (Section XI) approved in 10 CFR 50.55a(b) on the date 12 months before initial fuel load. The COL applicant stated that successive 120-month inspection intervals must comply with the requirements of the latest Edition and Addenda of the Code incorporated by reference in 10 CFR 50.55a(b) 12 months before the start of the 120-month interval, subject to the limitations and modifications listed in 10 CFR 50.55a(b). The requirements in 10 CFR 50.55a(g) state that inservice examinations of components and system pressure tests conducted during the initial 120-month inspection interval must comply with the requirements in the latest Edition and Addenda of the Code incorporated by reference in paragraph (b) of 10 CFR 50.55a on the date 12 months before the date scheduled for initial loading of fuel under a COL under 10 CFR Part 52. The staff concludes that the supplemental information provided by the COL applicant meets the NRC's regulations and is, therefore, acceptable.

As part of STD COL 6.6-1, the COL applicant added to the end of DCD Section 6.6.1 words to state that Class 2 and 3 components are included in the equipment designation list contained in the ISI program. The requirements in 10 CFR 50.55a(g)(3)(ii) state, in part, that Class 2 and 3 components be designed and provided with access to enable the performance of ISI examinations. In addition, the inclusion of Class 2 and 3 components is consistent with the requirements of an ISI program as defined under ASME Section XI, and is, therefore, acceptable. The staff concludes that the supplemental information provided by the COL applicant meets the NRC's regulations and is, therefore, acceptable.

In Section 6.6 of the FSER (NUREG-1793), the staff identified COL Action Item 6.6-1 in which the COL applicant will prepare a PSI program and an ISI program for ASME Code, Class 2 and 3 systems, components and supports. The PSI and ISI programs will address the equipment and techniques used. As part of STD COL 6.6-1, the COL applicant describes the use of visual, surface, ultrasonic, alternative examination techniques, and the use of automated equipment to perform the examinations. The COL applicant referenced the relevant portions of the ASME Code, Section XI to describe the nondestructive examination techniques and alternative examinations. The COL applicant also added information to describe the 120-month inspection interval as defined by IWB-2400 for Inspection Program B and the evaluation of examination results as defined by the ASME Code, Section XI, paragraphs IWC-, IWD-, IWE-, or IWF-3400 acceptance criteria. In addition, the COL applicant appropriately referenced 10 CFR 50.55a(b)(2)(xix) and IWA-2240 as described in the 1997 Addenda of the ASME Code, Section XI when applying alternative examination provisions. The supplemental information provided by the COL applicant meets the requirements in 10 CFR 50.55a, the ASME Code, Section XI, and the guidelines in RG 1.206, Section C.III.1, Chapter 6, C.I.6.6.3, and is, therefore, acceptable. Based on the discussion above, the staff concludes that the supplemental information under STD COL 6.6-1 is acceptable.

- **STD COL 6.6-2**

As part of STD COL 6.6-2, the COL applicant states that during the construction phase of the project, anomalies and construction issues are addressed using change control procedures. Modifications reviewed following DC will adhere to the same level of review as the certified design, thus, control of accessibility is maintained during post-DC activities. Control of accessibility for inspectability and testing during post-DC activities is provided via procedures for design control and plant modifications. In the NRC staff's FSER (NUREG-1793), the staff identified COL Action Item 6.6-2, which recommends COL applicants referencing the AP1000 certified design address the controls to preserve accessibility and inspectability for ASME Code, Section III, Class 2 and 3 components and piping during construction or other post-DC activities. The NRC staff reviewed the applicant's proposed resolution of COL Action Item 6.6-2 using NUREG-0800, Section 6.6. The staff finds that the accessibility needed to perform PSI/ISI examinations is maintained during the design, construction and operational phases, which satisfies NUREG-0800, Section 6.6 recommendations for accessibility. In addition, the supplemental information meets the regulations under 10 CFR 50.55a(g)(3)(ii), which requires that Class 1, 2, and 3 components be designed and provided with access that enables the performance of ISI examinations, and the requirements under ASME Code, Section XI, IWA-1500. Based on the discussion above, the staff concludes that STD COL 6.6-2 is acceptable.

Supplemental Information

- **STD SUP 6.6-1**

As part of STD SUP 6.6-1, the COL applicant added supplemental information to the AP1000 DCD, Section 6.6.2, to address accessibility of Class 2, 3, and Class MC pressure retaining components to permit preservice and inservice examinations. Factors considered, such as examination requirements, techniques, accessibility, geometry, and material selections, are used in establishing the designs with the goals being to eliminate uninspectable components, reduce occupational radiation exposure, reduce inspection times, allow state-of-the-art inspection systems, and enhance detection and the reliability of flaw characterization.

The requirements in 10 CFR 50.55a(g)(3)(ii) state, in part, that Class 2 and 3 components be designed and provided with access to enable the performance of ISI examinations. ASME Code, Section XI, IWA-1500 requires that access be provided to enable the performance of ISI examinations, along with design considerations to render ISI practical. The staff finds that the supplemental information under STD SUP 6.6-1 meets the requirements of 10 CFR 50.55a and ASME Code, Section XI, and is, therefore, acceptable.

License Condition

- *Part 10, License Condition 6*

The COL applicant proposed a license condition for BLN for all operational programs requiring that the licensee shall submit to the appropriate Director of the NRC a schedule, no later than 12 months after issuance of the COL, that supports planning for and conduct of NRC inspections of operational programs. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operational program has been implemented or the plant has been placed into commercial service. A separate license condition for PSI and ISI program implementation requirements is not necessary in the BLN COL FSAR since it is a requirement under 10 CFR 50.55a. However, submittal of the schedule for the PSI and ISI program development is necessary to plan for and conduct NRC inspections during construction. The staff finds that this schedule will enable the staff to adequately plan and schedule inspections of the PSI and ISI programs during the construction phase. This proposed license condition is consistent with the policy established in SECY-05-0197, and is acceptable.

6.6.5 Post-Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff proposes to include the following license condition associated with the PSI and ISI programs:

- License Condition (6-3)—No later than 12 months after issuance of the COL, the licensee shall submit to the appropriate Director of NRO a schedule that supports planning for and conduct of NRC inspections of the PSI and ISI programs. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the PSI and ISI programs have been fully implemented.

6.6.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 45 and 10 CFR 50.55a. The staff based its conclusion on the following:

- STD COL 6.6-1 is acceptable because the staff concluded that the applicant's AP1000 ISI program for ASME Code Class 2, 3, and MC (metal containment) components is acceptable and meets the requirements of 10 CFR 50.55a with regard to the preservice and inservice inspectability of these components.

- STD COL 6.6-2 is acceptable because the staff concluded that the accessibility needed to perform PSI/ISI examinations is maintained during the design, construction and operational phases, and satisfies NUREG-0800, Section 6.6 acceptance criteria for accessibility.
- STD SUP 6.6-1 is acceptable because the staff concluded that accessibility to perform ISI examinations would be incorporated into the design, and satisfies the requirements of 10 CFR 50.55a(g)(3)(ii).

7.0 INSTRUMENTATION AND CONTROLS

Nuclear power plant instrumentation senses various plant parameters and transmits appropriate signals to the control systems during normal operation and to the reactor trip and engineered safety feature systems during abnormal and accident conditions. The information provided in this chapter emphasizes those instruments and associated equipment that constitute the protection and safety systems.

7.1 Introduction

7.1.1 Introduction

The Westinghouse AP1000 Design Control Document (DCD) contains Combined License (COL) Information Item 7.1-1 that requires the COL applicant to address setpoint calculations for protective functions.

7.1.2 Summary of Application

Section 7.1 of the Turkey Point Units 6 and 7 COL Final Safety Analysis Report (FSAR), Revision 8 incorporates by reference Section 7.1 of the AP1000 DCD, Revision 19.

In addition, the applicant provided the following to address COL Information Item 7.1-1:

AP1000 COL Information Item

- STD COL 7.1-1

Standard (STD) COL 7.1-1 addresses setpoint calculations for protective functions.

7.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for Instrumentation and Controls are in Section 7.1 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants."

The applicable regulatory requirements for the information being reviewed in this section are:

- Title 10 of the *Code of Federal Regulations* (10 CFR) 50.36
- 10 CFR 52.79(a)(30)

7.1.4 Technical Evaluation

The Nuclear Regulatory Commission (NRC) staff reviewed Section 7.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this

review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to setpoint calculations for protective functions. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the design certification (DC) and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant (VEGP), Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) may include evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 7.1.4 of the VEGP SER:

*The applicant, in its letter dated May 21, 2010, proposed to incorporate the Setpoint Program (SP) that will be added to the AP1000 DCD into the VEGP Technical Specifications (TS). This proposal was made to address Open Item 16.1-1. In Chapter 16 of this safety evaluation report (SER), the staff concludes that the response to Open Item 16.1-1 is acceptable. The incorporation of this program into the VEGP TS in a later revision is being tracked as **Confirmatory Item 16.1-1**. The closure of this Confirmatory Item is provided in SER Section 16.1.*

In addition, in a letter dated June 4, 2010, the applicant proposed adding STD COL 7.1-1 as a new COL information item addressed in the VEGP COL FSAR.

¹ Section 1.2.2 contains a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a design certification (DC). This footnote will be referenced in several places throughout the chapter of this Safety Evaluation.

AP1000 COL Information Item

- STD COL 7.1-1

The applicant proposed adding a new line item to VEGP COL FSAR Table 1.8-202 to address COL Information Item 7.1-1. The applicant also proposed the following addition to VEGP COL FSAR Section 7.1:

7.1.6.1 Setpoint Calculations for Protective Functions

The Setpoint Program described in Technical Specifications Section 5.5 provides the appropriate controls for update of the instrumentation setpoints following completion of the calculation of setpoints for protective functions and the reconciliation of the setpoints against the final design.

The applicant states that the TS program identified in the proposed Section 7.1.6.1 was that addressed in the VEGP revised response to Bellefonte Nuclear Plant (BLN) Open Item 16.1-1, dated May 21, 2010, and that the calculation and reconciliation of the setpoints discussed is required by the AP1000 Inspections, Tests, Analyses and Acceptance Criteria (ITAAC) included in AP1000 DCD Tier 1, Table 2.5.2-8, Item 10. In Chapter 16 of this SER, the staff concludes that the May 21, 2010, response to BLN Open Item 16.1-1 is acceptable.

*Based on the ITAAC in Table 2.5.2-8, Item 10 and the TS controls in Section 5.5, the staff finds there are adequate controls for updating the instrumentation and controls (I&C) setpoints. Therefore, the staff finds STD COL 7.1-1 acceptable. The incorporation of the changes associated with proposed STD COL 7.1-1 into a future revision of the VEGP COL FSAR is **Confirmatory Item 7.1-1**.*

Resolution of Standard Content Confirmatory Item 7.1-1

Confirmatory Item 7.1-1 is an applicant commitment to revise its FSAR Table 1.8-202 and Section 7.1 to address COL Information Item STD COL 7.1-1. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 7.1-1 is now closed.

7.1.5 Post Combined License Activities

There are no post-COL activities related to this section.

7.1.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff has compared the application to the relevant NRC regulations and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. The staff based its conclusion on the following:

- STD COL 7.1-1, the applicant provided a program for setpoint calculations for protective functions in accordance with the requirements of 10 CFR 50.36 and 10 CFR 52.79(a)(30).

7.2 Reactor Trip

Section 7.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8 incorporates by reference, Section 7.2, "Reactor Trip," of Revision 19 of the AP1000 DCD.

In addition, in the Turkey Point Units 6 and 7 FSAR, the applicant provided the following:

Departures

- PTN DEP 6.4-2

The applicant provided additional information in Section 7.2 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR, is reviewed in Section 21.3 of this SER.

- PTN DEP 7.3-1

The applicant provided additional information in Table 7.2-201 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 7.3-1 related to required design changes for the protection and safety monitoring system (PMS) source range neutron flux doubling logic to comply with the requirements of Institute of Electrical and Electronics Engineers (IEEE) Std. 603-1991, Clause 6.6. This information, as well as related PTN DEP 7.3-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.5 of this SER.

The NRC staff reviewed Section 7.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of the information relating to this section.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

7.3 Engineered Safety Features

Section 7.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8 incorporates by reference, Section 7.3, "Engineered Safety Features," of Revision 19 of the AP1000 DCD.

In addition, in the Turkey Point Units 6 and 7 FSAR the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Section 7.3.1.2.17 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

- PTN DEP 6.4-2

The applicant provided additional information in Section 7.3.1.2.17 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR is reviewed in Section 21.3 of this SER.

- PTN DEP 7.3-1

The applicant provided additional information in Section 7.3.1.2.14 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 7.3-1 related to required design changes for the PMS source range neutron flux doubling logic to comply with the requirements of IEEE Std. 603-1991, Clause 6.6. This information, as well as related PTN DEP 7.3-1 information appearing in other chapters of the FSAR is reviewed in Section 21.5 of this SER.

The NRC staff reviewed Section 7.3.1.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this section.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In RAI 1-4, issued to the applicant for the BLN, Units 3 and 4, the staff questioned how the applicant would verify that the as-built I&C system configuration conformed to schematics. In its response to RAI 1-4, the BLN applicant indicated that it or a designee would verify I&C cabinets as-built against the design drawings during manufacturing and would functionally test each system. In addition, the BLN applicant's response indicated that the I&C cabinets would be tested during preoperational testing and in accordance with several ITAAC related to the I&C system. The BLN response to RAI 1-4 was endorsed as standard for Turkey Point Units 6 and 7 by Florida Power & Light Company in its letter dated October 5, 2009.

The staff notes that vendor qualification testing, which may be done offsite, and preoperational testing fall under the applicant's quality assurance program. Any anomalies found during the testing or any problems identified from the time the testing is complete until the components are installed at the site would be corrected in accordance with the applicant's quality assurance program. The staff finds the verification of the as-built I&C system configuration against schematics using a combination of vendor and onsite testing that falls under the applicant's

quality assurance program acceptable. In addition, the staff finds that adequate program controls exist to ensure that once the testing was complete, the I&C system configuration would be maintained as valid throughout the life of the plant. Based on the above, the staff finds the response to BLN RAI 1-4 and the Florida Power & Light Company endorsement of that response acceptable.

7.4 Systems Required for Safe Shutdown

Section 7.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8 incorporates by reference, Section 7.4, "Systems Required for Safe Shutdown," of Revision 19 of the AP1000 DCD.

In addition, in the Turkey Point Units 6 and 7 FSAR the applicant provided the following:

Departures

- PTN DEP 6.3-1 and PTN DEP 3.2-1

The applicant provided additional information for PTN DEP 6.3-1 and PTN DEP 3.2-1 in Turkey Point Units 6 and 7 COL FSAR Section 7.4.1.1 related to extended operation of the PRHR-HX, the ability to maintain safe shutdown conditions, changing the indefinite duration to at least 72 hours, and operator directed actions to preserve battery capability. This information, as well as related PTN DEP 6.3-1 information appearing in other chapters of the FSAR is reviewed in Section 21.1 of this SER.

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 7.4.1.1 and checked the referenced DCD to ensure that the combination of the DCD and the Turkey Point Units 6 and 7 COL application represents the complete scope of information relating to this section. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements. Section 21.1 of this report evaluates the departures from the AP1000 DCD provided in PTN DEP 6.3-1 and PTN DEP 3.2-1.

7.5 Safety-Related Display Information (Related to RG 1.206, Section C.III.1, Chapter 7, C.1.7.5, "Information Systems Important to Safety")

7.5.1 Introduction

Safety-related display information includes equipment that processes safety-related information and displays it for use by the operator to monitor and maintain the safety of the AP1000 throughout operating conditions that include anticipated operational occurrences and accident and post-accident conditions.

The AP1000 DCD contains COL Information Item 7.5-1 that requires the COL applicant to address post accident monitoring variables listed as site specific in DCD Tables 7.5-1 and 7.5-8.

7.5.2 Summary of Application

Section 7.5 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8 incorporates by reference Section 7.5 of the AP1000 DCD, Revision 19.

In addition, in the Turkey Point Units 6 and 7 FSAR the applicant provided the following:

Departure

- PTN DEP 6.4-2

The applicant provided additional information in Section 7.5 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR, is reviewed in Section 21.3 of this SER.

AP1000 Information Items

- STD COL 7.5-1 and PTN COL 7.5-1

The applicant provided additional information in Turkey Point Units 6 and 7 COL FSAR Section 7.5, "Safety-Related Display Information," describing the FSAR Table 7.5-201 supplement to DCD Table 7.5-1 and providing variable data shown in the DCD table as "site specific."

The applicant also provided additional information in Turkey Point Units 6 and 7 COL FSAR Section 7.5, describing the FSAR Table 7.5-202 supplement to DCD Table 7.5-8 and providing variable data shown in DCD Table 7.5-8 as "site specific."

7.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in the Final Safety Evaluation Report related to the DCD.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the information systems important to safety are given in Section 7.5 of NUREG-0800.

The applicable regulatory requirements, guidelines, and related acceptance criteria for the supplemental information item are as follows:

- General Design Criterion (GDC) 13, "Instrumentation and Control"
- GDC 64, "Monitoring Radioactivity Releases"

The regulatory bases require, in part, that instrumentation be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to ensure adequate safety. Monitoring should include checking the plant environs for radioactivity that may be released from postulated accidents.

7.5.4 Technical Evaluation

The NRC staff reviewed Section 7.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to safety-related display information. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- STD COL 7.5-1 and PTN COL 7.5-1

The AP1000 DCD references and commits to Regulatory Guide (RG) 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," Revision 3, as the method of complying with GDC 13 and GDC 64.

Appendix 1AA of Turkey Point Units 6 and 7 COL FSAR takes exception to Revision 4 of RG 1.97. The applicant, instead, states conformance to Revision 3 of RG 1.97. The applicant states, "Portable equipment outside the DCD scope conforms to Revision 3 of this Regulatory Guide for consistency with DCD scope since Revision 4 indicates that partial implementation is not advised." The staff discusses the acceptability of Revision 3 of RG 1.97 in Section 12.1 of this SER.

Revision 3 of RG 1.97 states that the variable and range information should be provided for environs radiation and radioactivity, and meteorological instrumentation.

The staff issued RAI 5191, Question 07.05-1 requesting information on boundary environs radiation and meteorological instrumentation. The staff finds that the range of the boundary environs radiation instruments is necessary to ensure that the instruments are adequate for monitoring radioactivity that may be released from a postulated accident. In a letter dated March 18, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML110800598), the applicant provided a supplemental response to RAI 5191, Question 07.05-1 with sufficient meteorological range and accuracy information for wind direction, wind speed, and differential temperature. In addition, the revised Turkey Point Units 6 and 7 COL FSAR Table 7.5-201 included the boundary environs radiation variable and the required range information for the post-accident monitoring system. The supplemental information conforms to the guidance of Revision 3 of RG 1.97. The staff confirmed that the Turkey Point Units 6 and 7 COL FSAR was updated to incorporate the instrumentation supplemental information. The staff finds the response acceptable and considers RAI 5191, Question 07.05-1 closed.

Additionally, the applicant identified a typographical error in FSAR Table 7.5-201, with respect to the range of the wind direction parameter. In its letter dated January 28, 2013, the applicant identified the proposed change for the wind direction range, from 0 - 36° to 0 - 360°. This proposed change will be tracked as **Confirmatory Item 7.5-1** pending the applicant's update of the FSAR.

Resolution of Turkey Point Confirmatory Item 7.5-1

Confirmatory Item 7.5-1 is an applicant commitment to revise its FSAR Table 7.5-201 regarding the wind direction range. The staff verified that the Turkey Point Units 6 and 7 COL FSAR, Revision 8 was appropriately revised. As a result, Confirmatory Item 7.5-1 is now closed.

7.5.5 Post Combined License Activities

There are no post-COL activities related to this section.

7.5.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff has compared the application to the relevant NRC regulations and other NRC RGs and concludes that the applicant is in compliance with the NRC regulations. The applicant has satisfactorily addressed the guidance of Revision 3 of RG 1.97 through the response to RAI 5191, Question 07.05-1. The staff based its conclusion on the following:

- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.
- STD COL 7.5-1 and PTN COL 7.5-1 provided sufficient information regarding the safety-related display information, which is, therefore, acceptable in accordance with the requirements of 10 CFR Part 50, Appendix A, GDC 13 and GDC 64.

7.6 Interlock Systems Important to Safety

Section 7.6 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8 incorporates by reference, with no departures or supplements, Section 7.6, "Interlock Systems Important to Safety," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review. The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

7.7 Control and Instrumentation Systems (Related to RG 1.206, Section C.III.1, Chapter 7, C.I.7.7, "Control Systems Not Required for Safety")

Section 7.7 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8 incorporates by reference, with no departures or supplements, Section 7.7, "Control and Instrumentation Systems," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review. The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

8 ELECTRIC POWER

8.1 Introduction

The electric power system is the source of power for station auxiliaries during normal operation and for the reactor protection system and engineered safety features during abnormal and accident conditions at the Turkey Point, Units 6 and 7. This chapter provides information on the functional adequacy of the offsite electric power systems and safety-related onsite electric power systems, as applicable to the application, based on the Westinghouse AP1000 certified standard design, and ensures that these power systems have adequate capacity, capability, redundancy, independence, and testability in conformance with the current criteria established by the U.S. Nuclear Regulatory Commission (NRC).

Chapter 8, "Electric Power," of this advance safety evaluation (ASE) describes the results of the review by the NRC staff (the staff) of the Turkey Point Combined License (COL) Final Safety Analysis Report (FSAR), Part 2 of the COL application (COLA), submitted by Florida Power and Light Company (FPL), the COL applicant (the applicant).

8.1.1 Introduction

This section provides the applicant's description of the electric power system with regard to the interrelationships between the nuclear unit, the utility grid, and the interconnecting grids.

In addition, this section includes a regulatory requirements applicability matrix that lists all design bases, criteria, regulatory guides (RGs), standards, and other documents to be implemented in the design of the electrical systems that are beyond the scope of the AP1000 design certification (DC).

8.1.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR, Revision 8, Section 8.1 incorporates by reference AP1000 Design Control Document (DCD), Revision 19, Section 8.1, with some departures and/or supplements.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 8.1, the applicant provided the following:

Supplemental Information

- Turkey Point Supplement (PTN SUP) 8.1-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 8.1, "Introduction," describing Turkey Point's connections to the FPL electrical grid and the connection interfaces with neighboring utilities via the Turkey Point, Units 6 and 7, 500/230-kilovolt (kV) Clear Sky switchyard at the Turkey Point site.

- PTN SUP 8.1-2

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 8.1 describing additional information pertaining to regulatory guides and Institute of

Electrical and Electronics Engineers (IEEE) standards identified in AP1000 DCD FSAR, Table 8.1-1, and to other applicable regulatory guides as indicated in Turkey Point Units 6 and 7 COL FSAR Table 8.1-201, "Site-Specific Guidelines for Electric Power Systems."

8.1.3 Regulatory Basis

The regulatory basis for the information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report [FSER] Related to Certification of the AP1000 Standard Design," and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of NRC regulations for the introduction to the electric power systems are given in NUREG-0800, Section 8.1, "Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR [light-water reactor] Edition)."

The applicable regulatory requirements, guidelines, and related acceptance criteria for the supplemental information items are as follows:

- Title 10 of the *Code of Federal Regulations* (10 CFR) Subsection 50.63, "Loss of All Alternating Current Power"
- RG 1.155, "Station Blackout"
- RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)"

8.1.4 Technical Evaluation

The NRC staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 8.1 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the introduction to the electric power systems. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the following information in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- PTN SUP 8.1-1

The staff reviewed the supplemental information related to the FPL utility grid and its connection to neighboring utilities included under PTN SUP 8.1-1. The applicant's supplement to Turkey Point Units 6 and 7 Section 8.1.1 is summarized as follows:

¹ See Section 1.2.2 of this SER for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a DC. This footnote will be referenced in several places throughout the chapter of this Safety Evaluation.

The FPL power transmission system consists of transmission lines and substations that link various generation facilities, load centers, and grid interties within the FPL service territory at various voltages. FPL maintains multiple direct interconnections with neighboring utilities. These interconnections serve to increase the reliability of the FPL electrical grid.

Turkey Point, Units 6 and 7 are connected to a new common switchyard, the Clear Sky substation, having dual voltages 500 kV and 230kV. The switchyard also serves as units' preferred and maintenance source. The switchyard has two sections, one operating at 230 kV, and the other at 500 kV. These sections are interconnected with two 230-kV/500-kV autotransformers. The switchyard has both breaker-and-a-half (230 kV) and double breaker (500-kV) schemes. There are two 500-kV and two 230-kV transmission lines that connect the switchyard to the grid.

The NRC staff finds that the applicant has adequately described the Turkey Point, Units 6 and 7, connection to the utility grid and that the information provided is in accordance with the recommendations of RG 1.206 and the guidance in NUREG-0800, Section 8.1.

- PTN SUP 8.1-2

The staff also reviewed supplemental information included in PTN SUP 8.1-2, related to regulatory guidelines and industry standards and concluded that it was consistent with NUREG-0800, Section 8.1, with the exception of the information discussed below.

Turkey Point Units 6 and 7 COL FSAR Table 8.1-201, Item 1b, indicated that RG 1.155 is not applicable to Turkey Point. This item was deemed standard among COL applications being discussed in Bellefonte's (BLN) response to Request for Additional Information (RAI) 08.01-2. In an October 5, 2009, letter, the applicant stated that the standard response to RAI 08.01-2 applies to the Turkey Point Units 6 and 7 COL application.

The standard response submitted by BLN in a June 24, 2008, letter, is summarized as follows: BLN stated that the AP1000 design meets the requirements of 10 CFR 50.63 for 72 hours and, therefore, no specific procedures or training specific to station blackout (SBO) are necessary. The staff determined that the above response was inconsistent with the recommendations of RG 1.155 and the requirements of 10 CFR 50.63. The staff recognizes that the passive systems can maintain safe-shutdown conditions after design-basis events for 72 hours, without operator action, following a loss of both onsite and offsite alternating current (ac) power sources. However, the applicant needs to establish SBO procedures and training for operators to include actions necessary to restore offsite power after 72 hours by addressing alternating current (ac) power restoration (e.g., coordination with transmission system load dispatcher), and severe weather guidance (e.g., identification of site-specific actions to prepare for the onset of severe weather such as an impending tornado) in accordance with RG 1.155, Regulatory Positions C.2 and C.3.4.

Several discussions were held between the staff and the BLN applicant regarding this issue. Subsequently, in an April 15, 2009, letter, the BLN applicant stated that the training and procedures to support mitigation of an SBO event would be implemented in accordance with BLN COL FSAR Sections 13.2 and 13.5, respectively. As recommended by NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," which is endorsed by RG 1.155, the loss of all ac power event mitigation procedures will address response (e.g., restoration of onsite power sources), ac power restoration (e.g., coordination with transmission system load dispatcher), and severe weather guidance (e.g., identification of actions to prepare for the onset of severe weather such as an

impending tornado), as applicable. In addition, the BLN applicant stated that there are no nearby large power sources, such as a gas turbine or black-start fossil fuel plant that can directly connect to the station to mitigate the event. The staff found the BNL applicant's response acceptable.

In a January 26, 2010, letter, the Turkey Point applicant stated that it did not endorse BLN's revised response because nearby large power sources exist at Turkey Point. However, the applicant updated Turkey Point Units 6 and 7 COL FSAR, Revision 6, Section 1.9.5.1.5 to include training and procedures to support mitigation of an SBO event.

The staff verified that the applicant updated Turkey Point Units 6 and 7 COL FSAR Sections 1.9.5.1.5 and 1.9.6 to include the above-mentioned items including the implementation of training and procedures to support mitigation of an SBO event. The staff finds that this update satisfies RG 1.155, Regulatory Positions C.2 and C.3.4. Based on the above, the staff considers this item resolved.

8.1.5 Post Combined License Activities

There are no post COL activities related to this section.

8.1.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to the introduction to the electric power systems, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point COL Units 6 and 7 application are documented in NUREG-1793 and its supplements.

In addition, the staff compared the additional COL-specific supplemental information in the application to the relevant NRC regulations; guidance in NUREG-0800, Section 8.1, and other NRC regulatory guides; and concluded that the applicant is in compliance with the NRC regulations. The staff based its conclusion on the following:

- PTN SUP 8.1-1 is acceptable because the applicant provided sufficient information regarding the FPL transmission system and its connection to neighboring utilities in accordance with the recommendations of RG 1.206.
- PTN SUP 8.1-2 is acceptable because the COL-specific regulatory guidelines and industry standards and additional new regulatory guidelines, are adequately addressed by the applicant. The applicant has also provided sufficient information to satisfy the requirements of 10 CFR 50.63 and the guidance in RG 1.155.

8.2 Offsite Power System

8.2.1 Introduction

The offsite power system is referred to in regulatory guides and industry standards as the "preferred power system." The offsite power system includes two or more physically independent circuits capable of operating independently of the onsite standby power sources

and encompasses the grid, transmission lines (overhead or underground), transmission line towers, transformers, and other switchyard components.

The AP1000 passive reactor plant standard design supports an exemption in 10 CFR Part 52, "Licenses, certifications, and approvals for nuclear power plants," Appendix D, "Design Certification Rule for the AP1000 Design," paragraph V.B.3, to the requirement of 10 CFR Part 50, "Domestic licensing of production and utilization facilities," Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 17, "Electric Power Systems," to have only one (not two) physically independent offsite circuit to provide for defense-in-depth. Therefore, for Turkey Point, Units 6 and 7, the single offsite power source provided from the transmission network is reviewed below to assure that it satisfies the requirements of GDC 17 with respect to its capacity and capability.

8.2.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR, Revision 8, Section 8.2 incorporates by reference AP1000 DCD FSAR, Revision 19, Section 8.2.

In addition in Turkey Point Units 6 and 7 COL FSAR Section 8.2, the applicant provided the following:

AP1000 COL Information Items

- **PTN COL 8.2-1**

The applicant provided additional information in PTN COL 8.2-1 to address COL Information Item 8.2-1 (COL Action Items 8.2.3-1 and 8.2.3.3-1) to address the design of the ac power transmission system and its testing and inspection plan. The information describes: (1) the designs of the plant site 500-kV/230-kV switchyard and the transmission lines connecting Units 6 and 7 to the switchyard and the 500-kV/230 kV switchyard to various substations throughout the transmission grid; (2) the connections of the generator step-up (GSU) transformers and the reserve auxiliary transformers (RATs) to the switchyard; (3) the ratings and arrangement of the switchyard circuit breakers and disconnect switches; (4) the transformer area arrangement for each unit; (5) the locations of the GSU transformers, unit auxiliary transformers (UATs), and RATs; (6) the design of the control building in the plant site 500-kV/230-kV switchyard; (7) the administrative control of the 500-kV/230-kV switchyard and transmission line circuit breakers; (8) the switchyard and transmission line testing and inspection plan; and (9) grid stability analysis. PTN COL 8.2-1 is addressed in Turkey Point Units 6 and 7 COL FSAR Sections 8.2.1, 8.2.1.1, 8.2.1.2, 8.2.1.3, and 8.2.1.4.

- **PTN COL 8.2-2**

The applicant provided additional information in PTN COL 8.2-2 to address COL Information Item 8.2-2 (COL Action Items 8.2.3.1-1, 8.2.3.1-2, and 8.2.3.1-3), describing: (1) the switchyard arrangement and design of the protective relaying scheme; and (2) a transmission system study performed regularly to verify grid stability, switchyard voltage, and frequency to confirm the transmission system capability to maintain reactor coolant pump (RCP) operation for 3 seconds following a turbine trip as specified in AP1000 DCD FSAR Section 8.2.2. PTN COL 8.2-2 is addressed in Turkey Point Units 6 and 7 COL FSAR Sections 8.2.1.2.1 and 8.2.2.

Site-Specific Information Replacing Conceptual Design Information (CDI)

- PTN CDI

The applicant provided site-specific information describing the transformer area located next to each unit's turbine building and containing the GSU transformers, the UATs, and the RATs. This replaced the CDI located in the AP1000 DCD FSAR.

Supplemental Information

- PTN SUP 8.2-1

The applicant provided supplemental information describing details of a failure modes and effects analysis (FMEA) performed for the offsite power distribution system, plant site switchyard, and the transmission system.

- PTN SUP 8.2-2

The applicant provided supplemental information describing the formal agreement between Turkey Point and FPL's Transmission Operations and Planning organization, which is the transmission system operator (TSO). The applicant provided supplemental information describing FPL's responsibility for assuring that adequate voltage is available to Turkey Point, Units 6 and 7; maintaining area bulk transmission system reliability and demonstrating, by power system simulation studies, projections, and analyses, the current and future reliability of the system. In addition, the applicant described the interfaces between Turkey Point and FPL's Transmission Operations explaining that protocols are in place for both entities to remain cognizant of grid vulnerabilities in order to make mutually informed decisions regarding maintenance activities critical to the electric system.

- PTN SUP 8.2-3

The applicant provided supplemental information describing the average grid availability of the 230 kV and 500 kV from the Turkey Point substation and transmission lines that feed the Turkey Point site for the period from January 1, 1988, to September 30, 2008.

- Turkey Point Units 6 and 7, response to RAI 6750

The applicant, in response to the staff concern related to the design vulnerability identified in Bulletin 2012-01, proposed the following additional information (ML15091A388):

8.2.1.2.2 Plant Response to High Voltage Open Phase Condition

"A monitoring system is installed on the credited GDC 17 offsite power circuit that provides continuous open phase condition monitoring of the MSU transformer HV input power supply (see Reference 202). The system detects an open phase condition (with or without a concurrent high impedance ground on the HV side of the transformer) on one or more phases under all transformer loading conditions. The open phase condition monitoring system provides an alarm to the operators in the control room should an open phase condition occur on the HV source to the MSU transformers. The system design utilizes commercially available components including state of the art digital relaying equipment and input parameters as required to provide loss of phase detection and alarm capability.

Additionally, a high-voltage open phase condition with or without a ground fault can manifest itself as an unacceptable voltage on the 6.9 kV medium voltage ES-1 and ES-2 buses during normal loading conditions. The presence of unacceptable voltages on the ES-1 and ES-2 buses results in isolation of the affected medium voltage bus from the offsite power supply and enables the onsite standby diesel generators to start and restore ac power to the ES-1 and ES-2 buses and associated defense-in-depth loads. The onsite ac power system is described in AP1000 DCD Section 8.3.1.

Motor management relays for the medium voltage motors on ES-1 and ES-2 provide detection of unacceptably high negative sequence currents. High negative sequence current motor trips or other running load trips provide alarms in the main control room (MCR), which can assist in the detection of a high-voltage open phase condition with or without a ground fault. Electric circuit protection for the medium voltage system and equipment is described in AP1000 DCD Section 8.3.1.1.1.1.

A high-voltage open phase condition with or without a ground fault can also manifest itself as an unacceptable voltage on the 480 VAC low-voltage buses powered from ES-1 and ES-2. The safety related IDS battery chargers are powered from the low-voltage buses and continue to charge the IDS batteries unless the battery charger input or output monitored electrical parameters are unacceptable. If the monitored electrical parameters degrade to the point that the battery charger no longer provides sufficient dc bus voltage, the Class IE electrical system dc bus receives power from the applicable IDS battery and the battery charger maintains isolation between the Non-Class IE ac and Class 1 E dc power systems which generates alarms in the MCR. The onsite AC power system is described in AP1000 DCD Section 8.3.1 and the Class 1 E DC power system is described in AP1000 DCD Section 8.3.2.1.1.

Operator actions and maintenance and testing activities are addressed in procedures, as described in Turkey Point Units 6 and 7 COL FSAR Section 13.5. Plant operating procedures, including off-normal operating procedures associated with the monitoring system will be developed prior to fuel load. Maintenance and testing procedures, including calibration, surveillance testing, set point determination and troubleshooting procedures associated with the monitoring system will be developed prior to fuel load.

Control Room operator and maintenance technician training associated with the operation and maintenance of the monitoring system will be conducted in accordance with the milestones for Non Licensed Plant Staff and Reactor Operator Training Programs provided in Turkey Point Units 6 and 7 COL FSAR Table 13.4-201.”

Interface Requirements

The plant offsite electrical power interfaces for the AP1000 standard design are discussed in AP1000 DCD Tier 2, Section 8.2.5, Table 1.8-1, Items 8.1, 8.2, and 8.3. These interfaces are identified as “non-nuclear safety (NNS)” interfaces in this table.

8.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of NRC regulations for the offsite power system are given in NUREG-0800, Sections 8.1 and 8.2.

The regulatory bases for acceptance of the COL information and supplementary information items are established as follows:

- 10 CFR Part 10, "Domestic licensing of production and utilization facilities," Appendix A, "General Design Criteria for Nuclear Power Plants" (GDC) Criterion 17 "Electric power systems,"
- GDC 18, "Inspection and Testing of Electrical Power Systems,"
- 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,"
- RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition),"
- Generic Letter (GL) 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power."

8.2.4 Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 8.2 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the Turkey Point Units 6 and 7 COL application and the DCD information incorporated by reference addresses the required information relating to the offsite power system. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generation Plant (VEGP) Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed by the Turkey Point Units 6 and 7 COL applicant.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and concluded that the evaluation performed for the standard content is directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER. Confirmatory items that are first identified in this SER section will have a specific designation (e.g., Confirmatory Item 8.2-1).

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Items

- PTN COL 8.2-1

The applicant provided additional information in PTN COL 8.2-1 to resolve COL Information Item 8.2-1, which states:

Combined License applicants referencing the AP1000 certified design will address the design of the ac power transmission system and its testing and inspection plan (DCD Section 8.2.5).

The commitment was also captured as COL Action Items 8.2.3-1 and 8.2.3.3-1 in NUREG-1793, Appendix F, which states:

The operating voltage for the high side of the AP1000 transformer and transmission switchyard, as well as the frequency decay rate are site-specific and, therefore, will be addressed in the COL application. The COL applicant will provide analysis of these matters, including transient stability, voltage operating range, and preservation of the grid connections, in the COL application (COL Action Item 8.2.3-1).

Combined License applicants referencing the AP1000 certified design will address the design of the ac power transmission system and its testing and inspection plan (COL Action Item 8.2.3.3-1).

The staff reviewed the resolution to COL information item, PTN COL 8.2-1, related to the transmission system design, testing, and inspection included in Turkey Point Units 6 and 7 COL FSAR Section 8.2. The staff's evaluation is as follows:

Turkey Point, Units 6 and 7, receive offsite ac power from a common 500/230-kV switchyard (Clear Sky substation), which is connected to the FPL transmission network through four transmission lines. The applicant described the connection of the RATs to the 230-kV bus in the switchyard. The normal power supply to the main ac power system is provided from the main generator through the UATs. Any of the four transmission lines can serve as the preferred power supply and is the recognized GDC 17 offsite power source for Turkey Point, Units 6 and 7. When either the normal power or the preferred power supply is available, the RATs serve as a source of maintenance power.

In Turkey Point Units 6 and 7 COL FSAR Section 8.2.1.3, regarding the switchyard control building, the applicant stated that the controls for switchyard breakers associated with the Turkey Point Units 6 and 7 main step-up transformers are located inside the plant and are under the administrative control of the plant. The system control center of FPL transmission and substation operations has operational control over the other breakers in the switchyard (including those associated with the reserve auxiliary transformers). Normal ac power for the switchyard is supplied from station service transformers supplied by the tertiary windings of the 500/230-kV autotransformers. A backup source of ac power to the switchyard is supplied from a plant source.

Regarding switchyard and transmission line testing and inspection, in Turkey Point Units 6 and 7 COL FSAR Section 8.2.1.4, the applicant stated that FPL uses a process called, "The

Phoenix Assurance Process,” to ensure the installations of new, relocated, or modified facilities are fully operational before being placed into service. FPL explained as follows: The objectives of the Phoenix Assurance Process are as follows: safety (zero injuries); correct operation of facilities after they are put into service; no rework associated with the installation of facilities; and documentation of new assets and lessons learned. The Phoenix Assurance Process covers acceptance, commissioning, and in-service testing for new equipment and defines the responsibility of each person associated with the project. The transmission switchyard interface agreement will specify that grid maintenance and testing activities that could affect offsite power reliability be closely coordinated with Turkey Point Units 6 and 7. This agreement will also specify that the plant switchyard equipment is maintained by FPL transmission and substation operations. FPL transmission and substation operations will conduct regular inspections of the plant switchyard and perform regular maintenance and necessary repair or replacement of equipment.

The staff reviewed the resolution to the COL information Item PTN COL 8.2-1 related to the description of the offsite power system. The staff determined that additional information was needed to complete the technical evaluation of this item.

Turkey Point Units 6 and 7 COL FSAR Section 8.2.1.1 describes the ratings for the 500-kV and 230-kV circuit breakers associated with the Turkey Point, Units 6 and 7 and states that the 500-kV switchyard is rated for a continuous current of 4000 amperes (A) and fault duty rating of 50 kilo amperes (kA) and 230-kV switchyard is rated for a continuous current of 4000 A and fault duty rating of 63 kA. Since no basis is provided for the specified ratings, in RAI 5993, Question 08.02-2, the staff requested that the applicant explain why the ratings for circuit breakers and disconnect switches in the switchyard are adequate for the application. Specifically, the staff requested that the applicant identify the maximum fault available from the system and confirm that the breaker interrupting ratings, both symmetrical and asymmetrical, are consistent with the available fault. In an October 31, 2011, response to RAI 5993, Question 08.02-2, the applicant stated that it had used steady state power flow simulations to determine the required current capability (amperes RMS) of the 500-kV and 230-kV circuit breakers and disconnect switches. The equipment ratings were determined for all line-in and line-out conditions. The applicant determined that the load current in the 500-kV and 230-kV circuit breakers and disconnect switches is less than 4000 amps for all conditions, and were therefore adequate.

The applicant also stated that they had used short circuit simulations to determine the required maximum interrupting capability of the circuit breakers. The applicant further indicated that the analysis assumed that all generating sources relevant to the facility were in service and that under this assumption, the maximum symmetrical (RMS) fault currents are 21.2 kA and 58.1 kA for the 500-kV and 230-kV circuit breakers, respectively. The applicant concluded that the 500-kV circuit breakers with 50 kA rating and the 230-kV circuit breakers with 63 kA rating have the capability to interrupt the maximum asymmetrical fault. The applicant further stated that Turkey Point Units 6 and 7 COL FSAR Section 8.2.1.1 will be revised to indicate rating for buses and disconnect switches. The staff finds the applicant’s response acceptable because the design of the offsite system components meets the requirements of GDC 17. Therefore, the staff finds the issues in RAI 5993, Question 08.02-2 are resolved and has verified that this change was incorporated in Revision 6 of the Turkey Point Units 6 and 7 COL FSAR.

Turkey Point Units 6 and 7 COL FSAR, Revision 2, Section 8.2.1.1 stated that the switchyard includes surge protective devices, and grounding and a lightning protection system in accordance with standard industry practice. Turkey Point Units 6 and 7 COL FSAR

Table 8.1-201 states that RG 1.204 is applicable to offsite and onsite power systems. In RAI 5993, Question 08.02-3, the staff requested that the applicant clarify if the surge protective devices, and grounding and lightning protection system will follow the guidelines of RG 1.204 and revise Turkey Point Units 6 and 7 COL FSAR Section 8.2.1.1 accordingly. In an October 31, 2011, response to RAI 5993, Question 08.02-3, the applicant stated that Turkey Point will comply with the applicable portions of the standards referenced in RG 1.204, Revision 0. Because the design will include the surge protection features recommended in RG 1.204, Rev 0, the staff finds the applicant's response acceptable and, therefore, considers RAI 5993, Question 08.02-3 resolved. The staff verified that this change was incorporated in Revision 4 of the Turkey Point Units 6 and 7 COL FSAR.

With regard to switchyard and transmission lines testing and inspections, described in Turkey Point Units 6 and 7 COL FSAR, Revision 2, Section 8.2.1.4, in RAI 5993, Question 08.02-4 the staff requested that the applicant indicate the extent to which maintenance and modifications to the switchyard and substation will be reviewed, controlled, and approved through the Turkey Point process. In addition, Turkey Point Units 6 and 7 COL FSAR Section 8.2.1.4 did not provide details regarding testing and inspection of switchyard components. Therefore, in RAI 5993, Question 08.02-5, the staff requested that the applicant provide details in the Turkey Point Units 6 and 7 COL FSAR regarding testing and inspection of switchyard components and the frequency at which these components will be tested/inspected. The staff also requested that the applicant discuss whether North American Electric Reliability Corporation (NERC) standards will be used for switchyard maintenance and testing. In an October 31, 2011, response to RAI 5993, Question 08.02-5, the applicant stated that Turkey Point Units 6 and 7 COL FSAR Section 8.2.1.4 will be revised to include additional details regarding testing and inspection of switchyard components and to discuss compliance with NERC reliability standards applicable to testing and maintenance. In response to RAI 5993, Questions 08.02-2, 08.02-3, 08.02-4, and 08.02-5, the applicant augmented Turkey Point Units 6 and 7 COL FSAR Section 8.2.1.4 in Revision 4 to address these issues. Additionally, the applicant provided the site-specific voltage and frequency variations expected at the Turkey Point, Units 6 and 7, switchyard during transient and steady state operating conditions and the site-specific frequency decay rate to satisfy PTN COL 8.2-1. Since the applicant provided all of the information necessary for the staff to complete the review, the staff finds the applicant's response acceptable and therefore, considers RAI 5993, Questions 08.02-4 and 08.02-5 resolved. The staff also verified that these changes were incorporated in Turkey Point Units 6 and 7 COL FSAR, Revision 6.

- PTN COL 8.2-2

The applicant provided additional information in PTN COL 8.2-2 to resolve COL Information Item 8.2-2, which states:

The Combined License applicant will address the technical interfaces listed in Table 1.8-1 and Section 8.2.2. These technical interfaces include those for ac power requirements from offsite and the analysis of the offsite transmission system and the setting of protective devices.

The staff's evaluation of the technical interfaces is addressed under "Interface Requirements" section of this report.

The commitment was also captured as COL Action Items 8.2.3.1-1, 8.2.3.1-2, and 8.2.3.1-3 in NUREG-1793, Appendix F, which states:

The COL applicant will perform a site-specific grid stability analysis to show that, with no electrical system failures, the grid will remain stable and the reactor coolant pump bus voltage will remain above the voltage necessary to maintain the flow assumed in the Chapter 15 analyses for a minimum of 3 seconds following a turbine trip (COL Action Items 8.2.3.1-1 and 8.2.3.1-3).

The COL applicant will set the protective devices controlling the switchyard breakers in such a way as to preserve the grid connection following a turbine trip (COL Action Item 8.2.3.1-2).

The staff reviewed the resolution to COL information item, PTN COL 8.2-2, related to the transmission system stability analysis and switchyard circuit breaker protective device settings included under Turkey Point Units 6 and 7 COL FSAR Section 8.2. The staff's evaluation is as follows.

PTN COL 8.2-2 was provided by the applicant describing details of the following: the switchyard's arrangement and design of the protective relaying scheme; and a transmission system study performed regularly to verify grid stability; switchyard voltage; and frequency to confirm the transmission system capability to maintain RCP operation for three seconds following a turbine trip as specified in AP1000 DCD FSAR Section 8.2.2. PTN COL 8.2-2 is addressed in Turkey Point Units 6 and 7 COL FSAR Sections 8.2.1.2.1 and 8.2.2.

The applicant stated that the 500-kV and 230-kV switchyards are locally interconnected and each designed with two full-capacity main buses and composite double-breaker/ breaker-and-a-half arrangement for reliability and maintainability. This arrangement allows for isolation of components and buses, while preserving the plant's connection to the grid. In addressing the switchyard protection relay scheme, the applicant stated that the relay protection schemes consist of primary and secondary relaying systems that use separate instrument current transformers, trip circuits, and direct current (dc) power supplies to achieve redundancy in their protection functions. The applicant also stated as follows: Each of the four transmission lines is protected by two independent pilot systems that provide high-speed clearing for a fault anywhere on the line. The 500/230-kV autotransformers and switchyard buses have primary and secondary protective relaying systems that provide high-speed clearing for a fault within the switchyard. The 230-kV circuits to the main step-up and reserve auxiliary transformers have primary and secondary protective relaying systems located in the switchyard control building that communicate via fiber optics to the associated protective relaying system located in the plant. Breaker failure relays are also provided for all switchyard breakers to isolate a failed breaker from all switchyard sources.

The staff finds that the switchyard breaker arrangement, the protection of lines by independent high speed relay schemes, and the breaker failure scheme would combine to preserve Turkey Point's Units 6 and 7 connection to the grid following a turbine trip. The staff considers COL Action Item 8.2.3.1-2 satisfied.

The applicant stated that FPL had performed the required studies to provide an analysis of the stability of the grid with the Turkey Point Units 6 and 7 nuclear units interconnected and integrated into the FPL transmission system. The applicant described the analysis as follows: The analysis included an assessment of how the generators and system would perform following potential severe grid disturbances. Models used for the analysis were based on the latest available load forecasts, generation expansion plan and system plans for 10 years into the future, in accordance with the NERC and Florida Reliability Coordinating Council (FRCC) reliability standards. The performance of the grid stability analysis study consisted of dynamic

simulation and power flow analysis that assessed the response of the transmission system to various system disturbances, including loss of the largest source; loss of the most critical transmission circuit; loss of the largest load; turbine trip (minimum of 3 seconds); and breaker failure. The simulation results were analyzed for any sign of instability, protective relay action, load shedding, voltage, or line-loading violations. The simulation results showed that the Turkey Point Units 6 and 7 plant and transmission system responses to the contingency events were acceptable. Specifically, the applicant found that, (1) the results of the grid stability analysis study do not indicate a loss of electric power from any remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power units or the loss of power from the transmission network; (2) the results of turbine trip simulations demonstrate that the voltage and frequency of the 230-kV switchyard buses remain within the limits required to maintain reactor coolant pump operation for at least 3 seconds following a turbine trip in either Turkey Point Unit 6 or 7; and (3) the transmission study confirmed that the interface requirements for steady-state load, in-rush kVA for motors, nominal voltage, allowable voltage regulation, nominal frequency, allowable frequency fluctuation, maximum frequency decay rate, and the limiting under frequency value for the reactor coolant pump are met.

In RAI 5993, Question 08.02-7, dated October 31, 2011, the staff requested that the applicant provide in the Turkey Point Units 6 and 7 COL FSAR the assumptions made, results (maximum and minimum voltage, frequency variations, and frequency decay rate, etc.) and acceptance criteria for each case. In the response to RAI 5993, Question 08.02-7, the applicant added Table 8.2-201 to provide the additional requested information. From the table, the results of the grid analysis shows the limiting under frequency value for the RCPs to be 57.7 Hz and the calculated value specific to Turkey Point to be 59.73 Hz. The staff confirmed that Table 8.2-201 and the results presented were included in the Turkey Point Units 6 and 7 FSAR and concludes that the expected grid performance is within the parameters specified in the AP1000 DCD. Therefore, the staff considers this issue resolved.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 8.2.4:

Submerged/Inaccessible Electrical Cables

In RAI 8.2-14, the staff asked the applicant to describe the inspection, testing and monitoring program to detect degradation of inaccessible or underground control and power cables that support equipment and other systems that are within the scope of 10 CFR 50.65. The description should include the frequency of testing and inspection. Guidance on the selection of electric cable condition monitoring can be found in Sections 3 and 4.5 of NUREG/CR-7000, "Essential Elements of an Electric Cable Condition Monitoring Program."

In a letter dated May 6, 2010, the applicant stated that the Maintenance Rule (MR) program will not be implemented until prior to fuel load; as such, specific information necessary to determine appropriate inspections, tests and monitoring is not available at this time. In order to determine the method and frequency, a review of detailed design and procurement information is needed. The applicant also stated that the latest industry experience and other available information, including NUREG/CR-7000, will be followed in developing a cable condition monitoring program as part of the MR program. The applicant also committed to revise its FSAR to include condition monitoring of underground or inaccessible

cables in its MR program. The commitment will be reflected in the COL application Part 2, FSAR Chapter 17, Section 17.6 as shown below.

The Condition monitoring of underground or inaccessible cables is incorporated into the maintenance rule program. The cable condition monitoring program incorporates lessons learned from industry operating experience, addresses regulatory guidance, and utilizes information from detailed design and procurement documents to determine the appropriate inspections, tests and monitoring criteria for underground and inaccessible cables within the scope of the maintenance rule (i.e., 10 CFR 50.65). The program takes into consideration Generic Letter 2007-01.

Based on the above, the staff concludes that the applicant's condition monitoring program for underground or inaccessible cables satisfies the recommendations of GL 2007-01, and the guidance in NUREG/CR-7000 and NUREG-0800 Section 8.2.III.1.L. Therefore, this item is resolved subject to the verification that the VEGP COL FSAR has been updated to include applicable portions of the RAI response. This is identified as Confirmatory Item 8.2-3.

Resolution of Standard Content Confirmatory Item 8.2-3

Confirmatory Item 8.2-3 is an applicant commitment to revise its FSAR Section 17.6 to address condition monitoring of underground or inaccessible cables. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 8.2-3 is now closed.

Supplemental Information

- PTN SUP 8.2-1

PTN SUP 8.2-1 was provided by the applicant describing details of a FMEA performed for the offsite power distribution system, plant site switchyard, and the FPL transmission system. The staff reviewed the FMEA of the Turkey Point switchyard and confirmed that the applicant has identified no single initiating event, such as a breaker not operating during a fault condition, a fault on a switchyard bus, a spurious relay trip, a loss of control power supply that would cause failure of more than one single offsite transmission line, or a loss of offsite power to either Turkey Point unit via the GSU transformer. This list conforms to the pertinent guidance of RG 1.206. Therefore, the staff considers PTN SUP 8.2-1 acceptable.

- PTN SUP 8.2-2

With regard to PTN SUP 8.2-2 the applicant provided, in part, the following information:

FPL is the transmission system provider/operator and it constructs, owns, and operates all substation and transmission facilities between the plant and the points of interconnection to the grid. An interface agreement in accordance with the North American Electric Reliability Corporation (NERC) Standard NUC-001-01, between FPL Transmission & Substation-Power Supply Department and Units 6 & 7 will establish the protocol to provide effective monitoring and oversight of all grid, switchyard, and plant activities. These activities include maintenance, testing, planned outages, load reductions, and

emergent conditions that could affect offsite power reliability. Department directives will implement the agreement and will facilitate prompt and effective communications between the FPL power supply system operator and Units 6 & 7 shift manager or unit supervisor. Procedures will be established to ensure switchyard maintenance and design changes are reviewed before implementation.

FPL uses a real-time contingency analysis computer program that is used by FPL's transmission system operators in determining the security level of the transmission system by performing an analysis using a predefined set of contingency criteria (e.g., single contingency). The computer program simulates a list of active contingencies on the current power system and produces an output of system conditions for each defined contingency. The program provides an updated output approximately every 5 minutes using real-time system conditions (e.g., real-time line outages, real-time flows and voltages, real-time breaker status, etc.). For each defined contingency simulated, specified elements are checked for limit violations (e.g. line overloads, voltage limits, and reactive limits at generator buses). All contingencies that cause violations are output along with the identification of the violations and information on the magnitude of the violation. The current and previous outputs are displayed to determine degree of change as compared to the previous contingency analysis output result.

A priority is also designated for each contingency. Violations of nuclear plant limits are assigned the highest priority and if a violation is detected by the contingency analysis computer program, it is reported at the top of the output violation list. The computer program alerts the system operator of abnormal voltages, overloads, or unit limitations that can be created by a loss of one or several elements of the transmission system. The output of the contingency analysis computer program is used continuously by the operators to make critical decisions in response to potential severe conditions.

Minimum and maximum voltage criteria specific to the Units 6 & 7 switchyard buses will be documented in the interface agreement. The Units 6 & 7 agreement will also specify that the Units 6 & 7 shift manager or unit supervisor be notified within 15 minutes if a condition exists or is forecasted to exist (i.e., via contingency analysis computer program) that would result in minimum or maximum switchyard voltage requirements for Units 6 & 7 switchyard being exceeded. This agreement, as well as the overall switchyard agreement, will require restoration of power to Units 6 & 7 on a first-priority basis in the event of a loss of offsite power. The goal for maximum restoration time will be 30 minutes.

The staff reviewed the information provided by the applicant on the functions of FPL and the transmission system operator (TSO). The staff observed that the scope of the interface agreement does not include communication to the grid operator of risk-sensitive plant maintenance activities that could affect grid conditions. Therefore, in RAI 5993 Question 08.02-9, the staff requested that the applicant indicate whether they coordinate maintenance activities that can have an impact on the transmission system with the TSO and have contacts with the TSO to determine current and anticipated grid conditions as part of the grid reliability evaluation performed before conducting grid-risk-sensitive maintenance activities. Additionally, the staff requested that the applicant indicate whether risk-sensitive maintenance

activities are shared between the units and confirm that a quantitative or qualitative grid reliability evaluation will be performed at Turkey Point, Units 6 and 7 as part of the maintenance risk assessment as required by 10 CFR 50.65(a)(4) before performing grid-risk-sensitive maintenance.

In an October 31, 2011, response to RAI 5993, Question 08.02-9, the applicant stated that interface agreement and associated communication protocols will be in accordance with the requirements of NERC reliability standard NUC-001. The applicant further stated that the interface agreement will require a qualitative risk assessment of plant maintenance and testing activities and will require these activities to be coordinated with TSO to prevent inadvertent reduction in nuclear plant defense-in-depth. The applicant indicated that the Turkey Point Units 6 and 7 operators will inform the power supply system dispatcher of planned outages and planned load reductions. The Turkey Point shift manager (SM) or unit supervisor (US) for maintenance and testing activities on the affected unit will provide early warning to the power supply system dispatcher and the SM and/or US of the unaffected units of potential or developing plant conditions that could cause grid instabilities. The detailed interface coordination for plant interface requirements and work controls for Turkey Point Units 6 and 7 will be controlled by plant procedures. The NRC staff has determined that the information provided by the applicant describes how risk-sensitive plant maintenance activities that could affect grid operations will be communicated to the grid operator. The NRC staff also has determined that all other proposed communication protocols between the plant operations staff and the grid operator are acceptable.

Based on the information provided by the applicant on the functions of TSO, and as explained above, the staff finds that the applicant has demonstrated that protocols are in place for Turkey Point Units 6 and 7 to remain cognizant of grid vulnerabilities in order to make informed decisions regarding maintenance activities critical to the electric system. This is consistent with Generic Letter (GL) 2006-2 of which one of the provisions is to reduce the likelihood of losing offsite power. The staff finds that the information provided is also consistent with the guidelines of RG 1.206 and, therefore, considers PTN SUP 8.2-2 acceptable.

- PTN SUP 8.2-3

With regard to PTN SUP 8.2-3, the applicant provided, in part, the following information:

For the period from January 1, 1988, through September 30, 2008, the average grid availability for the eight 230 kV lines from the existing Turkey Point substation and two 500 kV lines from Levee substation in the FPL system is approximately 99.8 percent with only 48 forced outages lasting more than one hour. The average frequency of forced line outages is approximately 1.4 line outages per year for these transmission lines. The majority of the outages where the cause was recorded were due to environmental conditions and equipment malfunction. Other causes for outages were foreign intervention, human error, and relay misoperation.

The guidance of RG 1.206 recommends the inclusion of historical availability performance of the grid at the plant site. Although the acceptability of grid availability is based upon the site with the new units present, history provides insight into the approval process. The staff reviewed the grid availability historical data information provided by the applicant and determined that the information provided by the applicant demonstrated that prior grid availability has not presented an issue of concern. Therefore, the staff considers PTN SUP 8.2-3 acceptable.

- PTN CDI

The CDI information provided by the applicant regarding the transformer area (containing the main step-up transformer, the unit auxiliary transformers, and reserve auxiliary transformers) being located next to each unit's turbine building is consistent with the AP1000 DCD FSAR Section 8.2.1.2 and satisfies the applicable requirements of GDC 17 and is acceptable.

In light of recent operating experience that involved the loss of one of the three phases of the offsite power circuit (i.e., loss of a single-phase) at Byron Station, Unit 2, the NRC issued Bulletin 2012-01, "Design Vulnerability in Electric Power System," on July 27, 2012, to all holders of operating and combined licenses requesting information about the facilities' electric power system designs. The above operating event resulted in neither the onsite nor the offsite electric power system being able to perform its intended safety functions (i.e., to provide electric power to the important to safety buses with sufficient capacity and capability to permit functioning of structures, systems, and components important to safety). NRC Bulletin 2012-01 was issued to operating and new reactor licensees to affirm compliance with GDC 17 requirements and to evaluate whether further NRC action is warranted to address this design vulnerability. Subsequently, in RAI 6750, Question 08-1, the staff requested that the Turkey Point Units 6 and 7 applicant address the matters described in NRC Bulletin 2012-01 and to ensure that the Turkey Point Units 6 and 7 design meets GDC 17.

In a December 4, 2012, letter, the applicant provided its response to RAI 6750, Question 08-1, "Single-Phase Open Circuit Condition," for Turkey Point Units 6 and 7. The proposed design utilized existing undervoltage relays on the ES-1 and ES-2 buses as well as existing undervoltage relays on the loads, on or downstream of the ES-1 and ES-2 buses. Based on review of this response, the staff was unable to determine whether the existing protection schemes would detect open circuit conditions on the high voltage side of a transformer connecting a GDC 17 offsite power circuit to the transmission system for all operating electrical system configurations and loading conditions.

On November 1, 2013, the NRC conducted a public meeting with representatives from the Nuclear Energy Institute (NEI) and other industry representatives to discuss the industry initiative associated with resolving NRC Bulletin 2012-01. During the meeting, industry representatives provided feedback regarding their review of an offsite power two-phase open circuit event that occurred at Forsmark Nuclear Power Plant in Sweden (see NRC Information Notice 2006-18, Supplement 1: "Significant Loss of Safety-Related Electrical Power at Forsmark Unit 1 in Sweden"). The industry representatives informed the staff that their detailed analyses of this condition indicated that the proposed single-open phase detection system may not be sensitive enough to detect a two-phase open circuit condition. Therefore, the industry has taken the position that a two-phase open circuit condition must be considered when developing a resolution for the NRC Bulletin open phase issue.

GDC 17 requires, in part, "An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure: (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences; and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents." For AP1000 reactors, the main ac power system is non-Class 1E and not safety-related. During a loss of offsite power, ac power is supplied by the onsite standby diesel generators, which are

also not safety-related. However, the ac power system is designed such that plant auxiliaries can be powered from the grid under all modes of operation. Furthermore, the ac power systems do supply power to equipment that is important to safety since that equipment serves defense-in-depth functions. The offsite power supply system provides power to the safety-related loads through the battery chargers, and both the offsite power system and the standby diesel generators provide defense-in-depth functions to supplement the capability of the safety-related passive systems for reactor coolant makeup and decay heat removal. In this regard, offsite power is the preferred power source, and supports the first line of defense. In addition, the safety analyses take credit for the grid remaining stable to maintain reactor coolant pump operation for three seconds following a turbine trip in accordance with the guidance of RG 1.206. Accordingly, these electric power systems are important to safety, and subject to the requirements of GDC 17. Consequently, it was the staff's position that AP1000 COL applicants address the design vulnerability identified in NRC Bulletin 2012-01.

Furthermore, it is the staff's position that an acceptable approach for passive designs includes the following four elements: (1) a dedicated automatic detection for an offsite power system single-phase open circuit condition with, and without, a high impedance ground fault condition on the high voltage side of the main power transformer including two open phase conditions under all loading and operating configurations; (2) an alarm in the main control room for operators to take manual actions if necessary; (3) an inspection, test, analysis, and acceptance criteria (ITAAC) to confirm that the analyses for developing the proper set points were completed in accordance with the acceptance criteria and to perform testing to demonstrate that the design functions as described in the Turkey Point Units 6 and 7 COL FSAR; and (4) procedures and training for the operating and maintenance staff. Since the system is continuously monitoring for open phase conditions using digital relays, the Staff concluded that the monitoring system automatically detects an open phase for either of the one or two open phase conditions (i.e. continuous monitoring meets the staff position of automatic detection). With regard staff position (4), Section 13.5 of this report states that the staff has reasonable assurance that the administrative procedures will be established to provide licensed operators and non-licensed plant staff with sufficient knowledge and operating experience to start up, operate, and maintain the plant in a safe manner. This approach ensures the required offsite ac power source with adequate capacity and capability is available to important safety equipment including safety-related battery chargers to meet their intended safety function in accordance with GDC 17 requirements.

The applicant provided a supplemental response to RAI 6750, Question 08-1, in a letter dated March 30, 2015. The response is technically identical to the Levy and Lee responses provided by Duke Energy. The staff reviewed this supplemental response. The supplement acceptably addresses the staff position, as described above, for measures necessary to protect a plant against an open phase condition as described in NRC Bulletin 2012-01. The applicant has provided (1) detection of an offsite power system open phase circuit condition, both with and without a high impedance ground fault condition, on the high voltage side of the MSU transformer under all loading and operating configurations, and (2) an alarm of an open phase condition in the MCR. The staff finds this acceptable since it meets the staff's position on passive reactor designs for open phase circuit conditions, as described above. The staff finds that the information provided in the above supplement is consistent with the information requested within RG 1.206 and the regulatory requirements and complies with the requirements of GDC 17. Therefore, the staff finds this acceptable and considers the issue resolved.

In the supplemental response to RAI 6750, Question 08-1, the applicant provided text that will be added to the next revision of the Turkey Point Units 6 and 7 COL FSAR, including but not

limited to, ITAAC to confirm that the analyses for developing the proper set points were completed in accordance with the acceptance criteria and to perform testing to demonstrate that the design functions as described in the Turkey Point Units 6 and 7 COL FSAR. These proposed additions to the Turkey Point Units 6 and 7 COL FSAR and the ITAAC acceptably address the staff's position as that which is necessary to protect a plant with regard to an open phase condition as described in NRC Bulletin 2012-01, and that the Turkey Point Units 6 and 7 design meets GDC 17. Therefore, the staff considers this issue resolved and RAI 6750, Question 08-1, closed pending the staff's confirmation that the revisions to the Turkey Point Units 6 and 7 COL FSAR identified in the application summary of this SE and provided in the Applicant's letter dated March 30, 2015 are incorporated in the next revision of the Turkey Point Units 6 and 7 application. The inclusion of the information provided in the RAI response in a future revision of the Turkey Point Units 6 and 7 COL FSAR was identified as **Confirmatory Item 8.2-1**.

Resolution of Turkey Point Confirmatory Item 8.2-1

Confirmatory Item 8.2-1 is an applicant commitment to revise its FSAR and ITAAC to include details necessary to protect a plant with regard to an open phase condition, described in NRC Bulletin 2012-01. The staff verified that the Turkey Point COL, Revision 8 was appropriately revised. As a result, Confirmatory Item 8.2-1 is now closed.

Interface Requirements

The plant interfaces for the standard design of the AP1000 are discussed in DCD Tier 2, Section 8.2.5, and in Items 8.1, 8.2, and 8.3 of AP1000 DCD Tier 2, Table 1.8-1, where they are identified as non-Nuclear Safety (NNS) interfaces.

The applicant incorporated by reference AP1000 DCD FSAR Section 1.8. This section of the AP1000 DCD FSAR identifies certain interfaces with the standard design that have to be addressed in accordance with 10 CFR 52.47(a)(1)(vii).² As required by 10 CFR 52.79(d)(2), the COL application must demonstrate how these interface items have been met.

To satisfy plant Interface Item 8.1 in AP1000 DCD FSAR Tier 2, Table 1.8-1, the applicant provided the design criteria, regulatory guides, and IEEE standards in Turkey Point Units 6 and 7 COL FSAR Section 8.1.4.3. The staff finds the information to be consistent with NUREG-0800, Section 8.1 and is acceptable. Therefore, this interface item for the offsite power system has been met.

With regard to plant Interface Item 8.2 in AP1000 DCD FSAR Tier 2 Table 1.8-1, the staff observed that in Turkey Point Units 6 and 7 COL FSAR Section 8.2.2, the applicant stated, "[the] transmission study has confirmed that the interface requirements for steady state load, inrush kVA for motors, nominal voltage, allowable voltage regulation, nominal frequency, allowable frequency fluctuation, maximum frequency decay rate, and the limiting under frequency value for the RCP have been met." In RAI 5993, Question 08.02-10, the staff requested that the applicant provide in the Turkey Point Units 6 and 7 COL FSAR a summary of the grid stability analysis results, the assumptions made, and the acceptance criteria for each case analyzed. Additionally, the staff requested that the applicant provide the nominal frequency, allowable frequency fluctuation, maximum frequency decay rate, and the limiting

² Following the update to 10 CFR Part 52 (72 *Federal Register* [FR] 49517), this provision has changed to 10 CFR 52.47(a)(25).

under-frequency values used for the reactor coolant pump (RCP) in the analysis. In an October 31, 2011, response to RAI 5993, Question 08.02-10, the applicant provided a table comparing the required parameter values (acceptance criteria) and the associated analysis results. Additionally, the applicant stated that the Turkey Point Units 6 and 7 COL FSAR would be revised to include such table. The staff verified that this information has been incorporated into Turkey Point Units 6 and 7 COL FSAR, Revision 4 (Table 8.2-201). The staff finds that the analysis results meet the AP1000 design requirements, the requirements of GDC 17 and the guidelines of RG 1.206. Therefore, the staff considers this issue resolved and Interface Item 8.2 in AP1000 DCD FSAR Tier 2, Table 1.8-1 is satisfied.

Regarding plant Interface Item 8.3 in AP1000 DCD FSAR Tier 2, Table 1.8-1, the applicant did not provide a statement affirming, "that the protective devices controlling the switchyard breakers are set with consideration given to preserving the plant grid connection following a turbine trip." Therefore, in RAI 5993, Question 08.02-11, the staff requested that the applicant provide a reference to where this issue is discussed in the Turkey Point Units 6 and 7 COL application, or to provide a proposed revision to the application to address the issue. In an October 31, 2011 response to RAI 5993, Question 08.02-11, the applicant stated that Turkey Point Units 6 and 7 COL FSAR Section 8.2.1.2.1 will be revised to include an affirmation that "the protective devices controlling the switchyard breakers are set with consideration given to preserving the plant grid connection following a turbine trip." The staff verified that the Turkey Point Units 6 and 7 COL FSAR was updated in Revision 6 to include this change and concludes that the switchyard arrangement, the protection of lines by independent high speed relaying, and breaker failure scheme would preserve the Turkey Point Units 6 and 7 connection to the grid following a turbine trip satisfying the requirements of GDC 17. Accordingly, the staff finds this interface has been met and the issue in RAI 5993, Question 08.02-11 resolved. On this basis, AP1000 DCD Interface Item 8.3 is resolved.

The staff reviewed the information supplied by the applicant and, as discussed directly above, concludes that the applicant has adequately addressed Interface Items 8.1, 8.2, and 8.3 of AP1000 DCD FSAR Tier 2, Table 1.8-1.

Inspections, Tests, Analyses and Acceptance Criteria

As part of the applicant's resolution of electrical power issues, discussed in the subsection NRC Bulletin 2012-01, "Design Vulnerability in Electric Power System," above, the applicant made changes to the Turkey Point Units 6 and 7 COL application, Part 10, Appendix B, "Inspections, Tests, Analysis and Acceptance Criteria."

The applicant proposed the following site-specific ITAAC for the offsite power system to be added in the Turkey Point Units 6 and 7 COL application, Part 10, Appendix B, as new line item 7, in Table 2.6.12-1. The inclusion of item 7 in Table 2.6.12-1 in a future revision of the Turkey Point Units 6 and 7 COL was identified as **Confirmatory Item 8.2-2**

Design Commitment	Inspections, Tests, and Analyses	Acceptance Criteria
<p>7. The credited GDC 17 off-site power source is monitored by an open phase condition monitoring system that can detect the following at the high voltage terminals of the transformer connecting to the off-site source, over the full range of transformer loading from no load to full load:</p> <p>(1) loss of one of the three phases of the offsite power source</p> <p>a. with a high impedance ground fault condition, or</p> <p>b. without a high impedance ground fault condition; or</p> <p>(2) loss of two of the three phases of the offsite power source</p> <p>a. with a high impedance ground fault condition, or</p> <p>b. without a high impedance ground fault condition.</p> <p>Upon detection of any condition described above, the system will actuate an alarm in the main control room.</p>	<p>i) Analysis shall be used to determine the required alarm set points for the open phase condition monitoring system to indicate the presence of open phase conditions described in the design commitment.</p> <p>ii) Testing of the credited GDC-17 off-site power source open phase condition monitoring system will be performed using simulated signals to verify that the as-built open phase condition monitoring system detects open phase conditions described in the design commitment and at the established set points actuates an alarm in the main control room.</p>	<p>i) Alarm set points for the open phase condition monitoring system to indicate the presence of open phase conditions as described in the design commitment have been determined by analysis.</p> <p>ii) Testing demonstrates the credited GDC 17 off-site power source open phase condition monitoring system detects open phase conditions described in the design commitment and at the established set points actuates an alarm in the main control room.</p>

The evaluation of the applicant-proposed site-specific ITAAC Item 7 is presented in the subsection, NRC Bulletin 2012-01, "Design Vulnerability in Electric Power System," above.

Resolution of Turkey Point Confirmatory Item 8.2-2

Confirmatory Item 8.2-2 is an applicant commitment to revise its Turkey Point Units 6 and 7 ITAAC regarding the offsite power system. The staff verified that the Turkey Point COL, Revision 8 was appropriately revised. As a result, Confirmatory Item 8.2-2 is now closed.

8.2.5 Post Combined License Activities

There are no post COL activities related to this section.

8.2.6 Conclusion

The staff reviewed the Turkey Point Units 6 and 7 COL application and checked the referenced DCD. The staff's review confirmed that the applicant adequately addressed the required information relating to the offsite power system, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the AP1000 DCD information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented within the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 17 and GDC 18. The staff based its conclusion on the following:

- PTN COL 8.2-1 is acceptable because the applicant provided sufficient information involving the design details of the plant site switchyard, its interface with the local transmission grid, and its testing and inspection plan in accordance with the guidelines of RG 1.206.
- PTN COL 8.2-2 is acceptable because the applicant provided sufficient information to demonstrate that the grid will remain stable to maintain RCP operation for 3 seconds following a turbine trip in accordance with the guidelines of RG 1.206. In addition, the staff finds that the switchyard breaker arrangement, the protection of lines by independent high speed relay schemes, and the breaker failure scheme would preserve the Turkey Point Units 6 and 7 connection to the grid following a turbine trip.
- PTN CDI in Turkey Point Units 6 and 7 COL FSAR, Section 8.2.1 is acceptable because the applicant provided sufficient information involving the transformer area being located next to each unit's turbine building in accordance with the guidelines of RG 1.206
- PTN SUP 8.2-1 is acceptable because the applicant provided sufficient information describing details of a failure analysis performed for the offsite power distribution system, and plant site switchyard in accordance with the guidelines of RG 1.206.
- PTN SUP 8.2-2 is acceptable because the applicant provided sufficient information to describe FPL's responsibility for maintaining area bulk transmission system reliability. The applicant also provided sufficient information to demonstrate that protocols are in place for LNS to remain cognizant of grid vulnerabilities in order to make informed decisions regarding maintenance activities critical to the electric power system in accordance with the guidelines of RG 1.206 and GL 2006-2.

- PTN SUP 8.2-3 is acceptable because the applicant provided sufficient information regarding causes of outages of the transmission line over the past five years in accordance with the guidelines of RG 1.206.
- The applicant provided sufficient information regarding the interfaces for standard design from the AP1000 DCD FSAR Table 1.8-1, Items 8.1, 8.2, and 8.3.

8.2.A Site-Specific ITAAC for Offsite Power Systems

8.2.A.1 Introduction

This section specifically addresses the site-specific inspections, tests, analyses, and acceptance criteria (SS-ITAC), that the applicant proposed related to the offsite power system that is necessary and sufficient to provide reasonable assurance that the facility has been constructed and will operate in conformance with the COL, the provisions of the Atomic Energy Act of 1954, as amended, and NRC regulations.

8.2.A.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR, Revision 8, Section 14.3 incorporates by reference AP1000 DCD FSAR, Revision 19, Section 14.3 with departures and/or supplements.

To address the departures and/or supplements in Turkey Point Units 6 and 7 COL FSAR Section 14.3, the applicant provided the following additional information:

Supplemental Information

- STD. SUP 14.3-1

The applicant provided supplemental information related to the offsite power system in STD. SUP 14.3-1 in Turkey Point COL FSAR Section 14.3.2.3.

8.2.A.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of NRC regulations for ITAAC are given in NUREG-0800, Section 14.3.

The applicable regulatory requirements for electrical SS-ITAC are in 10 CFR 52.80(a), "Contents of applications; additional technical information."

8.2.A.4 Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 14.3 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to SS-ITAC for offsite power systems. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and concluded that the evaluation performed for the standard content is directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 8.2.A.4:

Supplemental Information

- STD. SUP 14.3-1, addressing SS-ITAACs [COL Standard Content Evaluation]

ITAAC Screening Summary Table 14.3-201 of the BLN FSAR identified the transmission switchyard and offsite power system as a site-specific system and selected them for ITAAC, but the table indicated "title only, no entry for COLA." Consequently, Section 2.6.12 of Part 10 of Appendix B, "License Conditions and ITTAC" of the BLN COL application (COLA) provided no ITAAC information for the transmission switchyard and offsite power system. The COL applicant must provide this site-specific ITAAC for compliance with 10 CFR 52.79(d) and 10 CFR 52.80(a). In RAI 14.3-1, the NRC staff stated that RG 1.206, CIII.7.2, Site-Specific ITAAC, recommends that applicants develop ITAAC for the site-specific systems that are designed to meet the significant interface requirements of the standard certified design, that is, the site-specific systems that are needed for operation of the plant (e.g., offsite power). Therefore, the applicant should justify why there is no ITAAC entry associated with offsite power, or revise Table 14.3-201 of the BNL FSAR to include ITAAC entries for the transmission switchyard and the offsite power system.

By letter dated June 24, 2008, the applicant stated that approved DCD Section 14.3 refers to the selection criteria and processes used for developing the AP1000 Certified Design Material (CDM) and identifies no interfaces (e.g., systems for storm drain, raw water, and closed circuit TV system, etc.)

meeting this definition. Thus, according to the applicant, the CDM does not include ITAAC or a requirement for COL developed ITAAC for the offsite power interface system. The staff found the above response to be inconsistent with the requirements of 10 CFR 52.80(a), and guidance of NUREG-0800 Section 14.3 and RG 1.206.

Several discussions were held between the applicant and the NRC staff to discuss this issue. The staff pointed out that the offsite power system performs an important function in the passive designs as it provides power to the safety-related loads through battery chargers during normal, abnormal and accident conditions. It also provides power to those active systems that provide defense-in-depth capabilities for reactor coolant make-up and decay heat removal. These active systems are the first line of defense to reduce challenges to the passive systems in the event of plant transients. The above function of the offsite power system in passive designs supports the need for ITAAC for these systems so that the staff can verify that (1) the designed and installed systems, structures, or components of the offsite power systems will perform as designed and (2) the required single circuit from the transmission network satisfies the requirements of GDC 17.

Subsequently, in a letter dated May 11, 2009, the applicant revised its response to RAI 14.3-1 and provided an ITAAC for the offsite power system to verify that the as-built offsite portion of the power supply from the transmission network to the interface with the onsite ac power system will satisfy the applicable provisions of GDC 17. Specifically, the ITAAC shall verify:

- (1) A minimum of one offsite circuit supplies electric power from the transmission network to the interface with the onsite portions of the ac power system.*
- (2) Each offsite circuit interfacing with the onsite ac power system is adequately rated to supply assumed loads during normal, abnormal and accident conditions.*
- (3) During steady state operation, each offsite circuit is capable of supplying required voltage to the interface with the onsite ac power system that will support operation of assumed loads during normal, abnormal and accident conditions.*
- (4) During steady state operation, each offsite circuit is capable of supplying required frequency to the interface with the onsite ac power system that will support operation of assumed loads during normal, abnormal and accident conditions.*
- (5) The fault current contribution of each offsite portion circuit is compatible with the interrupting capability of the onsite ac power system fault current interrupting devices.*
- (6) The reactor coolant pumps continue to receive power from either the main generator or the grid for a minimum of 3 seconds following a turbine trip.*

To ensure that the requirements of GDC 17 for the adequacy of the offsite power source within the standard design scope are met, the proposed ITAAC would verify the capacity and capability of the offsite source to feed the onsite power system. The proposed ITAAC provides for the inspection of the connection of the offsite source to the onsite power system.

Additionally, the applicant identified all associated changes that will be made in a future revision of the Bellefonte FSAR. On the basis of its review, the staff finds that the applicant has adequately addressed the site-specific ITAAC for the offsite power system so that the staff can verify that the designed and installed systems, structures, or components of the offsite power system will perform as designed. Therefore, the staff concludes that the applicant meets the requirements of 10 CFR 52.79(d) and 10 CFR 52.80(a), and the guidance of SRP 14.3 and RG 1.206. The applicant will revise the BLN COL FSAR to include the proposed ITAAC for offsite power system. This is identified as Confirmatory Item 8.2A-1, pending NRC review and approval of the revised BLN COL FSAR.

Resolution of Standard Content Confirmatory Item 8.2A-1

The applicant proposed a license condition in Part 10 of the VEGP COL application, which will incorporate the ITAAC identified in Appendix B. Appendix B includes ITAAC for the offsite power system. The license condition's proposed text is evaluated in Chapter 1 of this SER.

Confirmatory Item 8.2A-1 required the applicant to update its FSAR to include proposed ITAAC for the offsite power system. The NRC staff verified that the VEGP COL application was appropriately updated. The ITAAC associated with the offsite power system are shown in VEGP COL Part 10, Appendix B, Table 2.6.12-1. Table 8.2A-1 of this SER reflects this table. As a result, Confirmatory Item 8.2A-1 is resolved. Therefore, the staff will include the ITAAC for the offsite power system in the license.

8.2.A.5 *Post Combined License Activities*

For the reasons discussed in the technical evaluation section above, the staff finds the following ITAAC proposed by the applicant acceptable:

- The licensee shall perform and satisfy the ITAAC defined in Turkey Point Units 6 and 7 COL FSAR Part 10, Appendix B, Table 2.6.12-1, "Offsite Power System."

8.2.A.6 *Conclusion*

The staff concludes that the relevant information presented within the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 17 and GDC 18.

8.3 Onsite Power Systems

8.3.1 Alternating Current Power Systems

8.3.1.1 *Introduction*

The onsite ac power system includes those standby power sources, distribution systems, and auxiliary supporting systems provided to supply power to safety-related equipment or equipment important to safety for all normal operating and accident conditions. In the AP1000 passive reactor design used at Turkey Point Units 6 and 7, the onsite ac power system is a non-Class 1E system that provides reliable ac power to the various system electrical loads. The onsite ac power system does not perform any safety-related functions. These loads enhance an orderly shutdown under emergency conditions when offsite power is not available. Additional loads for investment protection can be manually loaded on the standby power supplies. Diesel generator sets are used as the standby power source for the onsite ac power systems.

8.3.1.2 *Summary of Application*

Turkey Point Units 6 and 7 COL FSAR, Revision 8, Section 8.3 incorporates by reference AP1000 DCD FSAR, Revision 19, Section 8.3 with departures and supplements. AP1000 DCD FSAR Section 8.3 includes Section 8.3.1. In addition, in Turkey Point Units 6 and 7 COL FSAR Section 8.3.1, the applicant provided the following:

AP1000 COL Information Items

- PTN COL 8.3-1

PTN COL 8.3-1 describes the grounding grid system design within the plant boundary and a lightning protection risk assessment for the buildings comprising Turkey Point Units 6 and 7.

- STD. COL 8.3-2

STD. COL 8.3-2 describes the details of: (1) the bases of the recommendations in operation, inspection, and maintenance procedures for the onsite standby diesel generators; and (2) the procedures for the periodic testing of penetration overcurrent protective devices.

Supplemental Information

- PTN SUP 8.3-1

PTN SUP 8.3-1 provides supplemental information describing the site-specific switchyard and power transformer voltage.

- PTN SUP 8.3-2

PTN SUP 8.3-2 describes the site conditions provided in Turkey Point Units 6 and 7 COL FSAR Sections 2.1 and 2.3 that are bounded by the standard site conditions used to rate the diesel engine and the associated generator in AP1000 DCD Section 8.3.1.1.2.3.

- STD. SUP 8.3-4

STD. SUP 8.3-4 provides supplemental information regarding periodic verification of the onsite ac power system's capability to transfer between the preferred power supply and the maintenance power supply.

8.3.1.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG -1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of NRC regulations for the ac power systems are given in NUREG-0800, Section 8.3.1.

The regulatory bases for acceptance of PTN COL 8.3-1, addressing the grounding and lightning protection systems, are the guidelines of the following documents:

- RG 1.204, "Guidelines for Lightning Protection of Nuclear Power Plants"
- IEEE Standard (Std.) 80, "Guide for Safety in AC Substation Grounding"
- IEEE Std. 665, "Guide for Generating Station Grounding"
- IEEE C.62.23, "Application Guide for Surge Protection of Electric Generating Plants"
- National Fire Protection Association (NFPA) 780, "Standard for the Installation of Lightning Protection Systems"

The bases for acceptance of the part of STD. COL 8.3-2, addressing the recommendations in operation, inspection, and maintenance procedures for the onsite standby diesel generators, are the guidelines of the manufacturer and the appropriate industry diesel generator working group recommendations.

The regulatory bases for acceptance of the part of STD. COL 8.3-2, addressing procedures for penetration protective device testing, are the guidelines of the following regulatory guide:

- RG 1.63, "Electric Penetration Assemblies in Containment Structures for Nuclear Power Plants"

8.3.1.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 8.3.1 and checked the reference DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information contained in the application and incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP

Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.

- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and concluded that the evaluation performed for the standard content is directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The staff reviewed the information contained in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Items

- PTN COL 8.3-1

The staff reviewed PTN COL 8.3-1 related to COL Information Item 8.3-1. COL Information Item 8.3-1 states:

Combined License applicants referencing the AP1000 certified design will address the design of grounding and lightning protection.

The commitment was also captured as COL Action Item 8.3.1.6-1 in the staff's FSER for the AP1000 DCD FSER (NUREG-1793), Appendix F, which states:

The COL applicant will provide the design of the site-specific grounding and lightning protection.

The staff reviewed the resolution to COL information item, PTN COL 8.3-1, related to the ground grid system and lightning protection included in Turkey Point Units 6 and 7 COL FSAR Section 8.3. The staff's evaluation is described below.

The applicant stated that a grounding grid system design within the plant boundary includes a determination of step and touch potentials and ensuring that they are within the acceptable limit for personnel safety. Actual resistivity measurements from soil samples taken at the plant site were analyzed to create a soil model. The ground grid conductor size was then determined using the methodology outlined in IEEE Std. 80, "IEEE Guide for Safety in AC Substation Grounding," and a grid configuration for the site was created. The grid configuration was modeled in conjunction with the soil model.

The staff review of the grounding grid system design description observed that Turkey Point Units 6 and 7 COL FSAR Table 8.1-201 includes RG 1.204 which endorses IEEE Std. 665 for

generation station grounding. The staff also observed that the same subsection of the DCD indicates compliance with IEEE Std. 665. Therefore, in RAI 5995, Question 08.03-01-1 the staff requested that the applicant discuss the extent to which the Turkey Point Units 6 and 7 ground grid design complies with IEEE Std. 665 and confirm that their use of IEEE Std. 80 did not invalidate the Turkey Point conformance to the guidelines of RG 1.204. In an October 31, 2011, response to RAI 5995, Question 08.03-01-1, the applicant stated that IEEE Std. 80 methodology was used to determine the ground grid conductor size and that this methodology did not invalidate their conformance to the guidance of RG 1.204. The applicant also clarified that Turkey Point Units 6 and 7 COL FSAR, Appendix 1AA includes RG 1.204, Revision 0, with no exceptions taken. The staff finds the applicant's response acceptable because it is consistent with the guidelines of RG 1.206. Therefore, the staff considers the issues in RAI 5995, Question 08.03-01-1 resolved.

With regard to lightning protection, the applicant stated that, a lightning risk assessment was performed for the structures comprising Turkey Point, Units 6 and 7 based on the methodology of NFPA 780-2008 in accordance with IEEE Std. 665-1995 and lightning protection is provided for the structures in accordance with NFPA 780. Specifically, the applicant stated that the zone of protection is based on elevations and geometry of the structures. The zone of protection also includes the space covered by a rolling sphere having a radius sufficient enough to cover the building to be protected. The zone of protection method is based on the use of ground masts, air terminals, and shield wires. Lightning protection grounding is interconnected with the station/switchyard grounding system. The staff review of the applicant's description of the Turkey Point Units 6 and 7 lightning protection system design found that in Turkey Point Units 6 and 7 COL FSAR Table 8.1-201, where it is stated that RG 1.204 is implemented via IEEE Std. 665. Since the regulatory guide also endorses IEEE Std. 666-1991, "IEEE Design Guide for Electric Power Service Systems for Generating Systems"; IEEE Std. 1050-1996, "IEEE Guide for Instrumentation and Control Grounding in Generating Stations"; and IEEE C62.23-1995, "IEEE Application guide for Surge Protection of Electric Generating Plants"; in Question 08.03-02 the staff requested that the applicant discuss the applicability of these other standards. In an October 31, 2011 response, the applicant clarified that Turkey Point Units 6 and 7 COL FSAR Appendix 1AA includes RG 1.204, Revision 0, with no exceptions taken. Therefore, the applicant stated that they would also conform to the other standards in accordance with RG 1.204. Additionally, the applicant stated that Turkey Point Units 6 and 7 COL FSAR Table 8.1-201 will be revised to remove the note: "Implemented via IEEE Std. 665, IEEE Guide for Generating Station Grounding, (DCD section 8.3, and Reference 201)," under the "Remarks" column for RG 1.204. The staff verified this change to the Turkey Point Units 6 and 7 COL FSAR was accomplished in Revision 4. The staff finds the applicant's response acceptable because it is consistent with the guidelines of RG 1.206. Accordingly, the staff considers Question 08.03-02 resolved.

Based on the above, the staff concludes that IEEE Std. 665 provides an acceptable method for lightning protection; therefore, the supplemental information provided by the applicant on lightning protection is acceptable.

- STD. COL 8.3-2

The staff reviewed STD. COL 8.3-2 as follows.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 8.3.1.4 [which itself was reproduced from Section 8.3.1.4 of the Bellefonte SER]:

- **STD. COL 8.3-2**

The NRC staff reviewed STD. COL 8.3-2 related to COL Information Item 8.3-2. COL Information Item 8.3-2 states (in part):

The Combined License applicant will establish plant procedures as required for:

- Periodic testing of penetration protective devices*
- Diesel generator operation, inspection and maintenance in accordance with manufacturers' recommendations*

The commitment was also captured as COL Action Items 8.3.1.2-1 and 8.4.1-1 in [AP 1000 DCD, Section 8.3.3, "Combined License Information for Onsite Electrical Power," as discussed in] Appendix F of the NRC staff's FSER for the AP1000 [standard design] (NUREG-1793), which states:

The COL applicant will establish plant procedures for preoperational testing to verify proper operation of the ac power system. (COL Action Item 8.3.1.2-1)

The COL applicant will establish plant procedures for periodic testing of penetration protective devices. (COL Action Item 8.4.1-1)

A part of standard information item, STD. COL 8.3-2, was provided by the applicant describing the bases of the recommendations in operation, inspection, and maintenance procedures for the onsite standby diesel generators. This part of STD. COL 8.3-2 is addressed in BLN COL FSAR Section 8.3.1.1.2.4.

A portion of the standard information item, STD. COL 8.3-2, was provided by the applicant describing procedures for the testing of penetration protective devices. This portion of STD. COL 8.3-2 is addressed in BLN COL FSAR Section 8.3.1.1.6.

The NRC staff reviewed the resolution to COL information item, STD. COL 8.3-2, related to testing procedures for standby diesel generators and electrical penetrations included under Section 8.3 of the BLN COL FSAR. The NRC staff's evaluation follows.

For the operation, inspection and maintenance for diesel generators, the applicant's procedures will consider both the diesel generator manufacturer and industry diesel working group recommendations.

In RAI 8.3.1-2, the NRC staff stated that COL Action Item 8.3.1.2-1 in the NRC's FSER for the AP1000 DCD FSER (NUREG-1793), contains the following discussion:

Preoperational tests are conducted to verify proper operation of the ac power system. The preoperational tests include operational testing of the diesel load sequencer and diesel generator capacity testing. The diesel generators are not

safety-related and will be maintained in accordance with the requirements of the overall plant maintenance program. This program will cover the preventive, corrective, and predictive maintenance activities of the plant systems and equipment and will be presented in the COL application. This COL information is discussed in DCD Tier 2, Section 8.3.3, "Combined License Information for Onsite Electrical Power."

In RAI 8.3.1-2, the applicant was asked to provide a reference to where the preoperational testing program and the preventive, corrective, and predictive maintenance activities for the diesel generators are discussed in the application, or provide a proposed revision to the application to address this issue.

In a letter dated April 6, 2009, the applicant stated that COL Action Item 8.3.1.2-1 in Appendix F of the FSER does not indicate that "pre-operational testing" of the diesel generators has been addressed in the DCD. Pre-operational testing of the ac power system is described in FSER Section 14, DCD Section 14, and BLN COL FSAR Chapter 14. Specifically, DCD Sections 14.2.9.2.15 and 14.2.9.2.17 address the onsite ac power system and diesel generator testing, including diesel generator capacity and sequencer tests. BLN COL FSAR Section 14.2.9.4.23 describes testing of the offsite power system. The NRC staff agrees that pre-operational testing of the diesel generators is addressed in DCD Section 14.2.9.2.17 and was found acceptable by the staff as indicated in FSER NUREG-1793 Section 14.2.9. Based on the above, the NRC staff finds that the applicant's response to the portion of the RAI regarding COL areas of responsibility is acceptable.

In addition, the applicant stated that BLN COL FSAR Section 8.3.1.1.2.4 will be revised to include inspection and maintenance (including preventive, corrective, and predictive maintenance) procedures considering both the diesel generator manufacturer's recommendations and industry diesel working group recommendations.

The NRC staff concludes that following the manufacturer and industry diesel generator working group recommendations for onsite standby diesel generator inspection and maintenance including preventive, corrective, and predictive maintenance provides reasonable assurance that the diesel generators will be adequately maintained. Therefore, DCD COL Information Item 8.3-2 and FSER COL Action Item 8.3.1.2-1 are resolved subject to the verification that the BLN COL FSAR has been updated to include applicable portions of the RAI response. This is identified as Confirmatory Item 8.3.1-1.

With regard to establishing plant procedures for periodic testing of protective devices that provide penetration overcurrent protection, the applicant will implement procedures to periodically test a sample of each different type of overcurrent device. Testing includes:

- Verification of thermal and instantaneous trip characteristics of molded case circuit breakers*
- Verification of long time, short time, and instantaneous trips of medium voltage air circuit breakers*

- *Verification of long time, short time, and instantaneous trips of low voltage air circuit breakers*

Because the above testing is consistent with the recommendation of RG 1.63, the NRC staff concludes that the above information satisfies COL Information Item 8.3-2 and FSER COL Action Item 8.3.1.6-1, and that these items are resolved.

Resolution of Standard Content Confirmatory Item 8.3.1-1

Confirmatory Item 8.3.1-1 required the applicant to update its FSAR to specify that onsite standby diesel generator inspection and maintenance (including preventive, corrective, and predictive maintenance) procedures will consider both the diesel generator manufacturer's recommendations and industry diesel working group recommendations. The NRC staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 8.3.1-1 is resolved.

Supplemental Information

- PTN SUP 8.3-1

Because switchyard power transformer voltages are site-specific, the referenced DCD requires this information be provided in the COLA. The applicant provided information in PTN SUP 8.3-1 describing the site-specific switchyard and power transformer voltage. The staff finds this description adequate to allow the staff to complete its review of electrical power system.

- PTN SUP 8.3-2

The applicant stated in PTN SUP 8.3-2 that their site conditions are bounded by the standard site conditions in AP1000 DCD Section 8.3.1.1.2.3 used to rate the diesel generators. The staff agrees that the Turkey Point Units 6 and 7 site conditions are bounded by the standard site conditions used to determine the rating.

- STD. SUP 8.3-4

The applicant provided information in STD. SUP 8.3-4 to include implementation of procedures for periodic verification of proper operation of the onsite ac power system capability for automatic and manual transfer from the preferred power supply to the maintenance power supply and return from the maintenance power supply to the preferred power supply. The staff finds that the information satisfies the requirements of GDC 18 and is, therefore, acceptable.

8.3.1.5 *Post Combined License Activities*

There are no post COL activities related to this section.

8.3.1.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to ac power systems,

and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff compared the COL information items, the supplemental information, the interfaces for standard design, and the proposed design changes and corrections within the application to the relevant NRC regulations, guidance in NUREG-0800, Section 8.3.1, and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. The staff based its conclusion on the following:

- PTN COL 8.3-1 is acceptable because the applicant provided sufficient information related to the grounding grid system design and lightning protection consistent with the recommendations of RG 1.206 and RG 1.204.
- STD. COL 8.3-2 is acceptable because the applicant provided sufficient information related to preoperational testing of the diesel generators and periodic testing of the penetration overcurrent protective devices consistent with industry standards and the recommendations of RG 1.63.
- PTN SUP 8.3-1 is acceptable because the applicant adequately addressed the site-specific switchyard and transformer voltage.
- PTN SUP 8.3-2 is acceptable because the applicant demonstrated its site-specific conditions are bounded by the standard site conditions in the AP1000 DCD FSAR for rating the diesel generator.
- STD. SUP 8.3-4 is acceptable because the applicant will implement procedures for periodic verification of offsite power system capacity for automatic and manual transfer from the preferred power supply to the maintenance power supply and vice versa to satisfy the requirements of GDC 18.

8.3.2 Direct Current Power Systems

8.3.2.1 *Introduction*

The dc power systems include those dc power sources and their distribution systems provided to supply motive or control power to safety-related equipment. Batteries and battery chargers serve as the power sources for the dc power system and inverters convert dc from the dc distribution system to ac instrumentation and control power, as required. These three components, when combined, provide an uninterruptible power supply (UPS) that furnishes a continuous, highly reliable source of ac supply.

The AP1000 dc power system is comprised of independent Class 1E and non-Class 1E dc power systems. Each system consists of ungrounded stationary batteries, dc distribution equipment, and UPS.

8.3.2.2 *Summary of Application*

Turkey Point Units 6 and 7 COL FSAR, Revision 8, Section 8.3 incorporates by reference AP1000 DCD FSAR, Revision 19, Section 8.3 with several departures and/or supplements.

AP1000 DCD FSAR Section 8.3 includes Section 8.3.2. After submitting AP1000 DCD Revision 17 to the NRC, Westinghouse revised the COL information Item (COL 8.3-2) and the applicant took a departure (STD. DEP 8.3-1) to address the revised COL information item. This COL information item has been incorporated into AP1000 DCD, Revision 19; however, the discussion of the COL information item below did not change.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 8.3.2, the applicant provided the following:

Tier 2 Departure

- STD. DEP 8.3-1

In an April 20, 2011, letter to the NRC, the applicant endorsed an October 15, 2010, Southern Nuclear letter, for the VEGP application that proposed the following Tier 2 standard departure related to a proposed revision to AP1000 DCD FSAR Section 8.3.2.2. In the October 15, 2010, Southern Nuclear stated that the Class 1E battery chargers are designed to limit the input (ac) current to an acceptable value under faulted conditions on the output side, however, the voltage regulating transformers do not have active components to limit current. Therefore, the Class 1E voltage regulating transformer maximum current is determined by the impedance of the transformer. The voltage regulating transformer in combination with fuses and/or breakers will interrupt the input or output (ac) current under faulted conditions on the output side. Since AP1000 DCD FSAR Section 8.3.2.2 states that the Class 1E voltage regulating transformers are designed to limit the input (ac) current to an acceptable value under faulted conditions on the output side, the use of the breakers/fuses for the regulating transformers for isolation function, in lieu of current limiting characteristics as presented in the AP1000 DCD FSAR, is a departure for VEGP. Since the issue is identified as a standard item it is also a departure for Turkey Point Units 6 and 7.

AP1000 COL Information Item

- STD. COL 8.3-2

STD. COL 8.3-2 describes in detail the procedures for inspection, maintenance, and testing of Class 1E batteries, and the clearing of ground faults on the Class 1E dc power system. In an April 20, 2011, letter to the NRC, the applicant endorsed a Southern Nuclear October 15, 2010, letter for the VEGP application that proposed to revise STD. COL 8.3-2 by adding information related to periodic testing for the battery chargers and voltage regulating transformers.

Supplemental Information

- STD. SUP 8.3-3

The applicant provided supplemental information stating that no site-specific non-Class 1E dc loads were connected to the Class 1E dc system.

8.3.2.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements. In addition, the acceptance criteria associated with the relevant requirements of NRC regulations for the dc power systems are given in NUREG-0800, Section 8.3.2.

The regulatory basis for acceptance of COL information item, STD. COL 8.3-2 and STD. SUP 8.3-3, is established in:

- GDC 17, "Electric Power Systems"
- GDC 18, "Inspection and Testing of Electric Power Systems"
- RG 1.206, "Combined License Applications for Nuclear Power Plants(LWR Edition)"
- RG 1.129, "Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Nuclear Power Plants"
- IEEE Std. 450, "Recommended Practice for the Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications"
- RG 1.75, "Criteria for Independence of Electrical Safety Systems," Revision 3

8.3.2.4 *Technical Evaluation*

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 8.3.2 and checked the referenced DCD to ensure that the combination of the DCD and the information in the Turkey Point Units 6 and 7 COL application represent the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information contained in the application and incorporated by reference addresses in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and concluded that the evaluation performed for the standard content is directly applicable to the Turkey Point COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 8.3.2.4:

AP1000 COL Information Item

- *STD. COL 8.3-2, involving the inspection, maintenance, and testing of Class 1E batteries and clearing of ground faults on the Class 1E dc system.*

The NRC staff reviewed STD. COL 8.3-2 related to COL Information Item 8.3-2. COL Information Item 8.3-2 states (in part):

The Combined License applicant will establish plant procedures as required for:

- *Clearing ground fault on the Class 1E dc system*
- *Checking sulfated battery plates or other anomalous conditions through periodic inspections*
- *Battery maintenance and surveillance (for battery surveillance requirements, refer to DCD Chapter 16, Section 3.8)*

The commitment was also captured as COL Action Item 8.4.1-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will establish plant procedures for periodic testing of penetration protective devices. (COL Action Item 8.4.1-1)

The Class 1E 125 volts direct current (Vdc) system components undergo periodic maintenance tests to determine the condition of the system. The applicant has established procedures for inspection and maintenance of Class 1E batteries and non-Class 1E batteries. Class 1E battery maintenance and service testing is performed in conformance with RG 1.129. Batteries are inspected periodically to verify proper electrolyte levels, specific gravity, cell temperature and battery float voltage. Cells are inspected in conformance with IEEE 450 and vendor recommendations. In addition, the applicant has established procedures for clearing of ground faults on the Class 1E dc system. The battery testing procedures are written in conformance with IEEE 450 and the Technical Specifications. The NRC staff concludes that the applicant has established procedures for inspection and maintenance of Class 1E and non-Class 1E batteries to satisfy COL Information Item 8.3-2; therefore, this item is resolved.

With regard to periodic testing of electrical penetration protective devices (COL Action Item 8.4.1-1) for dc systems, the applicant has not addressed periodic testing of the penetration over load protective devices related to dc systems. In RAI 8.3.1-1, the staff requested that the applicant address the periodic testing of the electrical penetration primary and backup protective devices protecting Class 1E and non-Class 1E dc circuits. In a letter dated January 2, 2009, the applicant stated that the BLN COL FSAR will be revised in the next COLA submittal to include periodic testing of the electrical penetration primary and backup protective devices protecting Class 1E and non-Class 1E dc circuits, as well as control of protective devices. The staff has reviewed the information in

the applicant's response, which provided for the testing of Class 1E and non-Class 1E dc penetration overload protection devices. The staff also reviewed the proposed change to BLN COL FSAR Section 8.3.1.1.6 and concludes that COL Action Item 8.4.1-1 is resolved subject to the verification that the BLN COL FSAR has been updated to include portions of the RAI response. This is identified as Confirmatory Item 8.3.2-1.

Resolution of Standard Content Confirmatory Item 8.3.2-1

Confirmatory Item 8.3.2-1 required the applicant to update its FSAR to provide for the testing of Class 1E and non-Class 1E dc penetration overload protection devices. The NRC staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 8.3.2-1 is resolved.

Evaluation of Tier 2 Departure STD. DEP 8.3-1 and Revised STD. COL 8.3-2

In a letter dated June 18, 2010, Westinghouse provided a response to Open Item OI-SRP 8.3.2-EEB-09, Revision 3, related to the periodic testing of battery chargers and voltage regulating transformers. The response included a COL information item to be added to AP1000 DCD Section 8.3.3 to ensure that periodic testing is performed on the battery chargers and voltage regulating transformers. Specifically, this section will be revised to include the following COL information item:

The Combined License applicant will establish plant procedures as required for:

Combined License applicants referencing the AP1000 certified design will ensure that periodic testing is performed on the battery chargers and voltage regulating transformers.

In a letter dated October 15, 2010, the applicant submitted its response to address the above-identified AP1000 DCD revision to the Section 8.3.3 COL information item regarding battery charger and voltage regulating transformer testing. The applicant stated that procedures are established for periodic testing of the Class 1E battery chargers and the Class 1E regulating transformers in accordance with the manufacturer recommendations. The battery chargers and regulating transformers are tested periodically in accordance with manufacturer recommendations. Circuit breakers in the Class 1E battery chargers and Class 1E voltage regulating transformers that are credited for an isolation function are tested through the use of breaker test equipment. This verification confirms the ability of the circuit to perform the designed coordination and corresponding isolation function between Class 1E and non-Class 1E components. Circuit breaker testing is done as part of the MR program and testing frequency is determined by that program. Fuses/fuse holders that are included in the isolation circuit are visually inspected. Class 1E battery chargers are tested to verify current limiting characteristic utilizing manufacturer recommendation and industry practices. Testing frequency is in accordance with that of the associated battery.

The applicant clarified that the voltage regulating transformers do not have active components to limit current and, therefore, the voltage regulating transformer in combination with fuses and/or breakers will interrupt the input or output (ac) current under faulted conditions on the output side. The NRC staff finds this to be inconsistent with AP1000 DCD Section 8.3.2.2, which states that Class 1E voltage regulating transformers are designed to limit the input (ac) current to an acceptable value under faulted conditions on the output side. As such the use of the breakers/fuses for regulating transformers for isolation function in lieu of current limiting characteristics as presented in the AP1000 DCD is a departure for VEGP. The applicant stated that Part 7 of the COL application will be revised to include a departure from AP1000 DCD Section 8.3.2.2 clarifying the current limiting feature of voltage regulating transformers. The applicant has included, in its response, the appropriate changes related to the above departure that will be included in VEGP COL FSAR Sections 8.3.2.1.4 and 8.3.2.2, in Chapter 1, Table 1.8-201 and in Part 7 of the VEGP COL application. These changes will be included in a future revision to the VEGP COL application.

The NRC staff has reviewed the proposed changes to the VEGP COL application and concludes that the applicant has provided sufficient information regarding the isolation function and the periodic inspection and testing of the isolating devices for the Class 1E battery chargers and Class 1E voltage regulating transformers. In addition, the staff finds that, although the use of the breakers/fuses for regulating transformers isolation function in lieu of current limiting characteristics as presented in the AP1000 DCD is a departure for VEGP, the departure is acceptable because the use of the breakers/fuses for regulating transformers for isolation function is consistent with the recommendations in IEEE-384, "IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits," endorsed by RG 1.75. Therefore, AP1000 COL Information Item STD. DEP 8.3-1 and the revised STD. COL 8.3-2 are resolved subject to NRC staff verification of the revision to the VEGP COL FSAR sections discussed above. This is being tracked as Confirmatory Item 8.3.2-2.

Resolution of Standard Content Confirmatory Item 8.3.2-2

Confirmatory item 8.3.2-2 is an applicant commitment to revise its FSAR Table 1.8-201 and Section 8.3.2.1.4 to address COL Information Item STD. COL 8.3-2 and a departure, STD. DEP 8.3-1. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 8.3.2-2 is now closed.

The following portion of this technical evaluation section is reproduced from Section 8.3.2.4 of the BLN SER:

Supplemental Information

- **STD. SUP 8.3-1**

STD. SUP 8.3-1 was provided by the applicant indicating that there are no site-specific non-Class 1E dc loads connected to the Class 1E dc system. The staff finds this acceptable because it is consistent with the guidance in RG 1.206.

Evaluation of Site-specific Response to Standard Content

In VEGP COL FSAR, Revision 2, the VEGP applicant changed the number of the supplemental information item from STD. SUP 8.3-1 to STD. SUP 8.3-3. The associated VEGP COL FSAR, Revision 2 text, which is identical to the BLN COL FSAR, Revision 1 text accepted by the staff, was not changed. Therefore, the staff concludes that this difference is not relevant and that the staff's evaluation of STD. SUP 8.3-1 for BLN applies to STD. SUP 8.3-3 for VEGP.

8.3.2.5 *Post Combined License Activities*

There are no post COL activities related to this section.

8.3.2.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to dc power systems, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented within the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the relevant NRC regulations, guidance in NUREG-0800, Section 8.3.2, and other NRC regulatory guides and concludes that the applicant is in compliance with NRC regulations. The staff based its conclusion on the following:

- STD. DEP 8.3-1 is acceptable because the applicant provided sufficient information involving the use of breakers/fuses for regulating transformers for isolation function that is consistent with IEEE-384, endorsed by RG 1.75.
- STD. COL 8.3-2 is acceptable because the applicant provided sufficient information involving the inspection, maintenance, and testing of Class 1E batteries and clearing of ground faults on the Class 1E dc system, and periodic testing of the battery chargers and voltage regulating transformers.
- STD. SUP 8.3-3 is acceptable because the applicant made a commitment that there are no site-specific non-Class 1E dc loads connected to the Class 1E dc system.

9.0 AUXILIARY SYSTEMS

The auxiliary systems provide support systems that support the safe shutdown of the plant or the protection of the health and safety of the public. This area covers a wide range of systems including fuel storage and handling, water systems, compressed air, process sampling, drains, heating, ventilation, and air conditioning (HVAC), fire protection (FP), communications, lighting, and emergency diesel generator support systems.

9.1 Fuel Storage and Handling

9.1.1 **New Fuel Storage (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.1, “Criticality Safety of Fresh and Spent Fuel Storage and Handling,” and C.I.9.1.2, “New and Spent Fuel Storage”)**

The new fuel storage facilities include the fuel assembly storage racks, the concrete storage pit that contains the storage racks, and auxiliary components including the spent fuel handling crane and pit cover. The storage facilities must maintain the new fuel in subcritical arrays during all credible storage conditions. In addition, new fuel must remain subcritical during fuel handling.

Section 9.1 of the Turkey Point Units 6 and 7 Combined License (COL) Final Safety Analysis Report (FSAR) incorporates by reference, with no departures (DEPs) or supplements, Section 9.1.1, “New Fuel Storage,” of the AP1000 Design Control Document (DCD). The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design,” and its supplements.

9.1.2 **Spent Fuel Storage (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.1, “Criticality Safety of Fresh and Spent Fuel Storage and Handling,” and C.I.9.1.2, “New and Spent Fuel Storage”)**

9.1.2.1 **Introduction**

The spent fuel storage facilities include the spent fuel storage racks, the spent fuel storage pool that contains the storage racks, and the associated equipment storage pits. The storage

¹ See “*Finality of Referenced NRC Approvals*” in Section 1.2.2 which contains a discussion of the staff’s review related to verification of the scope of information to be included in a COL application that references a design certification (DC). This SER refers to the Turkey Point Units 6 and 7 COL FSAR, Revision 8, and AP1000 DCD, Revision 19, unless otherwise specified. This footnote will be referenced in several places throughout the chapter of this Safety Evaluation.

facilities must maintain the spent fuel in subcritical arrays during all credible storage conditions. In addition, spent fuel must remain subcritical during fuel handling.

9.1.2.2 Summary of Application

Section 9.1 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.1 of the AP1000 DCD. Section 9.1 of the DCD includes Section 9.1.2.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.1.6, the applicant provided the following:

AP1000 COL Information Item

- STD COL 9.1-7

The applicant provided additional information in standard (STD) COL 9.1-7 to address COL Information Item 9.1-7.

License Condition

- Part 10, License Condition 2, Item 9.1-7

The applicant proposed a license condition related to STD COL 9.1-7 that sets the implementation milestone for the Metamic Coupon Monitoring Program.

- Part 10, License Condition 6

The applicant proposed a license condition to provide a schedule to support the staff's inspection of operational programs and proposed to add the Metamic Coupon Monitoring Program to this list.

The Turkey Point Units 6 and 7 applicant proposed these license conditions through its endorsement, in a letter dated November 15, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103210407), of the letter dated April 23, 2010, from the Vogtle Electric Generating Plant (VEGP), Units 3 and 4, applicant on this issue.

9.1.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the fuel storage and handling are given in Sections 9.1.1 and 9.1.2 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)."

The regulatory basis for acceptance of the COL information and supplementary information items is established in:

- Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “Domestic Licensing of Production and Utilization Facilities,” Appendix A, General Design Criterion (GDC) 4, “Environmental and Dynamic Effects Design Bases”
- GDC 61, “Fuel Storage and Handling and Radioactivity Control”
- GDC 62, “Prevention of Criticality in Fuel Storage and Handling”
- 10 CFR 50.68, “Criticality Accident Requirements”

9.1.2.4 Technical Evaluation

The staff reviewed Section 9.1.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to spent fuel storage. The results of the staff’s evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the Design Certification (DC) and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant (VEGP), Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4, COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER. Confirmatory items that are first identified in this SER section have a Turkey Point Units 6 and 7 designation (e.g., Confirmatory Item 9.1-1).

The following portion of this technical evaluation section is reproduced from Section 9.1.2.4 of the VEGP SER:

AP1000 COL Information Item

- STD COL 9.1-7

COL Information Item 9.1-7 states:

The Combined License holder will implement a spent fuel rack Metamic coupon monitoring program when the plant is placed into commercial operation. This program will include tests to monitor bubbling, blistering, cracking, or flaking; and a test to monitor for corrosion, such as weight loss measurements and or visual examination.

STD COL 9.1-7 states:

A spent fuel rack Metamic coupon monitoring program is to be implemented when the plant is placed into commercial operation. This program includes tests to monitor bubbling, blistering, cracking, or flaking; and a test to monitor for corrosion, such as weight loss measurements and or visual examination.

The NRC staff reviewed STD COL 9.1-7 related to the Metamic coupon monitoring program included under Section 9.1 of the BLN COL FSAR. No additional details on the Metamic Coupon Monitoring Program are provided in Section 9.1 of the FSAR.

Since the applicant's proposed resolution of COL Information Item 9.1-7 was a restatement of the text of the COL information item from the DCD, the staff required additional information to be able to evaluate the applicant's closure of the item. An additional Request for Additional Information (RAI) response related to AP1000 DCD Section 9.1.2 (ML091120720) proposed a modification to the text of COL Information Item 9.1-7. The modified wording added neutron attenuation and thickness testing to the list of tests to be included in the Metamic monitoring program to be implemented by the COL holder. In RAI 9.1.2-1, the NRC staff requested that the applicant describe in detail the implementation of the aspects of the Metamic coupon monitoring program that are listed in STD COL 9.1-7, as modified by the additional AP1000 RAI response. In response to RAI 9.1.2-1, the applicant proposed modified wording for STD COL 9.1-7 as follows:

STD COL 9.1-7

A spent fuel rack Metamic coupon monitoring program is to be implemented when the plant is placed into commercial operation. This program includes tests to monitor bubbling, blistering, cracking, or flaking; and a test to monitor for corrosion, such as weight loss

measurements and / or visual examination. The program will also include tests to monitor changes in physical properties of the absorber material, including neutron attenuation and thickness measurements.

*This proposed wording matches the proposed revised text for AP1000 COL Information Item 9.1-7. However, the proposed wording is still a restatement of the COL information item and does not contain the level of detail needed by the staff to evaluate the adequacy of the Metamic monitoring program. Therefore, in RAI 9.1.2-2, the staff requested that the applicant describe the methodology and acceptance criteria for the tests listed, provide the corrective action requirements and provide the administrative controls applicable to the program. Additionally, the applicant should confirm the number of coupons and the withdrawal schedule will be the same as recommended in the DCD or provide an alternative. The staff has identified this as **Open Item 9.1-1** to track resolution of this issue and to ensure that the additional details are included in the BLN COL FSAR.*

Resolution of Standard Content Open Item 9.1-1

To resolve Open Item 9.1-1, the VEGP applicant provided additional information in a letter dated April 23, 2010, which superseded the original response to Open Item 9.1-1 provided in a letter dated December 30, 2009.

With respect to the number of coupons and the withdrawal schedule, the applicant confirmed that the number of coupons and the withdrawal schedule will be the same as stated in AP1000 DCD, Section 9.1.2.2.1. The applicant further stated that since AP1000 DCD Section 9.1 is incorporated by reference into the FSAR, no additional FSAR change would be required. The staff finds the applicant's response regarding the number of coupons and withdrawal schedule acceptable, because the applicant has confirmed the number of coupons and schedule will be the same as described in the AP1000 DCD.

With respect to methodology and acceptance criteria, corrective actions and administrative controls, the applicant stated that since the Metamic Coupon Monitoring Program has not yet been established, the level of detail requested is not completely available. The applicant further stated, "As stated in FSAR Subsection 9.1.6, a Metamic monitoring program will be implemented when the plant is placed into commercial operation. This program will include methodology to be employed, acceptance criteria, corrective actions and a description of administrative controls based on vendor recommendations and industry operating experience."

The applicant additionally stated that the VEGP COL FSAR will be revised to add the following to the end of the STD COL 9.1-7 discussion:

The program will include the methodology and acceptance criteria for the tests listed and provide corrective action requirements based on vendor recommendations and industry operating experience. The program will be implemented through plant procedures.

Metamic Monitoring Acceptance Criteria:

- *Verification of continued presence of the boron is performed by neutron attenuation measurement. A decrease of no more than 5 percent in Boron-10 content, as determined by neutron attenuation, is acceptable. This is equivalent to a requirement for no loss in boron within the accuracy of the measurement.*
- *Coupons are monitored for unacceptable swelling by measuring coupon thickness. An increase in coupon thickness at any point of no more than 10 percent of the initial thickness at that point is acceptable.*

Changes in excess of either of the above two acceptance criteria are investigated under the corrective action program and may require early retrieval and measurement of one or more of the remaining coupons to provide validation that the indicated changes are real. If the deviation is determined to be real, an engineering evaluation is performed to identify further testing or any corrective action that may be necessary.

Additional parameters are examined for early indications of the potential onset of Metamic degradation that would suggest a need for further attention and possibly a change in the coupon withdrawal schedule. These include visual inspection for surface pitting, blistering, cracking, corrosion or edge deterioration, or unaccountable weight loss in excess of the measurement accuracy.

The NRC staff concludes that the above information to be added to the VEGP COL FSAR provides the necessary level of detail for the Metamic Monitoring Program, including the methodology and acceptance criteria for the tests listed, the corrective action requirements, and the administrative controls applicable to the program.

The applicant proposed a markup of the VEGP COL application, Part 10, License Condition 6, adding a line item for the Metamic Monitoring Program. After the addition of this line item, the version of License Condition 6 included in Part 10 of the COL application, Revision 2, would be:

The licensee shall develop a schedule that supports planning for and conduct of NRC inspection of the operational program listed in VEGP COL FSAR Table 13.4-201, "Operational Program Required by NRC Regulations." This schedule must be available to the NRC staff no later than 12 months after issuance of the COL. The schedule shall be updated every 6 months until 12 months before scheduled fuel load, and every month thereafter until the operational programs listed in VEGP COL FSAR Table 13.4-201 have been fully implemented or the plant has been

placed in commercial service, whichever comes first. This schedule shall address:

- a. the implementation of site-specific Severe Accident Management Guidance.*
- b. the reactor vessel pressurized thermal shock evaluation at least 18 months prior to initial fuel load.*
- c. the approved preoperational and startup test procedures in accordance with FSAR Section 14.2.3.*
- d. the flow accelerated corrosion (FAC) program implementation, including the construction phase activities.*
- #. the spent fuel rack Metamic coupon monitoring program implementation.*

(Where # will be replaced with the next sequential number in the final version of this license condition.)

*The inclusion of the Metamic Coupon Monitoring Program in License Condition 6 ensures that the program will be treated as an operational program with respect to providing a schedule to support the NRC's inspection; thus, the applicant must submit and update the schedule for program implementation following the issuance of the COL, in order to support planning of NRC inspections. The staff, therefore, finds the applicant's proposed resolution of **Open Item 9.1-1** acceptable because the applicant will modify proposed License Condition 6 to ensure the appropriate information is available for the staff's review of the details of the Metamic Monitoring Program prior to the start of plant operation. **Open Item 9.1-1** is, therefore, resolved. Incorporation of the proposed revision to Chapter 9 of the VEGP COL FSAR and to License Condition 6 in the VEGP COL application is being tracked as **Confirmatory Item 9.1-1**.*

Resolution of Standard Content Confirmatory Item 9.1-1

Confirmatory Item 9.1-1 is an applicant commitment to revise its FSAR Section 9.1.6 to include a requirement for inclusion of methodology, acceptance criteria and corrective action in the Metamic Coupon Monitoring Program. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 9.1-1 is now closed.

9.1.2.5 Post-Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff finds the following license condition acceptable:

- License Condition (9-1) - Prior to initial fuel load, the licensee shall implement the spent fuel rack Metamic Coupon Monitoring Program. No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors

(NRO) a schedule that supports planning for and conduct of NRC inspections of the spent fuel rack Metamic Coupon Monitoring Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the spent fuel rack Metamic Coupon Monitoring Program has been fully implemented.

9.1.2.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidelines given in Section 9.1.2 of NUREG-0800. The staff based its conclusion on the following:

- STD COL 9.1-7 is acceptable because the necessary level of detail for the Metamic Coupon Monitoring Program has been provided by the applicant, including the methodology and acceptance criteria for the tests listed, the corrective action requirements, and the administrative controls applicable to the program.

9.1.3 Spent Fuel Pool Cooling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.3, "Spent Fuel Pool Cooling and Cleanup System")

9.1.3.1 Introduction

The spent fuel pool cooling system (SFS) is designed to remove decay heat, which is generated by stored fuel assemblies from the water in the spent fuel pool (SFP). The safety-related portion of the SFS credits the water inventory in the pool and safety-related makeup water to remove the decay heat. The nonsafety-related portion of the system is an active system during normal operations that pumps the high-temperature water from within the fuel pool through a heat exchanger (HX) and then returns the water to the pool. The SFS HXs are cooled by the component cooling water system (CCS). A secondary function of the SFS is clarification and purification of the refueling water and the SFP.

9.1.3.2 Summary of Application

Section 9.1 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.1 of the AP1000 DCD. Section 9.1 of the DCD includes Section 9.1.3. Units 6 and 7 COL FSAR, Section 9.1.3 includes one departure request and one item of supplemental (SUP) information.

Tier 1 and Tier 2 Exemption and Departure Request

The applicant proposed the following Tier 1 and Tier 2 DEP from the AP1000 DCD:

- PTN DEP 2.0-3

The Tier 1 DEP request is from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature, which is currently specified as 30.1 °Celsius (C) (86.1 °Fahrenheit (F)). The Tier 2 DEP was requested because this site parameter value is also listed as the maximum safety wet-bulb (noncoincident) air temperature in AP1000 DCD Tier 2, Table 2-1.

The applicant proposed to add the following information as part of PTN DEP 2.0-3, at the end of the third bullet in Turkey Point Units 6 and 7 COL FSAR, Section 9.1.3.1.3.1:

SFS performance following restart after a normal refueling is affected by a change in maximum safety wet-bulb temperature. Calculations confirm that spent fuel pool temperature remains below 46.1 °C (115 °F) with a CCS supply temperature of 36.1 °C (97 °F) at the specified SFP loading condition and decay time on the fuel fraction just replaced during the previous 17 day refueling outage.

While the maximum CCS temperature expected for Turkey Point Units 6 and 7 is 36.3 °C (97.4 °F), an increase of 0.2 °C (0.4 °F) in CCS supply temperature will produce a similar increase in the SFP maximum temperature; therefore, the requirement to maintain SFP temperature below 48.9 °C (120 °F) is met with margin.

The exemption request related to the AP1000 DCD maximum safety wet-bulb (noncoincident) air temperature involves an exemption to 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Appendix D, "Design Certification Rule for the AP1000 Design," Section IV.A.2.d. Specifically, the Turkey Point Units 6 and 7 applicant requested an exemption from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature. The exemption request is evaluated in Section 2.0.4 of this SER.

The applicant proposed to add the following information as part of the response to NRC Orders EA-12-051 and EA-12-063, following the first paragraph of DCD Subsection 9.1.3.7.D:

All three safety-related spent fuel pool level instruments and associated instrument tubing lines are located below the fuel handling area operating deck and the cask washdown pit. This location provides protection from missiles that may result from damage to the structure over the spent fuel pool. The SFP level instruments associated with PMS divisions A and C are physically separated from the SFP level instrument associated with PMS division B. The safety-related spent fuel pool level instruments measure the water level from the top of the spent fuel pool to the top of the fuel racks. These instruments are conservatively calibrated at a reference temperature suitable for normal spent

fuel pool operation on a regular basis and accuracy is not affected by power interruptions.

The evaluation of the proposed supplemental information is included in Section 20.3 of this SER.

Supplemental Information

- PTN SUP 9.1-1

The applicant provided supplemental information in Section 9.1.3.7, "Instrumentation Requirements," describing the location of safety-related SFP level instruments and instrument tubing lines.

9.1.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the SFS are given in Section 9.1.3 of NUREG-0800.

9.1.3.4 Technical Evaluation

The staff reviewed Section 9.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the CCS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Tier 1 and Tier 2 Departure

- PTN DEP 2.0-3

PTN DEP 2.0-3 proposes to increase the maximum safety wet-bulb (noncoincident) air temperature from 30.1 °C (86.1 °F) to 30.8 °C (87.4 °F). This change impacts the performance of various systems, structures, and components (SSCs) described in the AP1000 DCD. The staff's evaluation of this proposed change is also discussed in Sections 2.0, 2.3.1, 5.4, 6.2, 6.4, 9.2.2, and 9.2.7 of this SER.

The nonsafety portion of the SFS is designed to remove decay heat generated by the stored fuel assemblies from the water in the SFP and transfer it to the CCS. The site temperature (wet and dry bulb) impacts the cooling tower performance, which affects the temperature of the CCS. The SFS heat exchanger is cooled by the CCS, and a change in the CCS temperature affects the performance of the SFS. The impact of the proposed change on the CCS system is

evaluated in Section 9.2.2 of this SER. Since the safety-related portion of the SFS does not credit the use of the CCS, it remains unaffected by the proposed change.

The performance of the SFS is evaluated in the AP1000 DCD for several limiting offload scenarios. Of all the evaluated scenarios, only one scenario uses the maximum safety wet-bulb (noncoincident) air temperature as the basis to determine the system's heat removal performance. In this scenario, the analysis must demonstrate that the SFS is capable of maintaining the temperature of the SFP water below 48.9 °C (120 °F) following a partial core fuel shuffle refueling, with the wet-bulb temperature at the maximum safety wet-bulb (noncoincident) air temperature (most limiting case).

In letters dated June 24, 2011, the applicant responded to staff's RAI 9.2.2-1 and -2 (ADAMS Accession Nos. ML11178A231 and ML11178A232) and made reference to Calculation APP-SFS-M3C-042, Revision 0, "SFS HX Sizing Calculation Using Florida Power and Light (Turkey Point) Increased Wet-bulb Temperatures," as a demonstration that the Turkey Point Units 6 and 7 SFS still meets its design basis with the new wet-bulb temperature. Calculation APP-SFS-M3C-042 shows that, with a CCS temperature of 36.1 °C (97 °F), the SFP temperature remains below 46.1 °C (115 °F). The calculation in this report followed the same methodology used in Westinghouse Technical Report (TR)-36 (APP-GW-GLE-036), "Impact of a Revision to the Current Wet-bulb Temperature Identified in Table 5.0-1 (Tier 1) and Table 2-1 (Sheet 1 of 3) of the DCD (Revision 16)" for the AP1000 DC. The staff had evaluated this Westinghouse methodology as part of its AP1000 DCD review and found it acceptable in Supplement 2 of NUREG-1793. The staff has previously reviewed APP-SFS-M3C-042 while reviewing the V.C. Summer site-specific DEP 2.0-2 and found APP-SFS-M3C-042 acceptable as reference calculation.

As described in the markup for Turkey Point Units 6 and 7 COL FSAR, Section 9.2, the maximum design temperature for the CCS is 36.3 °C (97.4 °F). The Turkey Point Units 6 and 7 CCS maximum temperature is 0.2 °C (0.4 °F) higher than the temperature assumed for Turkey Point CCS in APP-SFS-M3C-042. The applicant stated that an increase in the CCS temperature will cause a proportional increase in the SFP temperature of approximately 0.2 °C (0.4 °F). This would result in a Turkey Point Units 6 and 7 SFP water temperature of approximately 46.3 °C (115.4 °F). Therefore, the staff finds that the Turkey Point Units 6 and 7 SFS is capable of maintaining the SFP water temperature below 48.9 °C (120 °F) following a partial core fuel shuffle refueling at the maximum safety wet-bulb (noncoincident) air temperature.

The applicant's departure request also proposed to revise Turkey Point Units 6 and 7 COL FSAR, Section 9.1.3.1.3.1 to reflect the impact of the change in the maximum safety wet-bulb (noncoincident) air temperature. Since the modification clarifies that only the refueling scenario discussed in this section (following a restart after a normal refueling, while the reactor is at power) has been impacted by the change in the maximum safety wet-bulb (noncoincident) air temperature, and that the Turkey Point Units 6 and 7 SFS is still capable of maintaining the SFP water temperature below the limit of 48.9 °C (120 °F), the staff finds the proposed departure with proposed Turkey Point Units 6 and 7 COL FSAR changes acceptable. The staff verified that the necessary changes were incorporated in the revised version of the Turkey Point Units 6 and 7 COL FSAR.

Supplemental Information

- PTN SUP 9.1-1

The applicant added supplemental regarding the location of safety-related SFP level instruments and instrument tubing lines. This supplemental information is reviewed above in this SER section.

9.1.3.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.1.3.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of NRC regulations and the acceptance criteria in NUREG-0800, Section 9.1.3. The staff based its conclusion on the following:

- PTN DEP 2.0-3 is acceptable because the staff determined that the SFS is capable of maintaining the SFP water temperature below 48.9 °C (120 °F) following a partial core fuel shuffle refueling, with the wet-bulb temperature at the maximum safety wet-bulb (noncoincident) air temperature of 30.8 °C (87.4 °F). Therefore, the staff concludes that the Turkey Point Units 6 and 7 SFS is acceptable.

9.1.4 Light Load Handling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.4, "Light Load Handling System (Related to Refueling)")

9.1.4.1 Introduction

The light load handling system (LLHS) consists of the equipment and structures needed for the refueling operation. This equipment comprises fuel assemblies, core component and reactor component hoisting equipment, handling equipment, and a dual basket fuel transfer system. The structures associated with the fuel handling equipment are the refueling cavity, the transfer canal, the fuel transfer tube, the SFP, the cask loading area, the new fuel storage area, and the new fuel receiving and inspection area.

9.1.4.2 Summary of Application

Section 9.1 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.1 of the AP1000 DCD. Section 9.1 of the DCD includes Section 9.1.4.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.1.4, the applicant provided the following:

AP1000 COL Information Items

- STD COL 9.1-5

The applicant provided additional information in STD COL 9.1-5 to address COL Information Item 9.1-5 (COL Action Item 9.1.6-5).

- STD COL 9.1-6

The applicant provided additional information in STD COL 9.1-6 to address COL Information Item 9.1-6 (COL Action Item 9.1.6-6).

9.1.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the LLHS are given in Section 9.1.4 of NUREG–0800.

The regulatory basis for acceptance of the COL information items is established in:

- 10 CFR Part 50, Appendix A, GDC 61
- American National Standards Institute/American Nuclear Society (ANSI/ANS) 57.1-1992, “Design Requirements for LWR Fuel Handling Systems”

9.1.4.4 Technical Evaluation

The staff reviewed Section 9.1.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the LLHS. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3

and 4) were equally applicable to the Turkey Point Units 6 and 7 COL FSAR, the staff undertook the following reviews:

- The staff compared the VEGP FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAls.
- The staff confirmed that all responses to RAls identified in the corresponding standard content evaluation were endorsed.
- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.1.4.4 of the VEGP SER:

AP1000 COL Information Items

- *STD COL 9.1-5*

COL Information Item 9.1-5 states:

The Combined License applicant is responsible for a program for inservice inspection of the light load handling system as specified in subsection 9.1.4.4 and the overhead heavy load handling system in accordance with ANSI B30.2, ANSI B30.9, ANSI N14.6, and ASME [American Society of Mechanical Engineers] NOG-1 as specified in subsection 9.1.5.4.

The commitment was also captured as COL Action Item 9.1.6-5 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The Combined License applicant is responsible for a program for inservice inspection of the light load handling system as specified in DCD Tier 2, Section 9.1.4.4 and the overhead heavy load handling system in accordance with ANSI B30.2, ANSI B30.9, ANSI N14.6, and ASME NOG-1 as specified in DCD Tier 2, Section 9.1.5.4.

STD COL 9.1-5 states:

The above requirements are part of the plant inspection program for the light load handling system, which is implemented through procedures. In addition to the above inspections, the procedures reflect the manufacturers' recommendations for inspection.

The staff reviewed STD COL 9.1-5, which addresses COL Information Item 9.1-5 on the inservice inspection (ISI) program for the LLHS. The applicant stated that the inspection program for the LLHS is implemented through procedures and reflect the manufacturer's recommendations. RAI 9.1.4-1 requested that the applicant provide a copy of the procedures for verification by the staff or provide the schedule in relation to fuel loading for issuance of the procedures.

The applicant stated in its response to RAI 9.1.4-1, that an inspection and testing program will be developed to address the LLHS. Procedures defining the program will address the testing and inspection requirements outlined in Section 9.1.4.4, "Inspection and Test Requirements," of the AP1000 DCD and the procedures will include applicable manufacturer's recommendations and industry standards. The applicant stated that procedure development is tracked by the overall plant construction and test schedule. The applicant further stated that details of the implementation milestones for development of procedures are not currently available and are not expected to be available until a detailed construction schedule has been developed. When it becomes available, scheduling information will be provided to the NRC as necessary to support timely completion of NRC inspection and audit functions.

*Although the response to RAI 9.1.4-1 states that the plant inspection program schedule information will be provided when available, BLN COL FSAR Table 1.8-202 lists STD COL 9.1-5 as having been completed by the applicant. The staff notes that STD COL 9.1-5 has not been fully addressed. The applicant is asked to revise BLN COL FSAR Table 1.8-202 to commit in the BLN COL FSAR to implementing the plant inspection program for the LLHS before receipt of fuel. This is **Open Item 9.1-2**.*

- STD COL 9.1-6

COL Information Item 9.1-6 states:

The Combined License applicant is responsible to ensure an operating radiation monitor is mounted on any crane or fuel handling machine when it is handling fuel.

The commitment was also captured as COL Action Item 9.1.6-6 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant/holder will ensure that an operating radiation monitor is mounted on any crane or fuel handling machine when it is handling fuel.

STD COL 9.1-6 states:

Plant procedures require that an operating radiation monitor is mounted on any machine when it is handling fuel. Refer to DCD Subsection 11.5.6.4, "Fuel Handling Area Criticality Monitors," for a discussion of augmented radiation monitoring during fuel handling operations.

The NRC staff reviewed STD COL 9.1-6, which addresses COL Information Item 9.1-6 related to radiation monitoring included under Section 9.1.4 of the BLN COL FSAR. The proposed mounting of an operating radiation monitor on any crane or fuel handling machine during fuel handling is included under Section 9.1.4.3.8 of the BLN COL FSAR. The applicant committed to develop plant procedures that will specify that an operating radiation monitor be mounted on any fuel handling machine when it is handling fuel. DCD Section 11.5.6.4 specifies the need to augment area radiation monitoring during fuel handling operations by a portable radiation monitor on the machine handling fuel. The staff finds that with the addition of the portable radiation monitor to any fuel handling machine when it is handling fuel, the BLN COL FSAR meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 61 for the prevention of unacceptable radiation exposure.

The staff finds that the applicant has adequately addressed COL Information Item 9.1-6 which would ensure that an operating portable radiation monitor is mounted on any fuel handling machine in the LLHS when it is handling fuel.

Resolution of Standard Content Open Item 9.1-2

*To resolve **Open Item 9.1-2**, in a letter dated December 30, 2009, the applicant proposed a change to VEGP COL FSAR Section 9.1.4.4 in response to this open item instead of a revision to Table 1.8-202. The applicant proposed a revision to FSAR Section 9.1.4.4 to clarify that the LLHS, including system inspections, is implemented prior to receipt of fuel onsite. The staff finds this acceptable since the commitment provided will ensure that these procedures will be in place prior to fuel movement. Therefore, **Open Item 9.1-2** is resolved. Incorporation of the proposed revision in the VEGP COL FSAR is being tracked as **Confirmatory Item 9.1-2**.*

Resolution of Standard Content Confirmatory Item 9.1-2

Confirmatory Item 9.1-2 is an applicant commitment to revise its FSAR Section 9.1.4.4 to include an inspection of the LLHS prior to receipt of fuel. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 9.1-2 is now closed.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from Section 9.1.4.4 of the BLN SER that requires correction. The BLN SER provides quoted material for COL Action Item 9.1.6-5, citing Appendix F of NUREG-1793

as the source. The source of the quoted material for COL Action Item 9.1.6-5 is in fact from Chapter 9 (Section 9.1.6) of NUREG-1793.

9.1.4.5 Post-Combined License Activities

For the reasons discussed in the technical evaluation above, the following FSAR commitment is identified as the responsibility of the licensee and is identified in Section 9.1.4.4 of the Turkey Point Units 6 and 7 COL FSAR:

- The light-load handling program, including system inspections, will be implemented prior to receipt of fuel onsite.

9.1.4.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of the NRC's regulations and the acceptance criteria given in the guidelines found in Section 9.1.4 of NUREG-0800. The staff based its conclusion on the following:

- STD COL 9.1-5 is acceptable because the staff finds that the Turkey Point Units 6 and 7 COL FSAR provided information that ISI of the LLHS is part of the plant inspection program for the LLHS, which is implemented through procedures.
- STD COL 9.1-6 is acceptable because the staff finds that the Turkey Point Units 6 and 7 COL FSAR meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 61.

9.1.5 Overhead Heavy Load Handling Systems (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.5, "Overhead Load Handling System")

9.1.5.1 Introduction

The overhead heavy load handling systems (OHLHS) are used to lift loads whose weight is greater than the combined weight of a single spent fuel assembly and its handling device. The principal equipment is the containment polar crane, equipment hatch hoist, maintenance hatch hoist, and the cask handling crane. The OHLHS are designed to ensure that inadvertent operations or equipment malfunctions, separately or in combination, will not cause a release of radioactivity, a criticality accident, an inability to cool fuel within the reactor vessel or SFP, or prevent safe shutdown of the reactor.

9.1.5.2 Summary of Application

Section 9.1 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.1 of the AP1000 DCD. Section 9.1 of the AP1000 DCD includes Section 9.1.5.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.1.5, the applicant provided the following:

Supplemental Information

- STD SUP 9.1-1

The applicant provided supplemental (SUP) information in Section 9.1.5.3, "Safety Evaluation," describing heavy-load lifts outside those already described in the AP1000 DCD.

- STD SUP 9.1-2

The applicant provided supplemental information in Section 9.1.5, "Overhead Heavy Load Handling Systems," describing key elements of the heavy-loads handling program and a quality assurance (QA) program.

- STD SUP 9.1-3

The applicant provided supplemental information in Section 9.1.5.5, "Load Handling Procedures," describing load handling operations for heavy loads in the vicinity of irradiated fuel and safe shutdown equipment.

AP1000 COL Information Items

- STD COL 9.1-5

The applicant provided additional information in STD COL 9.1-5 to address COL Information Item 9.1-5 (COL Action Item 9.1.6-5).

- STD COL 9.1-6

The applicant provided additional information in STD COL 9.1-6 to address COL Information Item 9.1-6 (COL Action Item 9.1.6-6).

9.1.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the OHLHS are given in Section 9.1.5 of NUREG-0800.

The regulatory basis for acceptance of STD SUP 9.1-1, STD SUP 9.1-2, and STD SUP 9.1-3 addressing planned heavy-load lift programs includes the following:

- 10 CFR Part 50, Appendix A, GDC 4
- 10 CFR Part 50, Appendix A, GDC 61
- NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants"

The regulatory basis for acceptance of STD COL 9.1-5, addressing the ISI program for the OHLHS, is based on GDC 4 and the guidelines of NUREG-0612, which references ANSI B30.2, "Overhead and Gantry Cranes," ANSI N14.6, "Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds or More," ASME NOG-1, "Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)," and ANSI B30.9, "Slings."

The regulatory basis for acceptance of STD COL 9.1-6, addressing operating radiation monitor on any crane handling fuel, is based on the requirements of GDC 61.

9.1.5.4 Technical Evaluation

The staff reviewed Section 9.1.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to OHLHS. The results of the staff's evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.1.5.4 of the VEGP SER:

Supplemental Information

- STD SUP 9.1-1, STD SUP 9.1-2, and STD SUP 9.1-3

The staff reviewed the information provided by the applicant for STD SUP 9.1-1. The applicant stated that it did not provide an itemized list of heavy load lifts outside the scope of heavy loads described in the AP1000 DCD because no such heavy load lifts are currently planned. The applicant provided a general description for addressing heavy load movements outside the planned scope if needed in the future. However, the applicant did not address all the program elements and detail listed in NUREG-0612 Section 5.1.1 and NUREG-0800 Section 9.1.5, nor did it provide a schedule for implementation of the heavy load handling program. A heavy load handling program that meets the guidelines of NUREG-0612 and NUREG-0800 Section 9.1.5, needs to be in place at a time before there is a possibility that a load drop could cause a release of radioactivity, a criticality accident, inability to cool fuel within the reactor vessel or spent fuel pool, or prevent safe shutdown of the reactor. The staff asked the applicant in RAI 9.1.5-1 to provide the program elements specified in NUREG-0612 Section 5.1.1 and NUREG-0800 Section 9.1.5, and a schedule for implementation.

In BLN COL FSAR, Revision 1, the applicant provided the missing and necessary information specified in NUREG-0612 Section 5.1.1 and NUREG-0800 Section 9.1.5. The applicant provided a description of the key elements of the heavy load handling system program in BLN COL FSAR Section 9.1.5. The key elements are: 1) Listing of heavy loads; 2) Listing of handling equipment; 3) Safe load paths definition, location and evaluation; 4) Procedures and maintenance manuals; 5) Inspection and testing; 6) Personnel qualification and training; and 7) Quality Assurance (QA) program to monitor and implement the heavy loads program. Also, the BLN COL FSAR, Revision 1 Section 9.1.5 describes the heavy loads handling system procedures. Because Section 9.1.5 of the BLN COL FSAR includes the key elements identified in NUREG-0612, the staff finds the aspects of RAI 9.1.5-1 regarding the key elements of the heavy loads program resolved. Therefore, the staff finds the applicant meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 4.

In its response to RAI 9.1.5-1, the applicant stated that details of the implementation milestones for the development of heavy load handling procedures and related engineering documents are not currently available, nor are the implementation milestones expected to be available until after a detailed construction schedule has been developed. The applicant stated that appropriate scheduling information will be provided, when available, to the NRC as necessary to support timely completion of inspection and audit functions. The applicant did not provide any schedule for when the heavy load handling program will be completed for the implementation of an approved heavy load handling program (including OHLHS procedures). The applicant is asked to revise

*BLN COL FSAR Table 1.8-202 to commit in the BLN COL FSAR to implementing the heavy load handling program before receipt of fuel. This is **Open Item 9.1-3**.*

AP1000 COL Information Items

- STD COL 9.1-5

The applicant provided additional information in STD COL 9.1-5 to address COL Information Item 9.1-5. COL Information Item 9.1-5 states:

The Combined License applicant is responsible for a program for inservice inspection of the light load handling system as specified in subsection 9.1.4.4 and the overhead heavy load handling system in accordance with ANSI B30.2, ANSI B30.9, ANSI N14.6, and ASME NOG-1 as specified in subsection 9.1.5.4.

The commitment was also captured as COL Action Item 9.1.6-5 in Chapter 9 of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The Combined License applicant is responsible for a program for inservice inspection of the light load handling system as specified in DCD Tier 2, Section 9.1.4.4 and the overhead heavy load handling system in accordance with ANSI B30.2, ANSI B30.9, ANSI N14.6, and ASME NOG-1 as specified in DCD Tier 2, Section 9.1.5.4.

The staff reviewed STD COL 9.1-5, which addresses COL Information Item 9.1-5 on the plant inspection program for the OHLHS. The applicant stated that the inspection program for the OHLHS is implemented through procedures and reflect the manufacturer's recommendations and the recommendations of NUREG-0612. The staff asked the applicant in RAI 9.1.5-2 to provide a copy of the procedures for verification by the staff.

In its response to RAI 9.1.5-2, the applicant stated that a plant inspection program for the OHLHS will be created using the manufacturer's recommendations and will meet the requirements outlined in applicable industry standards. The staff confirmed that BLN COL FSAR Section 9.1.5.4 was revised to provide additional information related to the description of implementing procedures. On the basis of its review, the staff finds the applicant adequately addressed that the OHLHS plant inspection program procedures will follow the equipment manufacturer's recommendations and will meet the requirements in applicable industry standards. With the addition to BLN COL FSAR Section 9.1.5.4 of a descriptive list of the minimum elements required to be addressed in the overhead heavy load handling equipment plant inspection program procedures, in addition to the other guidelines specified in Section 9.1.5 of NUREG-0800, the staff finds the applicant meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 4.

In the RAI response, the applicant stated that the schedule for issuing the procedures that implement the plant inspection program for the OHLHS are not

yet available. The applicant also stated that implementation milestones are not expected to be available until after a detailed construction schedule has been developed, but will be provided to the NRC when available to support timely completion of inspection and audit functions. Although the response to RAI 9.1.5-2 states that the plant inspection program schedule information will be provided when available, BLN COL FSAR Table 1.8-202 lists STD COL 9.1-5 as having been completed by the applicant. The staff notes that STD COL 9.1-5 has not been fully addressed. The applicant is asked to revise BLN COL FSAR Table 1.8-202 to commit in the BLN COL FSAR to implementing the plant inspection program for the OHLHS before receipt of fuel. This is **Open Item 9.1-4**.

- STD COL 9.1-6

The applicant provided additional information in STD COL 9.1-6 to address COL Information Item 9.1-6. COL Information Item 9.1-6 states:

The Combined License applicant is responsible to ensure an operating radiation monitor is mounted on any crane or fuel handling machine when it is handling fuel.

The commitment was also captured as COL Action Item 9.1.6-6 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant/holder will ensure that an operating radiation monitor is mounted on any crane or fuel handling machine when it is handling fuel.

The NRC staff reviewed STD COL 9.1-6, which addresses COL Information Item 9.1-6 related to radiation monitoring included under Section 9.1.5 of the BLN COL FSAR. The proposed mounting of an operating radiation monitor on any crane or fuel handling machine during fuel handling is included under Section 9.1.5.3 of the BLN COL FSAR. The applicant committed to develop plant procedures that will specify that an operating radiation monitor be mounted on any fuel handling machine when it is handling fuel. DCD Section 11.5.6.4 specifies the need to augment area radiation monitoring during fuel handling operations by a portable radiation monitor on the machine handling fuel. The staff finds that with the addition of the portable radiation monitor to any fuel handling machine when it is handling fuel, the BLN COL FSAR meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 61 for the prevention of unacceptable radiation exposure.

The staff finds that the applicant has adequately addressed COL Information Item 9.1-6 which would ensure that an operating portable radiation monitor is mounted on any crane when it is handling fuel.

Resolution of Standard Content Open Items 9.1-3 and 9.1-4

The VEGP applicant responded to **Open Items 9.1-3 and 9.1-4** in a letter dated December 30, 2009. The letter proposed a change to VEGP COL FSAR

*Section 9.1.5.4 in response to these open items instead of revising Table 1.8-202. The applicant proposed a revision to FSAR Section 9.1.5.4 to clarify that the OHLHS, including system inspections, will be implemented prior to receipt of fuel onsite. The staff finds this acceptable since the commitment provided will ensure that the procedures will be in place and the plant inspection program will be implemented for the OHLHS prior to fuel movement. Therefore, **Open Items 9.1-3 and 9.1-4** are resolved. Incorporation of the proposed revision in the FSAR is being tracked as **Confirmatory Item 9.1-3**.*

Resolution of Standard Content Confirmatory Item 9.1-3

Confirmatory Item 9.1-3 is an applicant commitment to revise its FSAR Section 9.1.5.4 to include an inspection of the OHLHS prior to receipt of fuel. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 9.1-3 is now closed.

9.1.5.5 Post-Combined License Activities

For the reasons discussed in the technical evaluation above, the following FSAR commitment is identified as the responsibility of the licensee in Turkey Point Units 6 and 7 COL FSAR, Section 9.1.5:

- The overhead heavy-load handling program, including system inspections, will be implemented prior to receipt of fuel onsite.

9.1.5.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of NRC regulations and the acceptance criteria given in Section 9.1.5 of NUREG-0800. The staff based its conclusion on the following:

- STD SUP 9.1-1, STD SUP 9.1-2, and STD SUP 9.1-3 are acceptable because the staff finds that the applicant provided supplemental information in accordance with NUREG-0612, NUREG-0800, Section 9.1.5, and RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," Section C.I.9.1.5, to describe the program and schedule for the implementation of the program governing heavy-load handling.
- STD COL 9.1-5 is acceptable because the staff finds that the Turkey Point Units 6 and 7 COL FSAR provided information that ISI of the OHLHS is part of the plant inspection

program for the OHLHS, which is implemented through procedures, in accordance with referenced national standards.

- STD COL 9.1-6 is acceptable because the staff finds that the Turkey Point Units 6 and 7 COL FSAR meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 61.

9.2 Water Systems

9.2.1 Service Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.1, “Station Service Water System (Open, Raw Water Cooling Systems)”)

9.2.1.1 Introduction

The service water system (SWS) is a nonsafety-related system that supplies cooling water to remove heat from the nonsafety-related CCS HXs in the turbine building. The SWS is arranged into two trains of components and piping. Each train includes one service water pump, one strainer, and a cooling tower cell as its heat sink. The heat sink for both trains is provided by a single cooling tower with two cells and a divided basin. Each train is capable of providing 100-percent of the required SWS flow for normal full-power operation.

9.2.1.2 Summary of Application

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the DCD includes Section 9.2.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.1, the applicant provided the following:

Supplemental Information

- PTN SUP 9.2-1

The applicant provided supplemental information in Section 9.2.1.2.2, “Component Description,” by adding additional text to address the SWS cooling tower potential interactions.

The SWS cooling tower was evaluated for potential impacts from interference and air restriction effects due to yard equipment layout and tower operation in an adjacent unit. Based on unit spacing, yard equipment layout, and the margins inherent in the performance requirements and design conditions of the towers, no adverse impacts were determined.

Tier 2 Departure

- PTN DEP 2.0-2

This Tier 2 departure (request is from a site parameter value provided in AP1000 DCD Tier 2, Table 2-1, for the maximum normal wet-bulb (noncoincident) air temperature. AP1000 DCD Tier 2, Table 2-1, identified this value as 26.72 °C (80.1 °F). The proposed revised value is

27.5 °C (81.5 °F). The corresponding site characteristic value is 27.5 °C (81.5 °F) as reported in Turkey Point Units 6 and 7 COL FSAR, Section 2.3.1.5. This site characteristic exceeds the DCD site parameter by 0.78 °C (1.4 °F). This change requires an evaluation of the various plant performance requirements and commitments affected by this parameter to confirm that the performance of the plant's safety systems remains within the bounds described in the AP1000 DCD. The SWS is one system affected; therefore, the departure was reflected in Revision 3 of the Turkey Point Units 6 and 7 COL FSAR and in Turkey Point Units 6 and 7 COL Part 7. The staff's evaluation of this proposed change is also discussed in Sections 2.0, 2.3.1, 9.1.3, 9.2.2, and 9.2.7.

Replace the paragraph in DCD Section 9.2.1.2.3.4, "Plant Cooldown/Shutdown," with the following paragraph:

During the plant cooldown phase in which the normal residual heat removal system has been placed in service and is providing shutdown cooling, the service water cooling tower provides cooling water at a temperature of 89.8 °F or less when operating at design heat load and at an ambient wet-bulb temperature of no greater than the maximum normal wet-bulb temperature as defined in Chapter 2, Table 2.0-201. Two service water pumps and two cooling tower cells are normally used for plant cooldown, and the cross-connection valves between trains are normally closed. The service water system heat load and flow rate are shown in DCD Table 9.2.1-1. During these modes of operation the normal residual heat removal system and the component cooling water system remove sensible and decay heat from the reactor coolant system. The service water system cooling towers are designed with sufficient margin so that normal time-related degradation of tower performance will not prohibit their support of this heat removal function. In the event of failure of a service water system pump or cooling tower fan, the cooldown time is extended.

9.2.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

Although the SWS (including heat sink) is not safety related, it supports the normal (defense-in-depth) capability of removing reactor and spent fuel decay heat, it is part of the first line of defense for reducing challenges to passive safety systems in the event of transients and plant upsets, and its cooling function is important for reducing shutdown risk when the reactor coolant system (RCS) is open (e.g., during midloop conditions). The risk importance of the SWS makes it subject to regulatory treatment of nonsafety-related systems (RTNSS) in accordance with the Commission's policy for passive reactor plant designs in SECY-94-084, "Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs."

The staff's evaluation of the SWS focuses primarily on confirming that the SWS is capable of performing its defense-in-depth and RTNSS functions; that it will not adversely impact safety-related structures, systems, and components (SSCs); and that inspections, tests, analyses, and acceptance criteria (ITAAC), test program specifications, and RTNSS availability controls for the SWS are appropriate.

The regulatory basis for acceptance of PTN SUP 9.2-1 and DEP 2.0-2, addressing the SWS cooling tower and the maximum normal wet-bulb revision, is the acceptance criteria in Sections 9.2.1 and 9.2.5 of NUREG-0800.

9.2.1.4 Technical Evaluation

The staff reviewed Section 9.2.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the SWS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- PTN SUP 9.2-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.1.2.2 by adding additional text to address the SWS cooling tower potential interactions.

The cooling capability of the SWS cooling towers for the Turkey Point Units 6 and 7 units can be adversely affected by interactions that exist between the SWS two mechanical draft cooling towers between units. In addition, interactions between cooling towers (circulating water system (CWS) versus SWS) may adversely affect the cooling capacity of the SWS. Since the Turkey Point Units 6 and 7 units utilize mechanical induced-draft towers for the CWS versus natural draft cooling towers as submitted by other COL applicants, interactions with the SWS cooling towers are now more likely due to the difference in height of the discharge plume. Adverse interactions can occur due to localized atmospheric influences caused by siting considerations, the locations of major structures, the locations of the mechanical draft cooling towers, mechanical draft cooling tower fan speed, and wind effects. Because AP1000 utilizes only one SWS mechanical draft cooling tower in its design, interaction effects between the mechanical draft cooling towers of multi-unit sites was not evaluated by the staff for AP1000. Therefore, the staff requested in RAI 28, Question 09.02.01-1 that the applicant provide analysis and additional information to address potential adverse interactions between the Turkey Point Units 6 and 7 mechanical draft SWS cooling towers and mechanical draft CWS cooling towers for the two Turkey Point Units 6 and 7 units and adjacent units to justify PTN SUP 9.2-1.

Based on its response dated August 17, 2011 (ADAMS Accession No. ML11231A983), the applicant addressed cooling tower interaction considerations as shown below.

Greater than 800 feet of separation will exist between the SWS cooling towers of adjacent Turkey Point Units 6 and 7 units and that the large turbine building structure is located between these two cooling towers. Also indicated that greater than 1,000 feet of separation will exist between each unit's SWS cooling towers and each unit's mechanical induced-draft towers for the CWS. Further, location of the Unit 5 cooling

tower is over 2,500 feet for the Turkey Point Units 6 and 7 SWS and over 3,000 ft for the CWS, respectively.

In addition, the CWS cooling towers for each Turkey Point Units 6 and 7 unit are mechanical induced draft towers. The plumes from the CWS cooling towers are directed upward by their fans and the buoyant effect of warm air. During normal power operation, the stack exit velocity is expected to be approximately 22.5 miles per hour. Based on the site arrangement (Turkey Point Units 6 and 7 COL FSAR, Figure 1.1-201), interactions of the CWS cooling towers with the SWS cooling towers may potentially result from winds from the south-southwest through south-southeast directions. The proposed design of the CWS cooling towers, including the circular shape and high stack exit velocity, in conjunction with the buoyant effect of the warm stack exhaust air, will tend to elevate and disperse the plume at elevations greater than the intakes of the SWS cooling towers, making it unlikely any significant interaction would occur. Strong SSW-SSE winds with velocities equal to or greater than the CWS cooling tower stack exit velocity would be necessary to have potential for interaction, but these winds occur less than 0.09 percent of the time based on site meteorological data (Turkey Point Units 6 and 7 COL FSAR, Table 2.3.2-205). Further, the SWS cooling towers are shielded by the larger and higher plant structures from winds from the south-southwest creating higher likelihood of dispersion of a plume from that direction. The low occurrence of winds from these directions and the large separation distances make any significant interaction unlikely under lower wind conditions; with higher wind velocities, greater dispersion is affected.

During conditions where the SWS cooling tower is subject to RTNSS requirements, the cooling tower is only operating at a small fraction of its operational heat load, leaving a substantial margin available to accommodate site specific adverse interactions, if they were to exist. Therefore, site specific performance degradation resulting from an interaction with a second unit would be minimal and would be readily accommodated by the design margins available to support RTNSS capability.

Based on the information that was provided in the response to RAI 28, Question 09.02.01-1, the staff finds the applicant's resolution of this issue to be acceptable since the SWS cooling tower interactions have been adequately addressed by at least 243 m (800 ft) of building separation and the large structure, the turbine building, being placed between the two SWS cooling towers. It is unlikely that an SWS cooling tower plume could travel to the vicinity of an SWS cooling tower on an adjacent unit. Distance and interfering structures in the path of the plume will disperse the plume, greatly minimizing any adverse effect on cooling tower performance. There is a minimal probability that a cooling tower plume will interact such that a significant degradation in performance would occur. Therefore, RAI 28, Question 09.02.01-1, is resolved.

Tier 2 Departure

- PTN DEP 2.0-2

The applicant, in PTN DEP 2.0-2, evaluated the DCD site parameter value for the maximum normal air temperature wet-bulb (noncoincident) in DCD Tier 2, Table 2-1, and proposed to increase the corresponding site characteristic value from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) to

reflect expected site conditions. The corresponding site characteristic value is 27.5 °C (81.5 °F) as reported in Turkey Point Units 6 and 7 COL FSAR, Section 2.3.1.5. This site characteristic exceeds the DCD site parameter by 0.8 °C (1.4 °F).

This increase in maximum normal wet-bulb air temperature impacts the SWS maximum cooling water temperature at design peak SWS heat duty, which occurs during plant cooldown. During plant cooldown, the SWS cooling tower provides cooling water to the CCS heat exchangers which in turn cool the normal residual heat removal system (RNS) heat exchangers while in shutdown cooling mode.

Turkey Point Units 6 and 7 COL FSAR, Section 9.2.1.2 and Units 6 and 7 COL Application Part 7, "Departures and Exemption Requests," state that, with this change in ambient wet-bulb temperature to 27.5 °C (81.5 °F), the SWS cold water temperature would rise to 32.1 °C (89.8 °F) (in lieu of 88.5 °F) during peak CCS/SWS heat duty 4 hours after reactor shutdown (beginning of cooldown), and that the change would not adversely affect the SWS function to provide adequate cooldown during maximum heat load conditions.

The applicant identified that multiple areas in the Turkey Point Units 6 and 7 COL FSAR are affected by the departure which includes Sections 2.0, 2.3.1.5, 9.2.1.2, and 9.2.7.2, as indicated in system tables for those systems affected. Additionally, the effects of the departure are discussed in Turkey Point Units 6 and 7 Application Part 7.

The staff evaluated this departure and determined there was a lack of information to support the proposed departure's effects on the maximum SWS cooling water tower outlet temperature of 32.1 °C (89.8 °F) to the CCS heat exchangers. Although the proposed change has been evaluated in Turkey Point Units 6 and 7 COL Part 7, it is not clear what aggregate effects there may be on other affected systems. Therefore, the staff, in RAI 23, Question 09.02.02-2, requested that the applicant provide analyses of the aggregate effects on integrated plant operation due to the implementation of PTN DEP 2.0-2.

In its response to RAI 23, Question 09.02.02-2, dated June 24, 2011 (ADAMS Accession No. ML11178A232), the applicant included all possible system effects, which included CCS and SWS related to the increase to maximum normal wet-bulb (noncoincidental) temperature. For completeness, systems outside the scope of the SWS that are affected by the rise in the maximum normal wet-bulb (noncoincident) air temperature are provided in the applicant's response. The applicant stated the following:

- The maximum normal wet-bulb (noncoincident) air temperature for the Turkey Point Unit 6 and 7 site was calculated for expected conditions at the site and increased from the standard value of 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F).
- These changes required an evaluation of the various plant performance requirements and commitments affected by each parameter to confirm that the performance for the plant's safety and nonsafety systems remain within the bounds described in the AP1000 DCD, and if necessary, identify changes to the design that are needed to ensure that performance is restored to within acceptable bounds.

- The following sections in the AP1000 DCD describe areas that could be affected by an increase in the maximum normal wet-bulb (noncoincident) air temperature.
 - DCD Section 5.4.7.1.2.1, “Normal Residual Heat removal System – Shutdown Heat Removal”
 - DCD Section 9.1.3.1.3.1, “Spent Fuel Pool Cooling - Partial Core – Plant Shutdown”
 - DCD Section 9.1.3.1.3.2, “Spent Fuel Pool Cooling – Full Core Off-load at 120 hours”
 - DCD Section 9.2.1.2.3.4, “Service Water System – Plant Cooldown/Shutdown”
 - DCD Section 9.2.2.1.2.2, “Component Cooling Water – Normal Plant Cooldown”
 - DCD Section 9.2.2.1.2.3, “Component Cooling Water – Refueling”
 - DCD Section 9.2.7.2.4, “Central Chilled Water System – Normal Operation”
- Each of these areas has been reviewed in detail and quantitative evaluations have been performed to determine the impact of the increases in the value of maximum normal wet-bulb (noncoincident) air temperature on the aggregate performance of all affected AP1000 systems. The increase in maximum normal wet-bulb (noncoincident) air temperature requires a modification to the design of the certified AP1000 central chilled water system (VWS) design to augment the total refrigeration capacity per train in the high capacity portion of the system by 351 kilowatts (kW) (100 tons). This will be accomplished by increasing the capacity of the two air-cooled chiller units in the high capacity portion of the VWS from 1055 kW (300 tons) to 1407 kW (400 tons).
- The impacts of the increase in the value of the maximum normal wet-bulb (noncoincident) air temperature were evaluated on a system by system basis. The same type of analyses have been performed twice previously for two required increases in AP1000 standard site temperature conditions, and once to justify a departure for a specific site whose site temperature conditions exceeded standard site temperature conditions documented in the DCD.
- Performance areas discussed in the DCD that can be affected by the increase in the maximum normal wet-bulb (noncoincident) air temperature include:
 - Plant cooldown with the RNS from 176.7 °C (350 °F) to 51.7 °C (125 °F) within 96 hours
 - Maximum SWS cold water temperature at peak system heat load conditions associated with the beginning of RNS cooldown

- Normal high capacity chilled water system design and performance
- Spent fuel pool cooling and design for maximum normal wet-bulb temperature cases (full core off-loading and normal refueling cases 150 hours after shutdown)
- Steam and power conversion systems performance

Plant Cooldown with the Normal Residual Heat Removal System (RNS) (Units 6 and 7 COL FSAR, Sections 5.4.7.1.2.1, 9.2.2.1.2.2, and 9.2.2.1.2.3)

Cooldown from 176.7 °C (350 °F) to 51.7 °C (125 °F) must be accomplished within 96 hours after reactor shutdown, using both trains of RNS, CCS, and SWS. This evolution produces the peak heat duty on the cooling water systems. The basis temperature for plant cooldown performance is the maximum normal wet-bulb (noncoincident) air temperature.

Calculation Note APP-RNS-M3C-093, Revision 0, "AP1000 Plant Cooldown Performance Calculation Considering the Higher Florida Power & Light Wet-bulb Temperature," demonstrates that the Turkey Point Units 6 and 7 plants can achieve a reactor coolant temperature of 48.9 °C (120 °F) within 83.5 hours after plant shutdown, with constant wet-bulb temperature of 27.5 °C (81.5 °F).

This performance satisfies the DCD requirement to reach 51.7 °C (125 °F) within 96 hours at an ambient wet-bulb temperature equal to the maximum normal wet-bulb (noncoincident) air temperature for the site.

SWS Cold Water Temperature at Beginning of Cool down (Turkey Point Units 6 and 7 COL FSAR, Section 9.2.1.2.3.4)

The DCD states that the maximum value of SWS cold water temperature (supply temperature to CCS heat exchangers) will be equal to or less than 31.4 °C (88.5 °F) at the beginning of cooldown, 4 hours after reactor shutdown. This performance is based on the use of the maximum normal wet-bulb (noncoincident) air temperature as the basis for determining SWS cooling tower performance.

Calculation Note APP-SWS-M3C-009, Revision 1, "Service Water Temperature Variation during RNS Cooldown," provides a detailed analysis of the time dependence of SWS cold water temperature for several different ambient wet-bulb temperatures at the expected cooldown peak heat duty. The calculated cold water temperature at 4 hours after reactor shutdown, for an ambient wet-bulb temperature of 27.5 °C (81.5 °F), is 31.1 °C (87.9 °F). This value satisfies the DCD commitment.

No design changes are necessary for Units 6 and 7 to allow the SWS to produce a cold water temperature of 31.4 °C (88.5 °F) or less at the beginning of cool down, with a wet-bulb temperature of 27.5 °C (81.5 °F).

Normal HVAC and High-Capacity Chilled Water System (HCCWS) Design and Performance (Turkey Point Units 6 and 7 COL FSAR, Section 9.2.7.2.4)

The high-capacity chilled water system (HCCWS) supplies chilled water to nonsafety-related HVAC cooling components throughout the plant, including the containment recirculation cooling system (VCS).

Calculation Note APP-GW-M1C-002, Revision A, "AP1000 High Humidity HVAC Systems Design Evaluation," assesses the impact of an increase in the value of the maximum normal wet-bulb (noncoincident) air temperature on the design and performance of the HCCWS. The performance of the HCCWS is affected by the increased humidity and temperature associated with an increase in the value of this wet-bulb temperature parameter from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) at the Turkey Point site. The calculation note demonstrates that an increase in the refrigeration capacity of the HCCWS of approximately 352 kW (100 t) per train will be required to restore HCCWS performance to the same level as achieved by the standard AP1000 HCCWS with a design-basis wet-bulb temperature of 26.7 °C (80.1 °F). This increased capacity will be obtained by changing the design capacity of the air-cooled chillers in the HCCWS from 1,055 to 1,407 kW (300 to 400 t).

Spent Fuel Pool Cooling Design and Performance for Maximum Normal Wet-bulb Temperature Cases (Turkey Point Units 6 and 7 COL FSAR, Sections 9.1.3.1.3.1 and 9.1.3.1.3.2)

Calculation Note APP-SFS-M3C-042, Revision 0, "SFS HX Sizing Calculation Using Florida Power and Light (Turkey Point) Increased Wet-bulb Temperatures," documents the anticipated SFS performance for these cases, which use maximum normal wet-bulb (noncoincident) air temperature as the basis for evaluation. They include a full core offloading case at 150 hours after shutdown, and a normal (fuel shuffle) refueling 120 hours after shutdown.

The calculations assume that the SFP holds 15 years (10 cycles) of spent fuel assemblies from operation of the plant with an 18-month refueling cycle, as well as the freshly discharged assemblies consistent with the respective type(s) of refueling operations just completed. For the full core offloading case, the performance requirement is to maintain SFS pool water temperature below 60 °C (140 °F) with a single train of SFS cooling and a CCS supply temperature consistent with wet-bulb temperature at the maximum normal (noncoincident) value. The calculation demonstrates that SFS pool temperature remains below 54.4 °C (130 °F) for this case. For the partial core offloading case at 120 hours, the requirement is that SFS pool temperature remain below 48.9 °C (120 °F) with two trains of SFS heat removal operating and CCS temperature consistent with maximum normal wet-bulb temperature. In this case, SFS temperature remains below 45.6 °C (114 °F).

All DCD case SFS performance requirements are satisfied with ambient wet-bulb temperature at the Turkey Point site elevated value of 27.5 °C (81.5 °F). Therefore, no changes to the plant design are required.

Steam and Power Systems Design and Performance

Westinghouse and the NuStart utilities have undertaken an effort to optimize the turbine generator and condenser designs and evaluate their performance over a range of CWS flow rates and inlet temperatures. The optimized standard condenser that has been developed for

the AP1000 will adequately accommodate the site conditions for Units 6 and 7 because the design cold water inlet temperature used for condenser and cooling tower sizing and CWS design was chosen to be 32.8 °C (91 °F). This cold water temperature is equivalent to an ambient wet-bulb temperature of between 25 °C (77 °F) and 28.9 °C (84 °F) for most cooling tower designs that are compatible with potential AP1000 sites.

Therefore, no changes to the standard AP1000 steam and power conversion systems are anticipated as a result of the increased value of the maximum normal wet-bulb (noncoincident) air temperature at the Turkey Point site.

The staff reviewed the applicant's response to RAI 23, Question 09.02.02-2, and finds it to be acceptable for the SWS as discussed below.

The applicant explained that the increase in maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) affects the RNS cooldown, maximum SWS cold water temperature at peak system heat load conditions associated with the beginning of RNS cooldown, normal high-capacity chilled water system design and performance, spent fuel pool cooling, and steam and power conversion systems performance. The staff's evaluation of these proposed changes outside the scope of the SWS is discussed in the corresponding SER sections.

Specifically for the SWS, the calculated cold water temperature at 4 hours after reactor shutdown, for an ambient wet-bulb temperature of 27.5 °C (81.5 °F), is 31.1 °C (87.9 °F). The staff finds that this value satisfies the AP1000 DCD Section 9.2.1.2.3.4 temperature value of 31.4 °C (88.5 °F) for plant cooldown/shutdown, which is the peak heat load condition.

Related to the SWS, the RNS cooldown from 176.7 °C (350 °F) to 51.7 °C (125 °F) must be accomplished within 96 hours after reactor shutdown, using both trains of RNS, CCS, and SWS. The Units 6 and 7 plants can achieve a reactor coolant temperature of 48.9 °C (120 °F) within 83.5 hours after plant shutdown, with constant wet-bulb temperature of 27.5 °C (81.5 °F). The staff finds that the 96-hour cooldown requirement is satisfied with the increased maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F).

In summary, the staff's evaluation determined that the change in the maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) is acceptable because the 96-hour cooldown requirement is satisfied. Therefore, RAI 23, Question 09.02.02-2, as it relates to SWS which supports CCS and RNS, is considered resolved.

PTN DEP 2.0-3, which increases the maximum safety wet-bulb (noncoincident) air temperature from 30.1 °C (86.1 °F) to 30.8 °C (87.4 °F) and affects SWS, CCS, and nuclear island nonradioactive ventilation system (VBS) for normal power operations, is described in detail in Sections 9.2.2 and 9.2.7 of this report. Specifically, the SWS in the AP1000 is impacted because it used cooling towers that rely on evaporative cooling. With the 0.7 °C (1.3 °F) higher safety noncoincident wet-bulb temperature, there is slightly less evaporative cooling, so the systems and components directly or indirectly cooled by the SWS will have cooling water at a slightly higher temperature.

9.2.1.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.2.1.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidelines given in Sections 9.2.1 and 9.2.5 of NUREG-0800. The staff based its conclusion on the following:

- PTN SUP 9.2-1 is acceptable because the staff finds that the design of the SWS cooling towers meets the requirements of NRC regulations and the acceptance criteria in Sections 9.2.1 and 9.2.5 of NUREG-0800 regarding adverse interactions between the SWS cooling towers on the Turkey Point Units 6 and 7 site.
- PTN DEP 2.0-1 is acceptable because the staff finds that the staff's RAI related to the increase in normal safety wet-bulb (noncoincidental) air temperature has been adequately resolved. Therefore, the staff concludes that the Turkey Point Units 6 and 7 SWS, as described in Section 9.2.1 of the Turkey Point Units 6 and 7 COL FSAR, is in accordance with regulatory requirements, and is acceptable.

9.2.2 Component Cooling Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.2, "Cooling System for Reactor Auxiliaries (Closed Cooling Water Systems)")

9.2.2.1 Introduction

The CCS is a nonsafety-related (except for containment isolation functions), closed-loop cooling system that transfers heat from various plant components to the SWS during normal phases of operation. It removes heat from various components needed for plant operation and removes core decay heat and sensible heat for normal reactor shutdown and cooldown.

The CCS is arranged into two trains of components and piping. Each train includes one component cooling water pump and one component cooling water HX, with the two trains taking suction from a single return header. The CCS includes a single surge tank, which accommodates thermal expansion and contraction. Component cooling water is distributed to the components by a single supply/return header with components being grouped in branch lines according to plant arrangement, with one branch line cooling the components inside containment. Loads inside containment are remotely isolated in response to a safety injection signal, which also trips the reactor coolant pumps (RCPs).

The CCS pumps are within the scope of the AP1000 Design Reliability Assurance Program (D-RAP) as described in AP1000 DCD, Table 17.4-1, "Risk Significant SSCs within the Scope of D-RAP," since these pumps provide cooling for the RNS and spent fuel pool (SFP) heat exchangers. In addition, CCS is discussed in AP1000 DCD, Table 16.3-2, "Investment

Protection Short-Term Availability Controls,” for Modes 5 and 6 to support RNS cooling with the RCS open (SER Section 2.3).

9.2.2.2 Summary of Application

The Turkey Point Units 6 and 7 COL FSAR, Section 9.2 incorporates by reference Section 9.2 of the AP1000 DCD.¹ Section 9.2 of the DCD includes Section 9.2.2. In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.2 and in Turkey Point Units 6 and 7 COL Part 7, the applicant provided the following:

Tier 1 and Tier 2 Departure and Exemption Request

- PTN DEP 2.0-3

The Tier 1 departure (DEP) request is from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature, which is 30.1 °C (86.1 °F). The Tier 2 departure was requested because this site parameter value is also listed as the maximum safety wet-bulb (noncoincident) air temperature in AP1000 DCD Tier 2, Table 2-1.

In Turkey Point Units 6 and 7 COL FSAR, Section 9.2.2.1, the applicant stated that the first bulleted item in the criteria for normal operation in AP1000 DCD Section 9.2.2.1.2.1 would be replaced with the following information:

The component cooling water supply temperature to plant components is not more than 100 °F assuming a 100-year return estimate of 2-hour duration wet-bulb temperature of 87.4 °F for service water cooling (per Table 2.0-201).

In addition, the applicant proposed to add the following to Turkey Point Units 6 and 7 COL FSAR, Section 9.2.2.1 in a letter dated April 23, 2013 (ADAMS Accession No. ML13115A176):

The most limiting component cooled by the CCS, the RCP motor cooling system, has been designed to operate for at least 6 hours continually with cooling water supplied at temperatures up to 100 °F.

The performance of the standard AP1000 CCS and SWS for single cooling water train, full power operation at a maximum safety wet-bulb temperature of 87.4 °F has demonstrated the highest CCS temperature achieved at these conditions is 97.4 °F, for a period of less than 2 hours. As ambient wet-bulb temperature decreases, the CCS temperature follows and will return to below 95 °F with ambient wet-bulb temperature slightly lower than 84 °F, assuming nominal performance of both the CCS and SWS. Since the definition of the maximum normal wet-bulb temperature value is the seasonal 1 percent exceedance value observed at the site, the annual total operating time for which CCS temperature could exceed 95 °F is less than 30 hours per year, for periods of a few hours at most. The maximum CCS temperature of 97.4 °F is bounded by the maximum allowable cooling water temperature for Reactor Coolant Pumps (the most limiting component) and the increase in maximum safety wet-bulb temperature is therefore acceptable on this basis.

The exemption request related to the AP1000 DCD maximum safety wet-bulb (noncoincident) air temperature involves an exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.d. Specifically, the Units 6 and 7 applicant requested an exemption from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature. The exemption request is evaluated in Section 2.0.4 of this SER.

9.2.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

While the CCS is a nonsafety-related system, it supports the normal (defense-in-depth) capability of removing reactor and spent fuel decay heat, it is part of the first line of defense for reducing challenges to passive safety systems in the event of transients and plant upsets, and its cooling function is important for reducing shutdown risk when the RCS is open (e.g., midloop condition). The risk importance of the CCS makes it subject to RTNSS in accordance with the Commission's policy for passive reactor plant designs.

The staff's evaluation of the changes that are proposed focused primarily on confirming that the changes will not adversely affect safety-related SSCs or those that satisfy the criteria for RTNSS; the capability of the CCS to perform its defense-in-depth and RTNSS functions; and the adequacy of ITAAC, test program specifications, and availability controls that have been established for the CCS.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the CCS are given in Section 9.2.2 of NUREG–0800.

9.2.2.4 Technical Evaluation

The staff reviewed Section 9.2.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the CCS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Tier 1 and Tier 2 Departure and Exemption Request

- PTN DEP 2.0-3

Turkey Point Units 6 and 7 COL FSAR, Section 9.2.2 and Turkey Point Units 6 and 7 COL Application Part 7 state that the maximum safety wet-bulb (noncoincident) air temperature for the Turkey Point Units 6 and 7 site was re-evaluated and increased from the standard AP1000 DCD value of 30.1 °C (86.1 °F) to 30.8 °C (87.4 °F) to reflect expected site maximum temperature conditions. This change requires that an evaluation be performed for the various plant performance requirements and commitments affected by this parameter to confirm that the performance of the plant's safety systems remains within the bounds described in the AP1000

DCD. The CCS was one of those systems that were affected; therefore, the departure was reflected in both the FSAR and Part 7 of the Turkey Point Units 6 and 7 COL application. The staff's evaluation of this proposed change is also discussed in Sections 2.0, 2.3.1, and 9.2.7 of this SER.

The AP1000 is impacted because it used cooling towers that rely on evaporative cooling. With the 0.7 °C (1.3 °F) higher safety noncoincident wet-bulb temperature, there is slightly less evaporative cooling, so the systems and components directly or indirectly cooled by the SWS will have cooling water at a slightly higher temperature.

The staff evaluated this departure and determined there was a lack of information to support this change to the CCS bounding temperature of 37.8 °C (100 °F). Therefore, the staff, in Letter No. 22, RAI 5403, Question 09.02.02-1, requested additional information related to this change in the maximum safety wet-bulb (noncoincident) temperature and the overall effects to various systems including CCS and SWS.

The applicant's response to RAI 5403, Question 09.02.01-1, dated June 24, 2011 (ADAMS Accession No. ML11178A231), included details related to all possible system effects, which included CCS and SWS with the increase to maximum safety wet-bulb (noncoincident) air temperature. The applicant in its response stated the following:

- The maximum safety wet-bulb (noncoincident) air temperature for the Turkey Point Units 6 and 7 site was calculated for expected conditions at the site and increased from the standard value of 30.1 °C (86.1 °F) to 30.8 °C (87.4 °F).
- The limiting temperature performance for the CCS and SWS occurs during normal power operation, with the site ambient wet-bulb temperature assumed to be at the maximum safety wet-bulb (noncoincident) value. The AP1000 DCD maximum safety wet-bulb (noncoincident) air temperature was originally defined to be the annual "0% exceedance" value measured at or calculated for the site. This measure of temperature is based on the maximum observed wet-bulb temperature value reached at a site, excluding periods of higher temperature extending less than 2 hours duration. For Turkey Point Units 6 and 7, the site maximum safety wet-bulb (noncoincident) air temperature value is defined as the 100-year return value for this parameter, excluding peaks of less than 2 hours duration.
- The original AP1000 design criterion for CCS and SWS performance was that the maximum CCS supply temperature should not exceed 35 °C (95 °F) for normal plant power operation with a single train of cooling water systems in service and ambient wet-bulb temperature at the maximum safety wet-bulb (noncoincident) air temperature value. Increases in the value of the standard site maximum safety wet-bulb (noncoincident) air temperature from 27.2 °C (81 °F) to 29.7 °C (85.5 °F) and finally (in DCD Revision 17) to 30.1 °C (86.1 °F) have been made to include a larger number of candidate sites within the standard site temperature envelope for AP1000 and are reflected in the current revision of the AP1000 DCD (Revision 19). The most limiting component cooled by the CCS, the RCP motor cooling system, has been designed to operate for at least 6 hours continuously with cooling water supplied at temperatures up to 37.8 °C (100 °F),

as a result of the increases in CCS temperature above 35 °C (95 °F) associated with the previous increases in limiting wet-bulb temperature. Each RCP is provided with four safety-related temperature sensors to monitor the stator cooling water temperature. These sensors generate a high temperature alarm when stator cooling water temperature rises above the normally expected operating range, and produce a reactor trip and RCP trip to protect the pumps if stator water temperature continues to rise beyond the trip setpoint. Operators monitor the cooling water temperature to verify that the RCPs are operating within normal temperature bounds at high ambient wet-bulb air temperature conditions.

- Calculation note TPG-CCS-M3C-001, Revision 0, *Turkey Point Units 6 and 7 Performance Evaluation using Elevated Maximum Non-Coincident Safety Wet-bulb Temperature* documents the performance of the standard AP1000 CCS and SWS for single cooling water train, full power operation at the higher maximum safety wet-bulb (noncoincident) air temperature of 37.8 °C (87.4 °F). The highest CCS temperature achieved at these conditions is 36.3 °C (97.4 °F) consistent with the maximum duration of the highest site ambient wet-bulb temperature. The SWS cooling water supply temperature assumed for this evaluation was determined in calculation note TPG-SWS-M3C-001, Revision 0, *Turkey Point Units 6 and 7 Cooling Tower Performance Evaluation Using Elevated Maximum Normal and Maximum Safety Wet-bulb Temperatures*. At the highest assumed value of wet-bulb temperature 37.8 °C (87.4 °F) the predicted value of SWS cold water temperature with the plant operating at full power is 33.2 °C (91.8 °F), which is lower than the DCD required upper limit of 34.2 °C (93.5 °F) for this value.
- As ambient wet-bulb temperature decreases, the SWS and CCS temperatures follow. CCS supply temperature will fall below 35 °C (95 °F) with ambient wet-bulb temperatures slightly lower than 28.9 °C (84 °F), assuming nominal performance of both the CCS and SWS. Since the definition of the maximum normal wet-bulb (noncoincident) air temperature value is the seasonal 1% exceedance wet-bulb temperature value observed at the site, the annual total operating time for which CCS temperatures could exceed 35 °C (95 °F) is less than 30 hours per year, for periods of a few hours at most. The maximum CCS temperature of 36.3 °C (97.4 °F) expected for Turkey Point Units 6 and 7 is well below the maximum allowable cooling water temperature of 37.8 °C (100 °F) for Reactor Coolant Pumps (the most limiting component) and the increase in maximum safety wet-bulb (noncoincident) air temperature for Turkey Point Units 6 and 7 is therefore acceptable on this basis.
- No changes to the design of the CCS or SWS are required for Turkey Point Units 6 and 7 to meet the DCD requirement that CCS temperature remains below 38 °C (100 °F) for normal power operation.
- The RTNSS function of the CCS and SWS is to remove decay heat during Mode 5 (cold shutdown) and Mode 6 (refueling) with reduced RCS inventory operations. Heat removal performance is reduced by increases in ambient wet-bulb temperature that cause increases in SWS cold water temperature and CCS

supply temperature. However, the total heat duty of the CCS and SWS is significantly lower during this mode of operation, as compared to the normal power or cooldown modes, because there is essentially no sensible heat to remove from the RCS and the core decay heat level is low. Primary plant component heat loads are also very small because no RCPs are in operation. Any slight increase in ambient wet-bulb temperature will not compromise the heat removal capability of the CCS and SWS. The impact of an increase in the applicant's maximum safety wet-bulb temperature from 30.1 °C (86.1 °F) to 30.8 °C (87.4 °F) on the RTNSS performance of the CCS and SWS is therefore acceptable. No changes are needed to the SWS or CCS Investment Protection Short Term Availability Control (IPSAC) requirements for the Turkey Point Units 6 and 7 as a result of the increased value of maximum safety ambient wet-bulb (noncoincident) air temperature.

- RCS cooldown from 176.6 °C to 51.7 °C (350 °F to 125 °F) must be accomplished within 96 hours after reactor shutdown, as addressed under RAI 5492, Question 09.02.02-2.

The staff reviewed the applicant's response to RAI 5403, Question 09.02.02-1, and finds it to be acceptable for the CCS as discussed below.

The increase of maximum safety wet-bulb (noncoincident) air temperature from 30.1 °C to 30.8 °C (86.1 °F to 87.4 °F) is seasonal and affects the CCS only during normal operations. This results in the highest CCS temperature of 36.3 °C (97.4 °F), for a period of less than 2 hours and, at the most, estimated to occur 30 hours per year. In addition, as ambient wet-bulb temperature decreases, the CCS temperature follows and will return to below 35 °C (95 °F), which is well below the normal operational temperature of the CCS in AP1000 DCD, Section 9.2.2.1.2.1, which states that the normal CCS supply temperature to plant components is not more than 37.8 °C (100 °F). Also, the most limited components cooled by CCS are the RCP's motor coolers, and they have been designed to operate for at least 6 hours continually with cooling water supplied at temperatures up to 37.8 °C (100 °F). Each RCP is provided with four sensors to monitor the stator cooling water temperature. These sensors generate a high-temperature alarm when stator cooling water temperature rises above the normally expected operating range, and produce trips to protect the pumps if stator water temperature continues to rise beyond the trip setpoint.

Related to CCS and its ability to support defense in depth, RTNSS, and cooldown of the reactor using RNS, the change to the maximum safety wet-bulb (noncoincident) air temperature affects only normal operations (at power). RNS cooldown does not utilize the maximum safety wet-bulb temperature but uses maximum normal wet-bulb air temperature. The RNS cooldown related to maximum normal wet-bulb (noncoincident) air is discussed in Section 9.2.1 of this report.

In summary, the staff's evaluation determined that the change in the maximum safety wet-bulb (noncoincident) air temperature from 30.1 °C to 30.8 °C (86.1 °F to 87.4 °F) is acceptable; therefore, Question 09.02.02-1, as it relates to CCS and SWS, is considered resolved. The staff has confirmed that the described changes appear in the revised version of the Turkey Point Units 6 and 7 COL FSAR and Part 7 of the application. No further changes to the Units 6 and 7 COL application text are required for PTN DEP 2.0-3.

The staff also confirmed that the applicant updated these figures on the revised Turkey Point Units 6 and 7 COL FSAR.

The staff's evaluation of the appropriateness of the 30.8 °C (87.4 °F) value for the Turkey Point Units 6 and 7 site is in Section 2.3 of this SER. The staff's evaluation of the effects that this higher temperature has on the operation of the AP1000 design is addressed in Sections 2.0, 2.3.1, 5.4, 6.2, 6.4, 9.1.3, and 9.2.7 of this SER.

Related information for PTN DEP 2.0-2, which increases the maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F), and affects SWS, CCS, and RNS performance for plant cooldown/shutdown, is described in detail in SER Section 9.2.1.

9.2.2.5 *Post-Combined License Activities*

There are no post-COL activities related to this section.

9.2.2.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR meets the relevant acceptance criteria provided in Section 9.2.2 of NUREG-0800. The staff based its conclusion on the following:

- PTN DEP 2.0-3 is acceptable because the staff determined that the applicant's RAI response related to the increase in maximum safety wet-bulb (noncoincident) air temperature has been adequately resolved. Therefore, the staff concludes that the Turkey Point Units 6 and 7 CCS, as described in Section 9.2.2 of the Turkey Point Units 6 and 7 COL FSAR, is acceptable. In addition, the staff concludes that the exemption meets the requirements in 10 CFR Part 52, Appendix D, VIII.A.4, and is therefore acceptable.

9.2.3 *Demineralized Water Treatment System*

The demineralized water treatment system (DTS) provides the required supply of reactor coolant purity water to the demineralized water transfer and storage system. This system does not perform any safety-related function or accident mitigation, and its failure would not reduce the safety of the plant.

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.2.3, "Demineralized Water Treatment System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding

information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.2.4 Demineralized Water Transfer and Storage System

The demineralized water transfer and storage system supplies demineralized water to fill the condensate storage tank and to the plant systems that demand a demineralized water supply. This system has no safety-related function other than containment isolation, and its failure does not affect the ability of safety-related systems to perform their safety-related functions.

The Turkey Point Units 6 and 7 COL FSAR, Section 9.2 incorporates by reference, with no departures or supplements, Section 9.2.4, "Demineralized Water Transfer and Storage System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.2.5 Potable Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.4, "Potable and Sanitary Water Systems")

9.2.5.1 Introduction

The potable water system (PWS) supplies clean water from a site-specific water system for domestic use and human consumption. The site-specific water system for Turkey Point Units 6 and 7 is the Miami-Dade Water and Sewer Department (MDWASD) potable water supply, which is further described below under PTN COL 9.2-1. This is a nonsafety-related system, with the exception of the main control room (MCR) boundary penetration, which includes design provisions for controlling the release of water containing radioactive material and preventing contamination of the PWS. A loop seal in the safety-related PWS piping that penetrates the MCR envelope boundary prevents unfiltered air in-leakage into the MCR envelope.

9.2.5.2 Summary of Application

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the AP1000 DCD includes Section 9.2.5, "Potable Water System," which addresses Section 9.2.4, "Potable and Sanitary Water Systems," of NUREG-0800.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.5, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 9.2-1

The applicant provided additional information in PTN COL 9.2-1 to address COL Information Item 9.2-1 identified in Table 1.8-202, "COL Item Tabulation."

Turkey Point Units 6 and 7 COL FSAR, Sections 9.2.5.2.1, "General Description," and 9.2.5.3, "System Operation," provided additional information concerning the source of water for the PWS.

Turkey Point Units 6 and 7 COL FSAR, Section 9.2.5.2.1 was modified to state that the source of water for the potable water system is the MDWASD potable water supply.

Turkey Point Units 6 and 7 COL FSAR, Section 9.2.5.3 was modified to state that the Miami-Dade Water and Sewer Department (MDWASD) potable water supply system provides filtered and disinfected water to the potable water distribution system. The MDWASD potable water supply system maintains the required pressure throughout the potable water distribution system. The source of potable water meets the [U.S. Environmental Protection Agency] EPA drinking water standards. No biocide or other water treatment is required.

9.2.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the PWS are given in Section 9.2.4 of NUREG-0800.

The regulatory basis for the review of the COL information item is established in 10 CFR Part 50, Appendix A, GDC 60, "Control of Releases of Radioactive Materials to the Environment."

9.2.5.4 Technical Evaluation

The staff reviewed Section 9.2.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the PWS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 9.2-1

The applicant provided additional information in PTN COL 9.2-1 to resolve COL Information Item 9.2-1. COL Information Item 9.2-1 states:

The Combined License applicant will address the components of the potable water system outside of the power block, including supply source required to meet design pressure and capacity requirements, specific chemical selected for use as a biocide, and any storage requirements deemed necessary. A biocide such as sodium hypochlorite is recommended. Toxic gases such as chlorine are not recommended. The impact of toxic gases on the main control room habitability is addressed in Section 6.4.

The staff reviewed the information provided by the applicant to address COL Information Item 9.2-1 on the source of water for the PWS included under Sections 9.2.5.2.1, 9.2.5.3, and 9.2.12.1 of the Turkey Point Units 6 and 7 COL FSAR.

The staff finds that the MDWASD potable water supply system provides filtered and disinfected water to the potable water distribution system. Since the source of potable water meets EPA standards, no biocide or other water treatment is required. Since there is no chemical treatment of the PWS on site, there are no toxic gases of concern related to the MCR habitability.

In addition, the MDWASD potable water supply source maintains the required pressure for the Turkey Point Units 6 and 7 PWS distribution system and capacity requirements from the AP1000 DCD, Section 9.2.5.1.2 are met. The PWS supply is not interconnected with any potentially radioactive system; therefore, the staff finds that GDC 60 is satisfied with respect to preventing contamination of the PWS by radioactive water.

As discussed above, the staff finds this an acceptable resolution of COL Information Item 9.2-1 because the applicant has adequately addressed the Turkey Point Units 6 and 7 potable water supply source.

9.2.5.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.2.5.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of NRC regulations and the acceptance criteria in Section 9.2.4 of NUREG-0800. The staff based its conclusion on the following:

- PTN COL 9.2-1 is acceptable because the applicant has provided sufficient information on the source of water for the PWS to satisfy GDC 60, with respect to preventing contamination by radioactive water.

9.2.6 Sanitary Drains (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.4, “Potable and Sanitary Water Systems”)

9.2.6.1 Introduction

The sanitary drain is a nonsafety-related system that collects sanitary wastes from plant restrooms and locker room facilities. The system design ensures that there is no possibility for radioactive contamination of the sanitary drains.

9.2.6.2 Summary of Application

Section 9.2 of the Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the AP1000 DCD includes Section 9.2.6, “Sanitary Drains,” which addresses Section 9.2.4, “Potable and Sanitary Water Systems,” of NUREG-0800.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.6, the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Section 9.2.6 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the MCR and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

Supplemental Information

- PTN SUP 9.2-3

The applicant provided supplemental information by adding text to the end of Section 9.2.6.2.1, “General Description,” to state that sanitary waste is treated on the Units 6 and 7 plant area. The treatment facility has the capacity to treat the waste from Units 1 through 7. The liquid effluent from the sanitary treatment facility is pumped to the blowdown sump where it combines with other effluent streams.

9.2.6.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for PTN SUP 9.2-3 are given in Section 9.2.4 of NUREG–0800.

The regulatory basis for the review of the COL information item is established in 10 CFR Part 50, Appendix A, GDC 60.

9.2.6.4 Technical Evaluation

The staff reviewed Section 9.2.6 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to sanitary drains. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- PTN SUP 9.2-3

The staff reviewed the location of the waste treatment plant included under Section 9.2.6.2.1 of the Turkey Point Units 6 and 7 COL FSAR. In Section 9.2.6.2.1 of the Turkey Point Units 6 and 7 COL FSAR, the applicant proposes an onsite sewage treatment plant for the treatment of sanitary waste. Treated effluent from the sanitary waste system is discharged to the blowdown sump where it combines with other effluent streams. The AP1000 DCD states that there are no interconnections between the sanitary drainage system and systems having the potential for containing radioactive material, and the sanitary drainage system does not service facilities in radiologically controlled areas. Therefore, the staff finds the proposed location of the waste treatment plant acceptable as it satisfies the requirements of GDC 60, with respect to preventing contamination by radioactive water.

9.2.6.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.2.6.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of NRC regulations and the acceptance criteria in NUREG-0800, Section 9.2.4. The staff based its conclusion on the following:

- PTN DEP 6.4-1, related to design changes affecting habitability of the MCR and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.
- PTN SUP 9.2-3 is acceptable because the applicant has provided sufficient information on the location of the waste treatment plant to satisfy GDC 60, with respect to preventing contamination by radioactive water.

9.2.7 Central Chilled Water System (Related to RG 1.206 Section C.III.1, Chapter 9, C.I.9.2.2, “Cooling System for Reactor Auxiliaries (Closed Cooling Water Systems)”)

9.2.7.1 Introduction

The plant's HVAC systems require chilled water as a cooling medium to satisfy the ambient air temperature requirements for the plant. The VWS supplies chilled water to the HVAC systems and is functional during reactor full-power and shutdown operation. The VWS provides chilled water to the cooling coils of the supply air handling units and unit coolers of the plant HVAC systems. It also supplies chilled water to the liquid radwaste system (WLS), gaseous radwaste system, secondary sampling system, and the temporary air supply units of the containment leak rate test system. The VWS is nonsafety related (except that the containment isolation interface is safety related).

The VWS consists of two closed loop subsystems: a high cooling capacity subsystem and a low cooling capacity subsystem. The HCCWS is the primary system used to provide chilled water to the majority of plant HVAC systems and other plant equipment requiring chilled water cooling. The low capacity chilled water subsystem (LCCWS) is dedicated to the nuclear island VBS, which includes the MCR, and the chemical and volume control system (CVS) makeup pump and normal residual heat removal pump compartment unit coolers.

The HCCWS consists of chilled water pumps, water-cooled chillers, air-cooled chillers, a chemical feed tank, an expansion tank, and associated valves, piping, and instrumentation. The LCCWS consists of two 100-percent-capacity chilled water loops. Each loop consists of a chilled water pump, an air-cooled chiller, an expansion tank, and associated valves, piping, and instrumentation.

The VWS pumps and chillers for the low capacity subsystem are within the scope of the AP1000 D-RAP as described in AP1000 DCD, Table 17.4-1, “Risk Significant SSCs within the Scope of D-RAP,” since these pumps and chillers provide cooling to the CVS makeup pump room. The pumps and chillers are important components of the VWS.

9.2.7.2 Summary of Application

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the DCD includes Section 9.2.7. In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2 and in Turkey Point Units 6 and 7 COL Part 7, the applicant provided the following:

Tier 1 and Tier 2 Departures and Exemption Request

The applicant proposed the following Tier 1 and Tier 2 departures from the AP1000 DCD:

- PTN DEP 2.0-3

The Tier 1 departure request is from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature, which is 30.6 °C (86.1 °F). The Tier 2 DEP was requested because this site parameter value is also listed as the maximum safety wet-bulb (noncoincident) air temperature in AP1000 DCD Tier 2, Table 2-1.

For Section 9.2.7, no departures or supplements were identified in Revision 3 of the Turkey Point Units 6 and 7 COL FSAR; however, based on its response to RAI 22, Question 09.02.02-1, dated June 24, 2011, additional information was provided by the applicant as part of PTN DEP 2.0-3 which is related to the LCCWS.

The exemption request related to the AP1000 DCD maximum safety wet-bulb (noncoincident) air temperature involves an exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.d. Specifically, the Units 6 and 7 applicant requested an exemption from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature. The exemption request is discussed in SER Section 2.0.4.

Tier 2 Departure

- PTN DEP 2.0-2

The Tier 2 DEP request is from a site parameter value provided in AP1000 DCD Tier 2, Table 2-1, for the maximum normal wet-bulb (noncoincident) air temperature. AP1000 DCD Tier 2, Table 2-1, identified this value as 26.72 °C (80.1 °F). The proposed revised value is 27.5 °C (81.5 °F). The corresponding site characteristic value is 27.5 °C (81.5 °F) as reported in Turkey Point Units 6 and 7 COL FSAR, Section 2.3.1.5. This site characteristic exceeds the DCD site parameter by 0.78 °C (1.4 °F). This change requires an evaluation of the various plant performance requirements and commitments affected by this parameter to confirm that the performance of the plant's safety systems remains within the bounds described in the AP1000 DCD. The VWS is one system affected; therefore, the departure was reflected in both the Turkey Point Units 6 and 7 COL FSAR and Part 7 of the Turkey Point Units 6 and 7 COL application. The staff's evaluation of this proposed change is also discussed in Sections 5.4.7, 9.1.3, and 9.2.7.

Replace the paragraph in DCD Section 9.2.7.2.1, "General Description," with the following paragraph:

The high capacity subsystem consists of two 80-percent capacity chilled water pumps, two 20-percent capacity chilled water pumps, two 80-percent capacity water-cooled chillers, two 20 percent air-cooled chillers, a chemical feed tank, an expansion tank, and associated valves, piping, and instrumentation. The subsystem is arranged in two parallel mechanical trains with common supply and return headers. Each train includes one 20-percent capacity pump, one 80-percent capacity pump, one 20-percent capacity chiller, and one 80-percent capacity chiller. A cross-connection at the discharge of each pump allows for each to feed a given chiller of matching capacity.

Based on a letter dated April 23, 2013 (ADAMS Accession No. ML13115A176), additional information was added by the applicant as part of PTN DEP 2.0-2, as described below:

Add the following information at the end of the first paragraph under “Normal Operation” in DCD Subsection 9.2.7.2.4.

The increased heat load produced by operation at the higher Turkey Point Units 6 and 7 maximum safety ambient wet-bulb temperature of 87.4 °F can be accommodated within the available capacity margin of the chiller units, without impacting the VWS low capacity subsystem or supporting systems design or plant operation. Cooling coil design calculations indicate that during operation at the standard plant design temperatures (115 °F dry bulb, 86.1 °F wet-bulb), the VBS air handling unit has cooling coil and system margin.

Modify Table 9.2.7-1R, “Component Data- Central Chilled Water System,” with the following information:

Air-Cooled Chillers: Capacity 400 nominal tons, Maximum power input 500 kW

9.2.7.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

Although the VWS is nonsafety-related, the LCCWS provides chilled water for cooling safety-related and defense-in-depth equipment rooms. The staff’s evaluation of the changes that are proposed focused primarily on confirming that the changes will not adversely affect safety-related SSCs or those that satisfy the criteria for RTNSS, the capability of the VWS to perform its RTNSS and defense-in-depth cooling functions, and the adequacy of ITAAC, test program specifications, and RTNSS availability controls that have been established for the VWS.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the CCS are given in Section 9.2.2 of NUREG–0800.

9.2.7.4 Technical Evaluation

The staff reviewed Section 9.2 of the Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff

confirms that the information in the application and incorporated by reference addresses the required information relating to the CCS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Tier 1 Departure

Related to PTN DEP 2.0-3, maximum safety wet-bulb (noncoincident) air temperature increased from the standard AP1000 DCD value of 30.06 °C (86.1 °F) to 30.78 °C (87.4 °F), the staff evaluated this departure for the VWS and determined there was a lack of information to support this change. Therefore, in RAI 22, Question 09.02.02-1, the staff requested additional information related to this change in the maximum normal wet-bulb (noncoincident) air temperature and the overall effects to various systems, including the CCS, SWS, and VWS.

In its response to RAI 22, Question 09.02.02-1, dated June 24, 2011 (ADAMS Accession No. ML11178A231), the applicant included all possible system effects, which included CCS, SWS, and VWS, related to the increase to maximum safety wet-bulb (noncoincident) air temperature.

- The nuclear island non-radioactive VBS is the only HVAC system that is designed to accommodate the maximum safety temperature limits. The LCCWS also uses the maximum safety temperature limits (dry and wet-bulb) as its design basis temperatures. The remainder of the HVAC systems are designed to accommodate the maximum normal temperature limits (1% exceedance values), including the HCCWS.
- The VBS maintains the safety-related heat sink temperatures and is designed with two 100 percent capacity subsystems. The VBS is served by the LCCWS exclusively. The LCCWS also serves the RNS and CVS pump room coolers. The nominal refrigeration capacity of each of the air-cooled chillers used in the LCCWS is 1055 kW (300 tons) at an ambient dry bulb temperature of 46.1 °C (115 °F).
- Calculation assesses the impact of changes in both maximum safety and maximum normal ambient wet-bulb temperature on the design and performance of the HCCWS and LCCWS. It assumes that maximum ambient wet-bulb temperature increases to 30.8 °C (87.4 °F) and maximum normal ambient wet-bulb temperature increases to 27.5 °C (81.5 °F).
- The increased heat load produced by operation at the higher Turkey Point Units 6 and 7 maximum safety ambient wet-bulb temperature of 30.8 °C (87.4 °F) can be accommodated within the available capacity margin of the chiller units, without impacting the LCCWS or supporting systems' design or plant operation. Since the LCCWS chillers are air-cooled, their performance is not affected by changes in wet-bulb temperature. Cooling coil design calculations indicate that during operation at the standard plant design temperatures 46.1 °C (115 °F) dry bulb, 30.1 °C (86.1 °F) wet-bulb, the VBS air handling unit has cooling coil and system margin.

- At the Turkey Point Units 6 and 7 site design temperatures of 44.4 °C (112 °F) dry bulb, 30.8 °C (87.4 °F) wet-bulb, the off coil temperatures for VBS do not change, based on the results of supplier coil performance calculations. Therefore, the MCR temperature and humidity at the higher site outside air wet-bulb temperature will remain at or below their desired design points during normal operation.
- No changes are needed in the AP1000 LCCWS design. Since these chillers are also air-cooled, their performance is not affected by changes in wet-bulb temperature. Therefore, the existing, standard air-cooled chillers and the associated VBS both perform acceptably at the increased Turkey Point Units 6 and 7 site maximum safety ambient wet-bulb temperature of 30.8 °C (87.4 °F).

The nuclear island nonradioactive VBS provides normal ventilation to the nuclear island including the control room and safety-related battery rooms. Although the system cools areas that contain safety-related components during normal operation, it is a nonsafety system. The associated safety-related habitability system, which relies on passive features, is designed to the maximum safety dry-bulb temperature, so it is unaffected by this exemption. The nuclear island nonradioactive VBS is affected because the higher wet-bulb temperature results in the higher heat load for the chillers.

The staff finds the applicant's response to RAI 22, Question 09.02.02-1, with respect to the VWS (HCCWS) because the increase of maximum safety wet-bulb (noncoincident) air temperature from 30.06 °C (86.1 °F) to 30.8 °C (87.4 °F) affects only the LCCWS air-cooled chillers.

Based on an audit of Turkey Point Units 6 and 7 HVAC calculations, the original chiller size based on the previous design wet-bulb air temperature resulted in a required rating of 577 kW (164 t). The revised calculated value including the revised wet-bulb air temperature resulted in a required rating of 641 kW (182 t). Based on calculations, no modifications are required to the existing specified chiller tonnage since the nominal refrigeration capacity of each of the LCCWS is 1,055 kW (300 t) at an ambient dry-bulb air temperature of 46.1 °C (115 °F); therefore, adequate margin is still maintained. Also, the MCR temperature and humidity at the higher Turkey Point Units 6 and 7 site outside air wet-bulb temperature will remain at or below their desired design points during normal operation. In addition, the VBS air handling unit has a cooling coil and system margin.

As previously stated, the LCCWS is within the scope of the AP1000 D-RAP because these pumps and chillers provide cooling to the CVS makeup pump room. The pumps and chillers are important components of the VWS. The increase in the maximum safety wet-bulb (noncoincident) air temperature of 30.1 °C to 30.8 °C (86.1 °F to 87.4 °F) will not negatively affect or compromise the heat removal capability of the VWS since adequate margin remains between the capacity of each chiller and the calculated heat load.

In summary, the staff's evaluation determined that the change in the increase of maximum safety wet-bulb (noncoincident) air temperature from 30.1 °C to 30.8 °C (86.1 °F to 87.4 °F) affecting the LCCWS is acceptable; therefore, RAI 22, Question 09.02.02-1, as it relates to the

VWS, is considered resolved. The staff confirmed that the revised Turkey Point Units 6 and 7 COL FSAR has made the changes described in the April 23, 2013, letter.

Tier 2 Departure

- PTN DEP 2.0-2

The applicant, in PTN DEP 2.0-2, evaluated the DCD site parameter value for the maximum normal air temperature wet-bulb (noncoincident) in DCD Tier 2, Table 2-1, and proposed to increase the corresponding site characteristic value from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) to reflect expected site conditions. The corresponding site characteristic value is 27.4 °C (81.5 °F) as reported in Turkey Point Units 6 and 7 COL FSAR, Section 2.3.1.5. This site characteristic exceeds the DCD site parameter by 0.7 °C (1.4 °F).

The increase in wet-bulb temperature will impact the standard plant design of the HCCWS. To accommodate the impact of the higher wet-bulb temperature on HVAC margins, the size of the air-cooled chillers in the HCCWS will be increased. The current HCCWS has two 5,982-kW (1,700-t) water-cooled chillers coupled with two 300-t (1,055-kW) air-cooled chillers. Replacing the two 300-t (1,055-kW) air-cooled chillers with 400-t (1,407-kW) air-cooled chillers will maintain adequate HVAC design margins and allow the HCCWS to meet the increased load due to higher wet-bulb design basis. There is no impact on the performance of SSCs important to safety or to analysis methods as a result of the increase in maximum normal wet-bulb temperature.

The applicant identified that multiple areas in the Turkey Point Units 6 and 7 FSAR are affected by the departure, which includes Sections 2.0, 2.3.1.5, 9.2.1.2, and 9.2.7.2, as indicated in system tables for those systems affected. Additionally, the effects of the departure are discussed in Turkey Point Units 6 and 7 COL Application, Part 7, "Departures and Exemption Requests."

The staff evaluated DEP 2.0-2 for the VWS and determined there was a lack of information to support this change. Therefore, the staff, in RAI 23, Question 09.02.02-2, requested additional information related to this change in the maximum normal wet-bulb (noncoincident) air temperature and the overall effects to various systems including the CCS, SWS, and VWS.

In its response to RAI 23, Question 09.02.02-2, dated June 24, 2011 (ADAMS Accession No. ML11178A232), the applicant included all possible system effects, which included CCS, SWS, and VWS, related to the increase to maximum normal wet-bulb (noncoincident) temperature. The applicant stated the following, which is related to the VWS. The complete RAI response, including effects to other systems, is described in Section 9.2.1 of this report.

- Each of these areas has been reviewed in detail and quantitative evaluations have been performed to determine the impact of the increases in the value of maximum normal wet-bulb (noncoincident) air temperature on the aggregate performance of all affected AP1000 systems. The increase in maximum normal wet-bulb (noncoincident) air temperature requires a modification to the design of the certified AP1000 central chilled water system (VWS) design to augment the total refrigeration capacity per train in the high capacity portion of the system by 100 tons (352 kW). This will be accomplished by

increasing the capacity of the two air-cooled chiller units in the high capacity portion of the VWS from 300 tons (1055 kW) to 400 tons (1407 kW).

- The High Capacity Chilled Water System supplies chilled water to non-safety related HVAC cooling components throughout the plant, including the Containment Recirculation Cooling System (VCS).

Calculation note APP-GW-M1C-002 Revision A, *AP1000 High Humidity HVAC Systems Design Evaluation* assesses the impact of an increase in the value of the maximum normal wet-bulb (noncoincident) air temperature on the design and performance of the HCCWS. The performance of the HCCWS is affected by the increased humidity and temperature associated with an increase in the value of this wet-bulb temperature parameter from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) at the Turkey Point site. The calculation note demonstrates that an increase in the refrigeration capacity of the HCCWS of approximately 100 tons (1055 kW) per train will be required to restore HCCWS performance to the same level as achieved by the standard AP1000 HCCWS with a design basis wet-bulb temperature of 26.7 °C (80.1 °F). This increased capacity will be obtained by changing the design capacity of the air-cooled chillers in the HCCWS from 300 (1055 kW) tons to 400 tons (1407 kW).

- Conclusion: Each of the areas discussed in departure PTN DEP 2.0-2 has been reviewed in detail, and the results of the individual evaluations are described above.

The analyses indicate that one change to the certified AP1000 design is required to ensure that Turkey Point Units 6 and 7 meet the performance requirements and commitments potentially affected by an increase in the value of the site maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F). This change is an increase in the refrigeration capacity per train for each of the two high capacity trains of the VWS. Each train's chiller capacity must be increased by 100 tons (352 kW). This capacity increase will be implemented by increasing the size of each of the two air-cooled chillers in the HCCWS from 300 (1055 kW) tons to 400 tons (1407 kW).

The increase of maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.4 °C (81.5 °F) affects only the HCCWS air-cooled chillers. Therefore, the staff finds the applicant's response to RAI 23, Question 09.02.02-2, with respect to the VWS and DEP 2.0-2, acceptable.

Based on an audit of Turkey Point Units 6 and 7 HVAC calculations, the original HCCWS chiller heat load was calculated to be 7,034 kW (1,999 t). Based on the increase of normal wet-bulb air temperatures, the new HCCWS heat load was calculated to be 7,594 kW (2,158 t), an approximate 8-percent increase in system load.

The AP1000 DCD chillers were rated for only 1,738 kW (2,000 t), a 5,982-kW (1,700-t) water-cooled chiller with a 1,055-kW (300-t) air-cooled chiller. Based on calculations, a modification to increase the capacity of the existing specified chiller tonnage in the nominal air-cooled refrigeration capacity of each of the HCCWSs, from 1,055 kW (300 t) to 1,407 kW

(400 t) at an ambient dry-bulb air temperature of 46.1 °C (115 °F), is required to ensure adequate HCCWS performance to the same level as achieved by the standard AP1000 HCCWS with a design-basis wet-bulb of 26.7 °C (80.1 °F). Therefore, RAI 23, Question 09.02.02-2, is considered resolved. The staff confirms that the changes described in the applicant's April 23, 2013, letter have been made in the Turkey Point Units 6 and 7 COL FSAR.

9.2.7.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.2.7.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the acceptance criteria in NUREG-0800, Section 9.2.2. The staff based its conclusion on the following:

- PTN DEP 2.0-2 is acceptable because the staff determined that the applicant's information related to the increase in maximum normal wet-bulb (noncoincident) air temperature meets NRC regulatory requirements. Therefore, the staff concludes that the Units 6 and 7 VWS is acceptable.
- PTN DEP 2.0-3 is acceptable because the staff determined that the applicant's information related to the increase in maximum safety wet-bulb (noncoincident) air temperature meets regulatory requirements. Therefore, the staff concludes that the Turkey Point Units 6 and 7 VWS is acceptable.

9.2.8 Turbine Building Closed Cooling Water System

9.2.8.1 Introduction

The turbine building closed cooling water system (TCS) is a nonsafety-related system that provides closed-loop cooling for the removal of heat from heat exchangers in the turbine building and rejects the heat to the CWS. The system consists of two 100-percent capacity pumps, three 40-percent capacity HXs (connected in parallel), one surge tank, one chemical addition tank, and associated piping, valves, controls, and instrumentation. Backwashable strainers are provided upstream of each TCS HX. System piping is made of carbon steel, except that nonmetallic piping may be used in accordance with ASME B31.1, if justified by evaluation.

9.2.8.2 Summary of Application

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the DCD includes Section 9.2.8.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.8, the applicant provided the following:

Site-Specific Information Replacing Conceptual Design Information

- PTN CDI

The applicant provided additional information to replace conceptual design information (CDI) in Section 9.2.8 of the AP1000 DCD with information identifying the source of cooling water for the Turkey Point Units 6 and 7 TCS heat exchangers.

9.2.8.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the TCS are given in Section 9.2.2 of NUREG–0800.

9.2.8.4 Technical Evaluation

The staff reviewed Section 9.2.8 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the TCS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Site-Specific Information Replacing Conceptual Design Information

- PTN CDI

The AP1000 standard plant allows the use of circulating water for removing heat from the TCS HXs. Circulating water is bracketed, which means conceptual design in the AP1000 DCD. The AP1000 DCD leaves it up to the COL applicant to specify a specific source of cooling water for plant-specific applications.

In its site-specific information, the applicant identified CWS as the source of cooling for the TCS. The staff's evaluation of the supplementary information that is provided in place of the CDI confirms that the plant-specific information is consistent with AP1000 DCD, Section 9.2.8, as approved by the staff, and is consistent with guidance in NUREG–0800, Section 9.2.2.

Therefore, the CDI that was provided for the Turkey Point Units 6 and 7 TCS is acceptable because circulating water provides an adequate water supply, which is less than 37.8 °C (100 °F), in order for the TCS to perform its intended function.

9.2.8.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.2.8.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the acceptance criteria given in Section 9.2.2 of NUREG-0800. The staff based its conclusion on the following:

- PTN CDI is acceptable because the design of the TCS meets the guidance in Section 9.2.2 of NUREG-0800 with respect to the source of cooling water for removing heat from the TCS heat exchangers.

9.2.9 Waste Water System (Related to RG 1.206 Section C.III.1, Chapter 9, C.I.9.3.3, "Equipment and Floor Drainage System")

9.2.9.1 Introduction

The waste water system (WWS) collects and processes the waste water from the equipment and floor drains in the nonradioactive building areas during plant operations and outages. The WWS has no safety-related function other than MCR envelope isolation. The waste water from the turbine building sumps flows to a waste water retention basin (WWRB), if required, for settling of suspended solids and treatment before discharge. The WWRB transfer pumps discharge the basin effluent to a blowdown sump prior to discharge into deep injection wells. The design of the system precludes inadvertent discharge of radioactively contaminated drainage.

9.2.9.2 Summary of Application

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the AP1000 DCD includes Section 9.2.9, "Waste Water System," which is reviewed in accordance with Section 9.3.3, "Equipment and Floor Drainage System," of NUREG-0800.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 9.2-2

The applicant provided additional information in Turkey Point Units 6 and 7 FSAR Section 9.2-2 to address COL Information Item 9.2-2 by including additional design information to the waste water system of AP1000 DCD Section 9.2.9.2.2 and 9.2.9.5.

Supplemental Information

- PTN SUP 9.2-4

The applicant added supplemental information regarding the blowdown sump in AP1000 DCD Sections 9.2.9.2.2 and 9.2.9.5.

- PTN SUP 9.2-5

The applicant added supplemental information in Turkey Point Units 6 and 7 COL FSAR, Section 9.2 regarding the operation of pumps discharging to the deep injection wells.

9.2.9.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the WWS are given in Section 9.3.3 of NUREG–0800.

The regulatory basis for acceptance of the COL information item is established in the following GDC of 10 CFR Part 50, Appendix A:

- GDC 4
- GDC 60

9.2.9.4 Technical Evaluation

The staff reviewed Section 9.2.9 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the WWS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 9.2-2

The applicant provided additional information in Turkey Point Units 6 and 7 COL FSAR, Section 9.2-2 to resolve COL Information Item 9.2-2. COL Information Item 9.2-2 states:

The combined license applicant will address the final design and configuration of the plant waste water retention basins and associated discharge piping, including piping design pressure, basin transfer pump size, basin size, and location of the retention basins.

The staff reviewed the resolution to Turkey Point Units 6 and 7 COL Information Item 9.2-2 with respect to the design of the plant WWRB and associated components included under Section 9.2.9.2.2, "Component Description" of the Turkey Point Units 6 and 7 COL FSAR. To address Turkey Point Units 6 and 7 COL Information Item 9.2-2, details were provided in the Turkey Point Units 6 and 7 COL FSAR for the location of the WWRB and routing configuration.

The wastewater from the WWRB is discharged into deep injection wells through a blowdown sump. The method for forwarding the wastewater from the basin to the blowdown sump is by use of two 100-percent transfer pumps. The blowdown sump inventory is then pumped to the deep injection wells. The blowdown sump pumps, downstream piping, and injection wells are part of the deep well injection system (DIS) described in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.12.

In order to meet GDC 60, the applicant must demonstrate suitable control of the release of radioactive materials in liquid effluent. Upon review of PTN COL Information Item 9.2-2, the staff requested the applicant, in RAI Question 09.03.03-1 (eRAI 5080), to provide a discussion on whether all site-specific potentially radioactive fluid draining into and downstream of the water basin will be monitored prior to disposition or provide a justification for not providing radiation monitoring. The staff also requested that the applicant provide the additional details of the associated components (i.e., transfer pumps, size of basin, etc.) as requested in the COL information item.

The applicant responded to RAI Question 09.03.03-1 in a letter dated November 5, 2010 (ADAMS Accession No. ML103130131). The staff reviewed the RAI response and determined sufficient information was provided and RAI Question 09.03.03-01 is resolved, as discussed below. The response provided detailed information on radiation monitoring, level instrumentation, and components for the WWS. The applicant confirmed that the potentially contaminated fluids entering the WWRB from the turbine building sumps are monitored with a radiation monitor on common discharge piping. As indicated in the RAI response, there are several effluent lines within the scope of the certified design that bypass this radiation monitor. The RAI response clarifies that these lines do not come in contact with radioactive sources or contain radiation monitoring prior to discharge into WWRB. For Turkey Point Units 6 and 7, there are no additional site-specific system influent streams to the WWRB outside of those associated with the certified design. Wastewater can also be sampled prior to discharge from the WWRB.

The wastewater retention basin WWRB, located west of the turbine building for each unit, is a lined basin with two compartments constructed such that its contents (dissolved or suspended) do not penetrate the liner and leach into the ground. The configuration and sizing of the WWRB is to allow settling of solids larger than 10 microns that may be suspended in the wastewater stream. Each WWRB is divided into two separate compartments, which allows one compartment to be out of service while the other compartment is available. A level transmitter located in each WWRB is used to control operation of the basin transfer pumps.

The WWRB contains two 100-percent capacity transfer pumps (one per compartment). The transfer pumps are sized to meet the maximum expected influent flow and prevent overflow of the basin. In the event of oily waste leakage into the WWRB, a recirculation line is provided to recycle the oil waste and water waste from the basin to the oil separator. In the event of radioactive contamination, this same line can be used to send the contents of the basin to the WLS.

The blowdown sump accepts wastewater from both Turkey Point Units 6 and 7 units, CWS cooling tower blowdown from both units, and sanitary treatment facility. The blowdown sump is located southeast of the units near the makeup water reservoir (MWR). In the absence of CWS cooling tower blowdown, RWS supplies an alternate source of dilution water. The blowdown sump is sized and equipped with controls and instrumentation as necessary to manage the blowdown sump level without overflowing.

The locations of the WWRBs, blowdown sump, and deep injection wells are shown on Turkey Point Units 6 and 7 COL FSAR, Figure 1.1-201. The locations of the WWRBs and the blowdown sump along with site grading ensure there will be no adverse impact on safety-related or RTNSS structures, systems, or components in the event of an overflow, as indicated in PTN SUP 9.2-5.

Based on the content in the Turkey Point Units 6 and 7 COL FSAR, Section 9.2.9 and the RAI Question 09.03.03-01 response, the staff concludes that the design of the WWS complies with GDC 60, with respect to control of radiation release to environment.

To protect against flooding, level instrumentation is provided at the WWRB, and controls are provided for automatic or manual operation of the basin transfer pumps based on the level of the WWRB. Each unit's WWRB is located in the yard area outside of each unit's respective turbine building.

The blowdown sump, injection pumping station and associated piping to the injection wells is sized with adequate capacity to accommodate the highest expected influent flow rate to the blowdown sump without overflowing of the sump. An alarm is provided to alert operators when the water level reaches a predetermined setpoint. The blowdown sump is located southeast of the units near the MWR.

Based on the content in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.9 and the RAI Question 09.03.03-01 response, the staff concludes that the design of the WWS complies with GDC 4 with respect to flood protection. Based on the information in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.9 and the response to RAI Question 09.03.03-01, the staff finds that the Turkey Point Units 6 and 7 COL FSAR adequately addresses PTN COL Information Item 9.2-2. The staff finds that GDC 4 is met based on the WWS design to prevent flooding that could affect safety-related SSCs adversely, and that GDC 60 is met, based

on the requirements for controlling the release of radioactive materials by preventing the inadvertent transfer of contaminated fluids to system portions for noncontaminated drainage. Therefore, RAI 8, Question 09.03.03-1, is closed.

Supplemental Information

- PTN SUP 9.2-4

The applicant added supplemental information regarding the blowdown sump and instrumentation in AP1000 DCD Sections 9.2.9.2.2 and 9.2.9.5. The additional content describes components in the final site design and configuration. This supplemental information is reviewed above in this SER section.

- PTN SUP 9.2-5

The applicant added supplemental information regarding the operation of pumps discharging to the deep injection wells. This supplemental information is reviewed above in this SER section.

9.2.9.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.2.9.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the applicable guidelines of the associated acceptance criteria given in Section 9.3.3 of NUREG-0800 with respect to the WWS.

9.2.10 Hot Water Heating System

The hot water heating system is a nonsafety-related system that supplies heated water to selected nonsafety-related air handling units and unit heater in the plant during cold weather operation, and to the containment recirculation fan coil units during plant outages in cold weather.

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.2.10 of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of

the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.2.11 Raw Water System

9.2.11.1 Introduction

Section 9.2.11, "Raw Water System," of the Turkey Point Units 6 and 7 COL FSAR describes the raw water system (RWS). The RWS provides makeup to the circulating water system (CWS) mechanical draft cooling towers, demineralized water treatment system (DTS), raw water storage tank, the fire protection system (FPS) water storage tanks, service water system (SWS) cooling tower basins, miscellaneous plant uses such as backwash, and provides dilution flow for liquid radwaste discharge. The RWS is a nonsafety-related system that provides a continuous supply of makeup water from three separate sources:

- reclaimed water supplied to the Florida Power and Light Company (FPL) reclaimed water treatment facility and MWR from the MDWASD potable water supply
- saltwater supplied from substratum radial collector wells recharged from the Biscayne Bay
- MDWASD potable water supply to the RWS storage tank

The RWS reclaimed water subsystem draws water from the makeup water reservoir for makeup to the CWS mechanical draft cooling tower basins, for filling the CWS, and for diluting liquid MWR radwaste. Major components include the FPL reclaimed water treatment facility (pumps, filters, clarifiers, and solid handling equipment), the MWR, the reclaimed makeup water pumps, piping, and screens. Each unit has three 50-percent-capacity reclaimed makeup water pumps that draw from the MWR. The reclaimed water subsystem at the pump discharge header can be cross-connected between the Turkey Point Units 6 and 7 units.

The RWS saltwater subsystem pumps water from four radial collector wells to supply water for makeup to the CWS mechanical draft cooling tower basins, for filling CWS, and for liquid radwaste dilution through the waste water system. Each unit consists of major components that include four radial collector wells, four 33-1/3-percent saltwater makeup pumps, piping, and valves. The saltwater subsystem at the pump discharge header can be cross-connected between the Units 6 and 7 units.

Finally, four RWS ancillary pumps provide MDWASD potable water from the RWS storage tank for normal makeup to the SWS cooling tower basins, supply the DTS, provide primary and secondary fire water tank fill for the FPS, and supply miscellaneous users to the Units 6 and 7 units. Major components include the one shared raw water storage tank, two 100-percent raw water ancillary pumps per unit, and associated piping. The SWS cooling tower basins rely upon makeup from the RWS storage tank in order to achieve and maintain cold shutdown conditions.

9.2.11.2 Summary of Application

Section 9.2.11 of the Turkey Point Units 6 and 7 COL FSAR provides information concerning the RWS design basis, system description, system operation, safety evaluation, tests and

inspections, and instrumentation. The RWS was referred to in the AP1000 DCD in relation to the CWS, SWS, DTS, and FPS, but an RWS section was not included in the AP1000 DCD for the staff to evaluate.

In addition, AP1000 DCD, Table 1.7-2, "AP1000 System Designators and System Diagrams," indicates that the RWS is "wholly out of scope." The RWS is needed in order to operate the Turkey Point Units 6 and 7 units; therefore, the applicant has provided a complete description of this system in the COL FSAR.

In Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11, the applicant provided the following:

Interface Requirements

The plant interfaces for the RWS are identified in Table 1.8-203, "Summary of FSAR Discussions of AP1000 Plant Interfaces," of the Turkey Point Units 6 and 7 COL FSAR as Item 9.4, "Plant makeup water quality limits," and Item 9.5, "Requirements for location and arrangement of raw and sanitary water systems." These items are identified as "non-nuclear safety (NNS)" interfaces.

Supplemental Information

- PTN SUP 9.2-2

The applicant provided supplemental information by adding the new Section 9.2.11 after AP1000 DCD Section 9.2.10.

9.2.11.3 Regulatory Basis

Because the RWS was not considered within the scope of the AP1000 DCD, a regulatory basis for this system was not established for the standard plant design. The regulatory basis of the RWS for the Turkey Point Units 6 and 7 units is provided in this section.

The acceptance criteria that pertain to CWS and RWS evaluations are given in NUREG-0800, Sections 10.4.5, "Circulating Water System," 9.2.1, "Station Service Water System," 9.2.5, "Ultimate Heat Sink," 3.4.1, "Flood Protection," and 3.5, "Barrier Design for Missile Protection."

The regulatory bases and guidance for acceptance of the SUP information and interface items are established in:

- 10 CFR Part 50, Appendix A, GDC 2, "Design Bases for Protection against Natural Phenomena"
- 10 CFR Part 50, Appendix A, GDC 4
- RG 1.29, "Seismic Design Classification," Revision 4, Position C.2
- 10 CFR 20.1406, "Minimization of Contamination"

- SECY-94-084

9.2.11.4 Technical Evaluation

The staff reviewed the information provided in Section 9.2.11 of the Turkey Point Units 6 and 7 COL FSAR that describes the RWS, including the information provided by Figure 9.2-201, "Raw Water System Flow Diagram." The staff's evaluation in this section focuses primarily on RWS failure considerations and on the capability and reliability of the RWS to perform its cooldown function. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The remainder of this SER section evaluates both PTN SUP 9.2-2 and Interface Items 9.4 and 9.5.

A. GDC 2, GDC 4, and RG 1.29

The staff reviewed the information in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 to confirm that RWS failures will not adversely impact the control room occupants or adversely affect SSCs that are safety-related or designated for RTNSS. Although Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11.1.1, "Safety Design Basis," states that failures of the RWS or its components will not affect the ability of safety-related systems to perform their intended functions, it did not include sufficient information to adequately describe the consequences of RWS failures and to explain why safety-related SSCs are not affected. Likewise, it did not include sufficient information to explain why a failure of the RWS will not adversely affect RTNSS systems and components or impact the control room, or result in an unacceptable release of radioactive material to the environment. Because the applicant did not identify and address these considerations, the staff was unable to confirm compliance with GDC 2, GDC 4, and passive plant policy considerations, as described in SECY-94-084. Consequently, the staff requested, in RAI 5491, Question 09.02.01-2, that the applicant revise Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 to address the impact of RWS failures, including development of plant-specific ITAAC and test program specifications, as appropriate.

In a letter dated August 17, 2011 (ADAMS Accession No. ML11234A011), the applicant provided a detailed response to the GDC 2, GDC 4, and ITAAC and testing questions. In its response, the applicant stated that the potential failures of the RWS and the corresponding impact on SSCs that are safety-related or AP1000 equipment Class D were considered. A summary of the applicant's response is described below.

- The RWS does not directly interface with any safety-related system as described in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 and shown on Turkey Point Units 6 and 7 COL FSAR, Figure 9.2-201. The RWS storage tank is located more than 200 ft east of the nearest building or structure within the scope of the AP1000 DCD certification (DCD Figure 1.2.2 and Turkey Point Units 6 and 7 COL FSAR, Figure 1.1-201) and therefore is distant to any safety-related or RTNSS SSCs. Also, RWS piping is not routed in close proximity to any safety-related SSCs. The only RTNSS system that RWS piping is in close proximity to is the SWS.

- A resultant flood from a break in the RWS piping is bounded by the analysis for a break in the CWS piping. DCD Section 3.4.1.1.1 indicates that a failure of the CWS cooling tower, the SWS piping, or the CWS piping could result in a potential flood source. However, these potential sources are not located in close proximity to safety-related structures and the consequences of a failure in the yard would be enveloped by the analysis described in DCD Section 10.4.5 for failure of the CWS. Likewise, because the RWS storage tank is not located in close proximity to safety-related or RTNSS SSCs, including the control room, the consequences of a failure would be enveloped by the analysis described in DCD Section 10.4.5. Site grading is designed to carry water away from safety-related or AP1000 Class D SSCs.
- RWS piping, which supplies water from the RWS storage tank to RWS interface points, is routed in the yard area and inside the turbine building. Water that discharges from a break in the RWS piping prior to securing the ancillary RWS pumps could be a source of flooding in the turbine building. A break in the RWS is bounded by a break in the CWS piping. As discussed in DCD Section 3.4.1.2.2.3, the bounding flooding source inside the turbine building is a break in the CWS piping. Flow from any postulated pipe failures above DCD elevation 100'-0" (Turkey Point Units 6 and 7 equivalent plant NAVD88 elevation is 26'-0") would travel down to DCD elevation 100'-0" via floor gratings and stairwells. There is no safety-related equipment in the turbine building. The CCS and SWS components on DCD elevation 100'-0", which provides RTNSS support for the RNS, is expected to remain functional following a flooding event in the turbine building because the pump motors and valve operators are above the expected flood level. Therefore, failures of the RWS piping within the turbine building will not adversely impact any safety-related or RTNSS SSCs.
- The RWS-to-SWS interface is at the SWS makeup control valve V009, as shown in DCD Figure 9.2.1-1. The SWS piping is routed from the control valve V009 to the top of the SWS cooling tower basin. There is an air gap between the SWS cooling tower basin water level and the discharge into the basin. The air gap ensures any break upstream of the raw water makeup control valve will not result in the draining of the SWS cooling tower basin.
- The RWS provides an alternate dilution source for the WLS discharge. The RWS does not have the potential to be a flow path for radioactive fluids due to system interfaces. The liquid radwaste effluent interface is at a point in the wastewater discharge system to the deep injection wells that prevents the effluent from entering the RWS.
- In summary, failure of the RWS or its components will not affect the ability of any safety-related systems to perform their intended safety functions nor will it adversely affect any RTNSS systems. Postulated breaks in the RWS piping will not impact safety-related components, because the RWS is not located in the vicinity of any safety-related equipment and the water from the postulated break will not reach any safety-related equipment, result in physical impact to the control room, or result in a release of radioactivity to the environment.
- Because the RWS is not safety-related and its failure does not lead to the failure of any safety-related systems, the requirements of GDC 2 and GDC 4 and the guidance of NUREG-0800 Section 9.2.1, regarding safety-related systems, do not apply.

- RWS piping and structures are designed and constructed in accordance with nationally recognized codes and standards (such as American Society of Mechanical Engineers/American National Standards Institute (ASME/ANSI) B31.1, “Power Piping,” and American Water Works Association). Design features have been included (such as the use of material not susceptible to corrosion for buried piping, redundant pumps, and alternate power supplies) to ensure RWS is reliable and will be available to support normal plant operation and shutdown functions.
- As noted in Turkey Point Units 6 and 7 COL FSAR, Section 14.3.2.3.3, this site-specific system RWS does not meet the ITAAC selection criteria. ITAAC screening was performed for the RWS, using the screening criteria of Turkey Point Units 6 and 7 COL FSAR, Section 14.3.2.3, which concluded that ITAAC is not applicable, as indicated in Turkey Point Units 6 and 7 COL FSAR, Table 14.3-201.
- No specific technical specifications (TSSs) are required for the RWS and none are applicable. TSSs for the AP1000 are discussed in Units 6 and 7 COL FSAR Chapter 16 and AP1000 DCD Chapter 16, and were evaluated by the staff in NUREG–1793, Chapter 16.
- There are no availability controls for the RWS, and they are not required based on the RTNSS evaluation discussed in NUREG–1793, Chapter 22, and Westinghouse Commercial Atomic Power (WCAP)-15985, “AP1000 Implementation of the Regulatory Treatment of Nonsafety-Related Systems Process,” Revision 2. Also, Turkey Point Units 6 and 7 COL FSAR, Chapter 16, and AP1000 DCD, Chapter 16, do not identify any availability requirements for RWS.

The staff finds the applicant’s response to RAI Question 09.02.01-2 addresses the staff’s concerns because it clarifies the design features of the RWS that prevent adverse effects and interactions with safety-related and RTNSS systems. The staff determined that failure of the RWS will not affect the ability of any safety-related systems to perform their intended safety functions nor will it adversely affect any RTNSS. Postulated breaks in the RWS piping will not impact safety-related components, because the RWS is not located in the vicinity of any safety-related equipment and water from a postulated pipe break will not reach any safety-related equipment or result in injury to occupants of the control room nor will it result in a release of radioactivity to the environment. Testing of the RWS has been properly addressed. Since the RWS is not safety related and its failure does not lead to the failure of any safety-related systems, the staff concludes that the requirements of GDC 2, GDC 4, and RG 1.29 have been satisfied; therefore, RAI Question 09.02.01-2 is resolved.

B. Cold Shutdown

The RWS is relied upon for achieving and maintaining cold shutdown conditions, which (in addition to the passive plant policy considerations discussed above in the Regulatory Basis section) is necessary for satisfying TS requirements. In particular, the RWS is relied upon for cooling the RCS from Mode 4 to Mode 5 conditions within 36 hours. The staff finds that Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 does not provide a clearly defined design basis with respect to the RWS cooldown function, and the reliability and capability of the RWS to perform this function for the most limiting situations have not been described and addressed in

this regard. For example, the minimum RWS flow rate, water inventory, temperature limitations, and corresponding bases for providing SWS makeup for the two Turkey Point Units 6 and 7 units were not described. Also, the suitability of RWS materials for the plant-specific application and measures being implemented to resolve vulnerabilities and degradation mechanisms to ensure RWS functionality over time were not addressed. Because the applicant did not adequately define and address RWS design-basis considerations with respect to its cool-down function, the staff was unable to confirm that the cool-down and policy considerations that apply to passive plant designs, as discussed in SECY-94-084, were satisfied. The staff requested, in RAI 5491, Question 09.02.01-3, that the applicant revise Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 to address the design basis regarding the reliability and capability of the RWS cool-down function, including the capability of the RWS system to supply makeup during a loss of power.

In its response dated August 17, 2011 (ADAMS Accession No. ML11234A011), the applicant stated that the following was related to achieving and maintaining cold shutdown conditions:

- As described in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 and shown on Turkey Point Units 6 and 7 COL FSAR, Figure 9.2-201 (Sheet 3 of 3), the RWS interfaces with the SWS. The other functions performed by RWS, as described in Section 9.2.11, do not have a direct interface with any system identified in the AP1000 DCD as safety related, designated for RTNSS, or designated as AP1000 Class D. Therefore, this response specifically focuses on the RWS interface with the SWS.
- The RWS provides a water fill/makeup function for the SWS. SWS has investment protection short-term availability controls, as described in AP1000 DCD, Table 16.3-2, which are applicable in Mode 5 with the RCS pressure boundary open and in Mode 6 with the upper internals in place or cavity level less than full. Under these conditions, the SWS is directly providing active core cooling and was evaluated by Westinghouse and determined to meet the RTNSS criteria as documented in NUREG-1793 and WCAP-15985. Unlike the SWS, the RWS does not directly provide core cooling and, as discussed in response to RAI Question 09.02.01-2, was evaluated in WCAP-15985 and determined not to meet the RTNSS criteria and not to require investment protection short-term availability controls.
- It is unlikely that a failure of RWS to provide adequate makeup flow to the SWS cooling tower basins would occur during the short time period in which the SWS is performing an RTNSS function, as described above. However, if a failure were to occur, the remaining available inventory in the service water cooling tower basins and the stored water, which is available in the additional excess volume of the secondary fire water tank, would provide ample time (more than 24 hours) to restore the RWS makeup flow or take the procedural actions necessary to exit the conditions for RTNSS applicability. Therefore, the RWS is not required to be an RTNSS system or subject to IPSAC. The RWS is designed to be a highly reliable and robust system capable of operating during a loss of normal alternating current (AC) power to provide makeup flow to the SWS under normal and abnormal conditions. Procedural controls, which provide for continued operation of the RWS or re-establishment of operations under off-normal conditions, will be described in the operating procedures, where appropriate.

- As defined in AP1000 DCD, Section 3.2.2.6, an SSC is classified as Class D when either of the following occurs:
 - The SSC directly acts to prevent unnecessary actuation of the passive safety systems.
 - The SSC supports those SSCs that directly act to prevent the actuation of passive safety systems.

Class D has normally been applied to AP1000 SSCs that perform defense-in-depth functions. While the SWS is designated in the AP1000 DCD as a defense-in-depth, Class D system, the RWS is designated as a Class E system (DCD Table 3.2-3). The basis for this classification is:

- A failure of the RWS will not directly cause an actuation of a passive system nor will it initiate the failure of an SSC that directly acts to prevent the actuation of a passive safety system.
- In the unlikely event of a failure of the RWS, the inventory in the service water cooling tower basin and available stored inventory in the additional excess volume of the secondary fire water tank ensure that the SWS can maintain the required defense-in-depth cooling functions for an extended period of time.
- As described in AP1000 DCD Section 5.4.7.1.2.1, the RNS in conjunction with its associated support systems, CCS and SWS (as a support system for CCS), are used for shutdown heat removal. The RWS provides indirect support for this function by providing a source of makeup water to the SWS cooling tower basins to compensate for evaporation, drift, and blowdown.
- The RWS provides this makeup water to support the cooling requirements for the SWS. During a normal plant cooldown, the RNS and CCS reduce the temperature of the RCS from approximately 177 °C (350 °F) to approximately 52 °C (125 °F) within 96 hours after shutdown. Each unit's RWS is designed to provide ample makeup flow during these conditions using the raw water ancillary pumps.
- If cooldown to Cold Shutdown (Mode 5) is required within 36 hours to comply with a limiting condition for operation, in accordance with the TSs, heat will be transferred from the RCS via the steam generators to the main steam system for a longer period of time, allowing the RNS to be placed in service at a lower temperature with lower decay heat levels. Because of the reduced RNS heat removal requirements associated with this cold shutdown sequence, the required RWS makeup flow to the SWS cooling towers is less than normal cooldown requirements.
- An ample inventory of raw water is available to provide makeup to the SWS cooling tower basins. As noted in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11.2.2.3, a raw water storage tank serving both units (note: GDC 5, "Sharing of Structures, Systems, and Components," does not apply, because the RWS is not an important-to-safety system as discussed previously) receives potable water supplied from the MDWASD. The potable water supply piping enters the Turkey Point Units 6

and 7 plant area from the north and is routed to the raw water storage tank located to the east of the two Turkey Point Units 6 and 7 units (Turkey Point Units 6 and 7 COL FSAR, Figure 1.1-201). The raw water ancillary pumps are located at grade elevation in close proximity to the above ground raw water storage tank, which continually receives makeup from the potable water supply. Should the potable water supply to the raw water storage tank be interrupted, the volume of water in the tank would provide sufficient time to temporarily supply water from another onsite water source, such as reclaimed water from the MWR. The MWR has a capacity well in excess of that needed to support cooldown to cold shutdown conditions and maintain the station in Mode 5 for more than 7 days.

RWS Design Reliability

- Underground RWS piping will be high-density polyethylene, which is not susceptible to corrosion. Therefore, periodic inspections of the underground RWS piping are not required.
- As discussed above, the lack of designation of the RWS as RTNSS or Class D indicates there is no performance requirement for the system during a loss of normal AC power or in the event of a single active failure. Nonetheless, the RWS is highly reliable based on its design. Each raw water ancillary pump can deliver makeup flow to the SWS cooling tower basins to meet demand during all modes of operation. Failure of an operating pump would not prevent the RWS from providing makeup to the SWS cooling towers. In the event of a loss of normal AC power, the raw water ancillary pumps may be manually loaded onto the appropriate diesel bus and may be manually started by the operator. The RWS, therefore, continues to maintain the capability to provide makeup water to the SWS cooling tower basins during the loss of normal AC power events.
- As discussed above, in the unlikely event that all the RWS flow to the SWS cooling towers is lost, there is ample time to identify and correct the situation or to align alternate sources of water to provide that makeup flow, and the RWS is shown not to be an RTNSS system nor subject to investment protection short-term availability controls. It is also important to note that the RNS, CCS, SWS, nor RWS are required to establish and maintain the AP1000 plant in a safe shutdown condition, since passive safety-related systems perform that function. This is explicitly recognized throughout the AP1000 DCD and NUREG-1793.
- Turkey Points Units 6 and 7 COL FSAR, Section 9.2.11 will be revised to include additional details to address the applicable system attributes requested in items-(a) through-(r) of this RAI.

The staff found that the response to RAI Question 09.02.01-3 was missing information and generated RAI Question 09.02.01-6 (eRAI 6346) to resolve the following issues:

- (1) Provide the volume of the RWS storage tank. A bounding volume of the RWS storage tank could be provided to support “sufficient time to restore the potable water supply” for various flow requirements, such as power operations, support for shutdown conditions, and SWS RTNSS conditions.

- (2) The flow rate of the RWS pumps was not provided and reviewed to the AP1000 required flow rate (to support RWS being adequately designed). Established AP1000 raw water makeup flow requirements can be found in the NRC's public document system at ADAMS Accession No. ML090760819.
- (3) The reclaimed water connections and system line-up from the MWR to support the SWS is not clearly defined in the Turkey Point Units 6 and 7 COL FSAR (drawings or text does not show interconnections). If temporary equipment is needed for this water makeup source, provide a statement that supports "sufficient time to restore the potable water supply."
- (4) Flow rate of the reclaimed makeup water pumps to support SWS makeup is not defined.
- (5) Since the MWR is a backup water source for the ESWS cooling tower, describe any negative SWS system performance issues with the cleanliness of the MWR water. Describe if the SWS cooling tower efficiency is affected by the change in water supply.

The applicant responded to RAI Question 09.02.01-6 on May 14, 2012, and provided the following response for each of the five requests.

- (1) The raw water storage tank minimum capacity is two million gallons. The installed available supply of makeup water to the SWS cooling tower basins would be 7571 m³ (2,000,000 gallons) (minimum raw water storage tank inventory), plus 1439 m³ (380,000 gallons) (secondary fire water tanks nominal volume not reserved for fire protection), plus 1741 m³ (460,000 gallons) (minimum usable SWS cooling tower basin inventory). This represents a combined capacity of 10,751 m³ (2,840,000 gallons). Twenty-four (24) hours from the loss of the potable water supply to the raw water storage tank should be sufficient time to either restore the supply or assess the situation and provide another source (such as the makeup water reservoir) of makeup water to the SWS cooling tower basins. At the normal makeup combined flow rate of approximately 1.68 m³/min (370 gpm) to both units' SWS cooling tower basins with blowdowns secured, greater than 72 hours of makeup flow would be available from the raw water storage tank alone.

For the case of shutdown of both units, the maximum makeup demand occurs at the beginning of cooldown, 4 hours after reactor shutdown. The maximum combined makeup requirement for simultaneous cooldown of both units, with blowdowns secured, is approximately 4.7 m³/min (1,250 gpm). Conservatively assuming this flow rate, a raw water storage tank minimum capacity of two million gallons can provide makeup to the SWS cooling tower basins for greater than 24 hours. In reality, the required makeup flow rate drops off significantly during the initial cooldown period and the required makeup flow rate during cooldown (96 hours) is estimated by Westinghouse to be approximately 1.68 m³/min (444 gpm) (combined average for both units with blowdowns secured). Based on this information, there is sufficient water in the raw water storage tank alone to provide makeup for at least 2 – 3 days to support simultaneous shutdown of both units while the potable water supply is

restored to the raw water storage tank or makeup water is provided from another source.

During Modes 5 and 6 (the modes when SWS RTNSS requirements could apply) the required makeup to the SWS cooling tower basins is much lower than during normal operation or cooldown during plant shutdown. Therefore, additional time would be available to restore the potable water supply to the raw water storage tank or provide SWS cooling tower basins makeup from another source.

Assuming normal power operations, the volume of raw water that is available in the raw water storage tank with blowdown secured is beyond 72 hours. Assuming the worst case raw water makeup requirements, the volume of raw water that is available in the raw water storage tank, in support of a shutdown of both units is beyond 24 hours. For the raw water makeup support for the SWS RTNSS functions, the available raw water volume will provide beyond 72 hours. Therefore, the staff finds that the raw water storage tank will adequately support power operations, shutdown, and RTNSS functions, and in the event that the raw water storage tanks become unavailable, there is adequate time (beyond 24 hours for worst case) to manually restore water makeup to the SWS basins. In addition, there is an initial 24 hours of SWS makeup water available within SWS basins and the FPS. The applicant provided a Turkey Point Units 6 and 7 COL FSAR markup adding the volume of the raw water storage tank, and the staff finds the Turkey Point Units 6 and 7 COL FSAR markup acceptable. The staff reviewed the applicant's response to RAI Question 09.02.01-6, Part 1, and finds it acceptable. The revised version of the Turkey Point Units 6 and 7 COL FSAR incorporates the associated revision to Section 9.2.11.2.2.3 as described in the applicant's letter of May 14, 2012.

- (2) Both Unit 6 and Unit 7 RWS have two (2) redundant ancillary pumps. Each of the four (4) pumps has a minimum capacity to provide 100 percent of the design maximum makeup requirement for the SWS of approximately 832 gpm which includes approximately 207 gpm for the SWS blowdown.

The staff reviewed the applicant's response to RAI Question 09.02.01-6, Part 2, and finds it acceptable. The Turkey Point Units 6 and 7 raw water ancillary pumps are adequately designed to the Westinghouse AP1000 design data, which is 3.1 m³/min (830 gpm) per unit, which includes a blowdown flow of 0.78 m³/min (205 gpm) per unit. Therefore, RAI Question 09.02.01-6, Part 2, is considered resolved.

- (3) Turkey Point Units 6 and 7 FSAR, Subsection 9.2.11.2.2.3 mentions the MWR as a potential temporary source of SWS makeup water in the event that the potable water supply to the raw water storage tank is interrupted. The Turkey Point Units 6 and 7 COL FSAR section specifically identifies the MWR as a potential temporary source of SWS makeup to convey that a sufficient volume of water would be available onsite should it be needed. Mention of the MWR does not preclude the use of water from other sources that may be determined to be suitable and available. The drawings and text do not show interconnections because the MWR is only identified as a potential temporary water source. Assuming water would be supplied from the MWR, determination of what interconnections, if any, would be used to transfer water from the MWR to the SWS cooling

tower basins will be made during the detailed design. The method of water transfer currently envisioned is the use of temporary pumps and hoses without the need for permanent connections/interconnections. This method would be procedurally controlled to ensure water would only be introduced into the SWS under controlled conditions to address a temporary need and that temporary equipment as necessary would be available for deployment and use.

As discussed in the response to RAI Question 09.02.05-6, Part 1, SWS makeup from another source of water, such as water from the MWR, would not be necessary for a number of days after the potable water supply to the raw water storage tank was interrupted. Therefore, there is ample time to restore the potable water supply or take steps to provide a temporary source of SWS makeup.

The staff reviewed the applicant's response to RAI Question 09.02.01-6, Part 3, and finds it acceptable. The MWR is considered a potential temporary source of SWS makeup and is not to be shown on Turkey Point Units 6 and 7 COL FSAR figures. Manual operator actions, with procedural controls, using temporary pumps and hoses are expected to be utilized in the water transfer from the MWR to the SWS, if the raw water storage tank becomes unavailable. Temporary equipment would be available for deployment. Therefore, RAI Question 09.02.01-6, Part 3, is considered resolved.

- (4) The maximum SWS makeup requirement is less than 6.4 m³/min (1700 gpm) (for two units), which is relatively small compared to the capacity of the reclaimed makeup water pumps (greater than 37.9 m³/min (10,000 gpm) anticipated). Therefore, use of the reclaimed makeup water pumps would not likely be considered to support SWS makeup because of the provisions in the permanent piping system that might be needed to accommodate the low flow condition. Procedurally controlled temporary pumps will be available (in appropriate quantity and capacity) to support SWS makeup requirements.

The staff reviewed the applicant's response to RAI 53, Question 09.02.01-6, Part 4, and finds it acceptable. The applicant stated in the response to item 3 above that temporary pumps would be utilized. The reclaimed makeup water pumps would not likely be used to support SWS makeup in the event that the raw water storage tank becomes unavailable. Therefore, RAI 53, Question 09.02.01-6, Part 4, is considered resolved.

- (5) Turkey Point Units 6 and 7 COL FSAR, Subsection 9.2.11.2.2.3 mentions the MWR as a potential temporary source of SWS makeup water in the event that the water supply to the raw water storage tank is interrupted. The Turkey Point Units 6 and 7 COL FSAR section specifically identifies the MWR as a potential temporary source of SWS makeup to convey that a sufficient volume of water would be available onsite should it be needed. Mention of the MWR does not preclude the use of water from other sources that may be determined to be suitable and available.

However, in the event a temporary source of SWS makeup water is needed and the MWR is used as the source, any negative impact to the

SWS cooling tower performance would not be significant during the short term use.

While the potable water supplied to the raw water storage tank is of higher quality than the water stored in the MWR, water from the MWR should be of sufficient quality for short term use in the SWS cooling towers. Finalization of the design will provide for additional treatment of the MWR water and/or another source that can supply sufficient water with acceptable chemistry, as necessary. The SWS includes permanent strainers and chemical injection to assist in controlling water quality. Additionally, during temporary operation with water from the MWR or another source, the SWS cooling towers would be subjected to heat loads lower than design capacity.

Plant procedures will control restoration of the normal potable water supply, including SWS cleanup, to ensure appropriate levels of chemical treatment and blowdown of the system.

The staff reviewed the applicant's response to RAI Question 09.02.01-6, Part 5, and finds it acceptable. MWR is to be utilized as a short-term potential temporary source of SWS makeup, and the MWR is not expected to cause any negative impact of the SWS cooling tower performance. Finalization of the design will provide for additional treatment of the MWR water or another source, or a combination of MWR water with another source that can supply sufficient water with acceptable chemistry, as necessary.

In addition as stated in AP1000 DCD Sections 9.2.1.2.1 and 9.2.1.2.2, the SWS is designed with permanent strainers and chemical injection to assist in controlling water quality. Therefore, RAI Question 09.02.01-6, Part 5, is considered resolved.

In summary, the staff notes that each RWS ancillary pump can deliver adequate makeup flow to the SWS cooling tower basins to meet demand during all modes of operation. Further, without RWS makeup to the SWS cooling tower basins, adequate inventory in the SWS cooling tower basins exists along with the stored water in the secondary fire water tanks that would provide more than 24 hours to restore RWS makeup flow. The raw water storage tank provides over 7,570 m³/min (2 million gal) of water for the SWS cooling tower basins, which are shared between the two nuclear units. The RWS is considered highly reliable based on its design, and a single failure of a structure or component in the RWS would not affect normal plant cooldown. The RWS ancillary pumps (two per unit) can be manually loaded onto the standby diesel generators to provide adequate makeup flow to the SWS cooling tower basins. Further, the staff reviewed the proposed Turkey Point Units 6 and 7 COL FSAR changes discussed in the RAI related to RWS operations and components. The staff finds that the Turkey Point Units 6 and 7 COL FSAR markup has been adequately incorporated into the revised version of the Turkey Point Units 6 and 7 COL FSAR for RAI 29, Questions 09.02.01-3. Therefore, the issues described in RAI Questions 09.02.01-3 and 09.02.01-6 are resolved. The staff confirms that the Turkey Point Units 6 and 7 COL FSAR has been revised accordingly.

C. Regulatory Treatment of Nonsafety-Related System

The RWS supports the SWS cooling function by providing makeup water to the SWS cooling tower basins. The staff noted that, while the SWS is designated for RTNSS during reduced

reactor inventory conditions, the RWS is not needed to support the SWS cooling function when the reactor water inventory is reduced, because the RWS is not designated for RTNSS. However, there is no explanation in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 as to why the RWS is not considered an RTNSS. Also, because the SWS cooling tower basins are very limited in their capacity, it was not clear why the RWS makeup would not be required for this situation. Consequently, the staff requested, in RAI Question 09.02.01-4 (eRAI 5491), that the applicant revise Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 to explain why the RWS makeup is not needed during reduced reactor inventory conditions and, in particular, to describe controls that will be implemented to ensure that assumptions remain valid.

In its response dated August 17, 2011 (ADAMS Accession No. ML11234A011), the applicant stated that a detailed response was provided to RAI 5491, Question 09.02.01-3, explaining why the RWS is not designated as RTNSS and makeup from the RWS to the SWS cooling tower basins is not required during reduced reactor inventory conditions. The referenced RAI response also discusses that procedural control will be established to take the required actions to exit the conditions for applicability of the SWS as an RTNSS system, in the unlikely event of a failure to re-establish the RWS makeup capability.

The staff finds the applicant's response to RAI 5491, Question 09.02.01-4 (ADAMS Accession No. ML11234A011), which references the response to RAI Question 09.02.01-3, acceptable because (1) the RWS was previously evaluated in WCAP-15985 in Table-1-1, "Nonsafety-related system evaluation in AP1000 RTNSS Process," which was previously approved by the staff, (2) the RWS does not directly provide core cooling, and (3) the RWS has adequate stored water within the SWS cooling towers and the secondary fire water tank for more than 24 hours to support the SWS RTNSS functions, plus the 24 hours stored onsite water supply provides ample time to restore the RWS makeup flow or take the procedural actions necessary to exit the condition of applicability for the SWS and its RTNSS function. Therefore, RAI Question 09.02.01-4 is resolved.

D. System Design Consideration

As specified by 10 CFR 20.1406, COL applicants are required to describe how facility design and procedures for operation will minimize the generation of radioactive waste and contamination of the facility and environment, and facilitate eventual plant decommissioning. The reclaimed water or saltwater portions of the RWS provide an alternate dilution source for liquid radwaste discharge when the CWS cooling tower blowdown is not available. Although the RWS has no interconnections with any systems that contain radioactive fluids, industry experience has shown that this alone may not be sufficient to prevent the RWS from becoming contaminated. For example, unplanned leaks or release of contaminated fluids as a result of component failures or transport, drainage problems in contaminated areas, and the migration of contamination through soils and other porous barriers over time have caused systems and areas of the plant that are not directly connected with contaminated systems to become contaminated. Therefore, the staff requested, in RAI Question 09.02.01-5 (eRAI 5491), that the applicant provide additional information to describe design provisions and other measures that will be implemented to satisfy the requirements specified by 10 CFR 20.1406, including measures that will be implemented to monitor the RWS for contamination and corrective actions that will be taken to eliminate any radioactive contamination that is identified.

In its response, dated August 17, 2011 (ADAMS Accession No. ML11234A011), as described in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11, "Raw Water System," reclaimed water from the MDWASD is supplied to the FPL reclaimed water treatment facility.

- Water from the reclaimed water facility is then stored in the MWR for use as makeup to the CWS mechanical draft cooling tower basins. Also as described in Section 9.2.11, saltwater from beneath Biscayne Bay is used for makeup to the CWS cooling tower basins directly when reclaimed water is unavailable in sufficient quantity, quality, or both.
- As further described in Section 9.2.11, potable water from the MDWASD is supplied to the raw water storage tank for makeup to the SWS mechanical draft cooling tower basins, DTS, and FPS. The reclaimed water or saltwater portions of the RWS also provide an alternate dilution source for liquid radwaste discharge when the CWS cooling tower blowdown is not available.
- Potential failures of the plant systems causing external and internal flooding are described in AP1000 DCD Section 3.4, and potential sources that could transport contaminants to the RWS are monitored in accordance with AP1000 DCD Section 11.5.
- As described in AP1000 DCD Section 11.5, the radiation monitoring system provides plant effluent monitoring, process fluid monitoring, airborne monitoring, and continuous indication of the radiation environment in plant areas where such information is needed.

Compliance with 10 CFR 20.1406:

- In support of COL application pre-application activities, Westinghouse has submitted to the staff the report, AP1000 Standard Combined License Technical Report APP-GW-GLN-098, Revision 0, "Compliance with 10 CFR 20.1406," dated April 10, 2007. This report summarizes the design approach and features incorporated into the AP1000 standard plant design that demonstrate compliance with 10 CFR 20.1406. The plant features described in this report will minimize contamination and radioactive waste generation for the AP1000 design.

Groundwater Transport:

- Turkey Point Units 6 and 7 COL FSAR, Section 2.4.13, "Accidental Release of Radioactive Liquid Effluents in Ground and Surface Waters," presents an analysis of the effect of an accidental release of liquid effluents to the groundwater environment through the postulated failure of the liquid waste system effluent holdup tank.

Groundwater Monitoring Program:

- In accordance with 10 CFR 20.1406 and as covered in Westinghouse Technical Report APP-GW-GLN-098, a groundwater monitoring program beyond the normal radioactive effluent monitoring program will be developed. Turkey Point Units 6 and 7 COL FSAR, Section 12AA.5.4.14 lists locations of areas to be monitored for the AP1000 design and states a groundwater monitoring program will be developed. Groundwater monitoring program implementation considerations are also described in Turkey Point Units 6 and 7 COL FSAR Section 12AA.5.4.13. A "Record of Operational Events of

Interest for Decommissioning” is described in Turkey Point Units 6 and 7 COL FSAR Section 12AA.5.4.15.

- Based on the above monitoring program, unplanned leakage or release of contaminated fluids will be detected.

Conclusion:

- The RWS piping system interfaces do not provide a potential to be a flow path for radioactive fluids, as indicated in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11.1.1 and shown in Turkey Point Units 6 and 7 COL FSAR, Figure 9.2-201. Also, the possibility of contaminating the RWS from a release to the subsurface environment from Units 6 and 7 is remote. Therefore, direct monitoring of the RWS for contamination is not required.

The staff finds that the RWS does not have the potential to be a flow path for radioactive fluids. The Turkey Point Units 6 and 7 WLS effluent discharge release point is where the WLS effluent discharge pipe connects to the blowdown sump discharge pipe to deep injection wells. Both CWS and RWS provide dilution flow to the blowdown sump for the effluent discharge. The pumping station associated with the blowdown sump and the associated WLS discharge piping is designed to ensure that there is no potential for contamination of the blowdown sump due to radioactive water discharge. The staff finds that it is unlikely that liquid radwaste would be able to travel to the RWS interface, based on the design of the blowdown sump. The blowdown sump design is further described in Section 9.2.9 of this report, and the WLS is described in Section 11.2.1.

In addition, the applicant indicated that the groundwater monitoring program should minimize the possibility of contaminating the RWS from external subsurface sources. The applicant noted that the groundwater monitoring program is described in Turkey Point Units 6 and 7 COL FSAR Section 12AA.5.4.14, “Ground Monitoring Program.” The applicant stated, in Turkey Point Units 6 and 7 COL FSAR Section 12AA.5.4.14, that it has adopted Nuclear Energy Institute (NEI) 08-08A, “Generic FSAR Template Guidance for Life Cycle Minimization of Contamination,” for the groundwater monitoring program description. The staff’s evaluation of the groundwater monitoring program is provided in Chapter 12 of this SER.

Because there is no interconnection with any system that contains potentially radioactive fluids as indicated in Turkey Point Units 6 and 7 COL FSAR Section 9.2.11.1.1, the staff concludes that the requirements of 10 CFR 20.1406 are satisfied and considers this aspect of RAI Question 09.02.01-5 resolved.

Based on the above technical evaluation, the staff finds the information added to the Turkey Point Units 6 and 7 COL FSAR to address PTN SUP 9.2-2 and Interface Items 9.4 and 9.5 to be acceptable.

9.2.11.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.2.11.6 Conclusion

The staff evaluated the RWS as described in Turkey Point Units 6 and 7 COL FSAR Section 9.2.11. The staff's evaluation focused primarily on confirming that (a) the design of the RWS complies with the requirements of GDC 2 and GDC 4 and conforms with the guidance in RG 1.29, (b) the RWS reliance for the support of SWS for achieving and maintaining cold shutdown conditions and RTNSS considerations is consistent with the guidance in SECY-94-084, (c) the RWS is not considered RTNSS, and (d) other system design considerations meet the requirements of 10 CFR 20.1406.

Based upon the results of this evaluation, the staff concludes that the Turkey Point Units 6 and 7 RWS, as described under PTN SUP 9.2-2 in Section 9.2.11 of the Turkey Point Units 6 and 7 COL FSAR, including Interface Items 9.4 and 9.5, is acceptable.

9.2.12 Deep Well Injection System

9.2.12.1 Introduction

The DIS is used to dispose of plant wastewater, including both nonradioactive liquid waste (e.g., CWS blowdown) and radioactive liquid waste from the liquid radwaste processing system. The principal DIS components consist of 12 deep injection wells, 6 dual zone monitoring wells and associated piping, valving, pumps, and instrumentation for system operational monitoring. The DIS functions to dispose of and confine plant wastewater to the Boulder Zone. The DIS has no safety-related function, and does not affect the ability of safety-related systems to perform their intended functions.

9.2.12.2 Summary of Application

Section 9.2 of the AP1000 DCD does not include a section on deep well injection. In response to RAI 6985, Questions 11.02-6-5 (ADAMS Accession No. ML13225A029) to RAI 6985, Question 11.02-6-6 (ADAMS Accession No. ML14269A066), the applicant supplemented Section 9.2 of the AP1000 DCD, Revision 19, by adding Section 9.2.12, "Deep Well Injection System," to the Turkey Point Units 6 and 7 COL FSAR. Therefore, no COL action items are associated with the added FSAR section of the COL application. Section 9.2.12 describes the operation and use of DIS.

9.2.12.3 Regulatory Basis

As identified above, the AP1000 DCD does not include a section on deep well injection. Therefore, COL FSAR Section 9.2.12 does not incorporate by reference associated information from the AP1000 DCD.

The regulatory basis for acceptance of this added information is established in:

- 10 CFR 20.1406, "Minimization of contamination"
- 10 CFR 20.2002, "Method for obtaining approval of proposed disposal procedures"
- 10 CFR Part 20, Appendix B, Table 2
- 10 CFR Part 50, Appendix I, Section II.A

9.2.12.4 Technical Evaluation

As described in Section 9.2.12.2 of this SER, Section 9.2.12 of the Turkey Point Units 6 and 7 COL FSAR does not have a corresponding section in the AP1000 DCD. The added section of the COL FSAR was created in response to staff RAI questions about the DIS that were raised for the staff's review of COL FSAR Section 11.2.

When discharging liquid radioactive waste, the DIS must maintain a minimum dilution water flow rate to comply with the radioactive waste release design objectives and limits described in NUREG-0800, Chapter 11. If sufficient dilution water is not available for a given liquid radwaste flow rate, the radwaste discharge flow rate can be adjusted as described in Turkey Point Units 6 and 7 COL FSAR, Chapter 11.

Circulating water is the primary source of dilution water for Turkey Point Units 6 and 7. Turkey Point Units 6 and 7 provide for the use of other sources of dilution water besides circulating water. Other sources of dilution water include reclaimed water and alternate dilution flow paths when circulating water system blowdown is not sufficient or available for dilution. These other sources of dilution water are available to supply the blowdown sump, which is the basin from which the dilution water pumps take suction. Sufficient dilution water is available in all modes of operation to provide at least 6,000 gpm of dilution water for each unit discharging liquid radwaste.

As stated in Appendix 12AA of the Turkey Point Units 6 and 7 COL FSAR, NEI 08-08A is adopted for Turkey Point Units 6 and 7. The NEI 08-08A template guidance provides a description of the operational and programmatic elements and controls that serve to minimize contamination of the facility, site, and the environment, to meet the requirements of 10 CFR 20.1406. Each of the 12 deep injection wells is constructed with materials designed to isolate and protect groundwater from injected fluid. This design will minimize potential environmental contamination. Six monitoring wells are located in close proximity to the injection wells to provide indication of leakage. Injection pipe casings are encapsulated in cement to protect against exposure to groundwater. The deep injection wells are constructed of new and unused steel casings designed to last for the life expectancy of the wells; a nominal 18 in. diameter fiberglass reinforced plastic pipe is encapsulated within the steel pipe with the intervening annulus filled with a nonhazardous corrosion inhibitor and sealed at the base and top to create a pressure-tight annular space.

In order to direct the discharge flow to the appropriate combination of discharge wells for discharge, the injectate piping contains manifolds, valves, and controls. The injectate piping also includes appurtenances, such as air/vacuum release valves, vent lines, and accessways, as necessary, for proper operation and maintenance of the discharge piping. 10 CFR 20.1406 specifies that the facility should be designed to minimize contamination of the facility and the environment. In order to comply with these requirements of 10 CFR 20.1406, the discharge piping, manifolds, valves, controls, and appurtenances are designed to minimize inadvertent or unidentified releases to the environment. The integrity of the injectate piping and the valve fittings will be monitored for leakage by performing periodic visual inspections, where accessible, as part of routine operation and maintenance activities. In order to ensure that leakage is contained and controlled, the valves associated with the injectate piping are included in the preventive maintenance program. As part of this program, they are checked periodically and maintained within acceptable parameters. Additional information concerning design

features of the discharge piping and deep injection wells incorporated to comply with the requirements of 10 CFR 20.1406 are described in Section 12.3.4 of the safety evaluation.

The staff reviewed Section 9.2.12 of the Turkey Point Units 6 and 7 COL FSAR and the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic. On the basis of its review, the staff confirms that the information in the application addresses most of the required information relating to the DIS. In response to NRC RAIs, the applicant supplied a response in FPL Letter L-2014-102, "Supplemental Response to NRC Request for Additional Information Letter No. 72 (RAI 6985) SRP Section 11.02 – Liquid Waste Management System (ADAMS Accession No. ML14269A066)." In the applicant's response, the applicant agreed to change some of the information in Section 9.2.12 by including additional sections discussing information on the source of alternate dilution flow from the makeup water reservoir; providing material to discuss information relating to the effluent concentration limits contained in 10 CFR Part 20, Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage," which is also discussed in SER Section 11; and describing typical monitoring and sampling systems used with the dual zone monitoring wells. The staff has reviewed the revised version of the Turkey Point Units 6 and 7 COL FSAR and has confirmed that the requested changes are incorporated and determined that the changes are acceptable. The staff considers those portions of RAI 6985, Questions 11.02-6-5 to 11.02-6-6 related to Section 9.2.12 closed.

9.2.12.5 *Post-Combined License Activities*

There are no post-COL activities related to this section.

9.2.12.6 *Conclusion*

The staff evaluated the DIS as described in Turkey Point Units 6 and 7 COL FSAR Section 9.2.12 and 11.2. The staff's evaluation of the DIS is found in 11.2 and focused primarily on complying with 10 CFR 20.2002, "Alternate Disposal Methods." Through the staff's review of the information provided in DCD Section 9.2.12 and 11.2 the staff concludes that the DIS complies with the requirements of 10 CFR 20.2002. The staff's full evaluation of the 10 CFR 20.2002 requirements is found in SER Section 11.2.4, "Compliance with 10 CFR 20.2002."

Based upon the results of this evaluation, the staff concludes that the Turkey Point Units 6 and 7, as described under DCD Sections 9.2.12 and 11.2 of the Turkey Point Units 6 and 7 COL FSAR is acceptable.

9.3 Process Auxiliaries

9.3.1 Compressed and Instrument Air System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.1, "Compressed Air Systems")

9.3.1.1 *Introduction*

The compressed and instrument air system delivers instrument air, service air, and high-pressure air. The instrument air subsystem provides high-quality instrument air for plant use. The service air subsystem supplies plant breathing air. The high-pressure air subsystem produces air for high-pressure applications.

9.3.1.2 Summary of Application

Section 9.3 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.3 of the AP1000 DCD. Section 9.3 of the AP1000 DCD includes Section 9.3.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 9.3, the applicant provided the following:

Departures

- PTN DEP 6.4-2

The applicant provided additional information in Section 9.3.1.1.2 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the MCR are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR is reviewed in Section 21.3 of this SER.

AP1000 COL Information Item

- STD COL 9.3-1

The applicant provided additional information in STD COL 9.3-1 to address COL Information Item 9.3-1 (COL Action Item 9.3.1-1).

9.3.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements. In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the compressed and instrument air system are given in Section 9.3.1 of NUREG–0800. The regulatory basis for STD COL 9.3-1 addressing Generic Safety Issue 43, “Reliability of Air Systems,” as part of training and procedures, is:

- 10 CFR Part 50, Appendix A, GDC 1, “Quality Standards and Records,” as it relates to the reliability of safety-related equipment actuated or controlled by compressed air

9.3.1.4 Technical Evaluation

The staff reviewed Section 9.3.1 of the Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the compressed and instrument air system. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

SER Section 1.2.3 provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside of the scope of the DC and use this review

in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.3.1.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 9.3-1 (COL Action Item 9.3.1-1), involving air systems (NUREG-0933, "Resolution of Generic Safety Issues," Issue 43)*

The NRC staff reviewed STD COL 9.3-1 related to COL Information Item 9.3-1. COL Information Item 9.3-1 states:

The Combined License applicant will address DCD 1.9.4.2.3, Issue 43 as part of training and procedures identified in section 13.5.

The commitment was also captured as COL Action Item 9.3.1-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will address NUREG-0933, Issue 43 as part of training and procedures.

The applicant proposed to resolve STD COL 9.3-1 by providing training and procedures for operations and maintenance of the instrument air subsystem and air operated valves. The methodology to develop system operating procedures, abnormal operating procedures, and alarm response procedures is reviewed in Section 13.5 of this SER. The training program for operators and maintenance

personnel is reviewed in Section 13.2 of this SER. The applicant also stated that the compressed and instrument air system will be maintained and tested in accordance with the manufacturers' recommendations and procedures and that the system will be periodically tested to demonstrate conformance with the quality requirements of ANSI/ISA-7.3-1981.

NUREG-0933, Issue 43 discusses that possible solutions for this issue, include better operator training, operator awareness of the importance of compressed air systems, and periodic testing and inspection of the compressed air systems. The NRC staff reviewed the applicant's proposed resolution to STD COL 9.3-1 and determined that the BLN COL FSAR meets the guidance in NUREG-0933, Issue 43; therefore, the staff finds STD COL 9.3-1 resolved.

9.3.1.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.3.1.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidelines given in Section 9.3.1 of NUREG-0800.

- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the MCR are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.
- STD COL 9.3-1, the staff evaluated Issue 43, "Reliability of Air Systems," as part of the training and procedures in accordance with the requirements of GDC 1, as it relates to the impact of a failure of the compressed and instrument air system on safety-related SSCs. Based on the results of this evaluation, the Turkey Point Units 6 and 7 COL FSAR meets the guidance in NUREG-0933, Issue 43, and is acceptable.

9.3.2 Plant Gas System (Related to RG 1.206 Section C.III.1, Chapter 9, C.I.9.3.1, "Compressed Air Systems)

The plant gas system is a nonsafety-related system that supplies hydrogen, carbon dioxide, and nitrogen gases to plant systems as required. Failure of the system does not compromise any safety-related system nor does it prevent safe reactor shutdown.

The Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.3.2, "Plant Gas System," of the AP1000 DCD. The staff reviewed the

application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.3.3 Primary Sampling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.2, "Process and Postaccident Sampling Systems")

The primary sampling system is used to collect samples during normal operations and following an accident. The system collects for analysis samples from the reactor coolant, auxiliary primary process streams, and containment atmosphere. Both the normal operation and post-accident requirements are carried out by this single system.

The Turkey Point Units 6 and 7 COL FSAR, Section 9.3 incorporates by reference, with no departures or supplements, Section 9.3.3, "Primary Sampling System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.3.4 Secondary Sampling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.2, "Process and Post Accident Sampling Systems")

The secondary sampling system delivers representative samples of fluids from secondary systems to sample analyzer packages. Continuous online secondary chemistry monitoring detects impurity ingress and provides early diagnosis of system chemistry excursions in the plant.

The Units 6 and 7 COL FSAR Section 9.3 incorporates by reference, with no departures or supplements, Section 9.3.4, "Secondary Sampling System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.3.5 Equipment and Floor Drainage Systems (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.3, "Equipment and Floor Drainage System")

The equipment and floor drainage system collects liquid wastes from equipment and floor drains during normal operation, startup, shutdown, and refueling. The equipment and floor drainage system consists of two subsystems: radioactive waste drains and nonradioactive waste drains.

The Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.3.5, "Equipment and Floor Drainage Systems," of the AP1000 DCD.

The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.3.6 Chemical and Volume Control System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.4, "Chemical and Volume Control System (PWR) including Boron Recovery System")

The CVS maintains the required water inventory and quality in the RCS, provides pressurizer auxiliary spray, controls the boron neutron absorber concentration in the reactor coolant, provides a means for filling and pressure testing the RCS, controls the primary water chemistry, and reduces coolant radioactivity level. Further, the system provides recycled coolant for demineralized water makeup for normal operation and provides borated makeup flow to the RCS in the event of some accidents, such as a small-break loss-of-coolant accident.

The Turkey Point Units 6 and 7 COL FSAR, Section 9.3 incorporates by reference, Section 9.3.6, "Chemical and Volume Control System," of the AP1000 DCD. In addition, in the Turkey Point Units 6 and 7 COL FSAR, the applicant provided the following:

Departures

- PTN DEP 7.3-1

The applicant provided additional information in Section 9.3.6 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 7.3-1 related to required design changes for the PMS source range neutron flux doubling logic to comply with the requirements of Institute of Electrical and Electronics Engineers (IEEE) Std. 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," Clause 6.6. This information, as well as related PTN DEP 7.3-1 information appearing in other chapters of the Turkey Point Units 6 and 7 COL FSAR, is reviewed in Section 21.5 of this SER.

The NRC staff reviewed Section 9.3.6 of the Turkey Point Units 6 and 7 COL FSAR (letter dated April 29, 2016 (ADAMS Accession No. ML16124A921)) and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this section. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the WLS COL application are documented in NUREG-1793 and its supplements.

9.4 Air-Conditioning, Heating, Cooling, and Ventilation Systems

9.4.1 Nuclear Island Nonradioactive Ventilation System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.1, "Control Room Area Ventilation System")

9.4.1.1 Introduction

The VBS, in conjunction with the MCR emergency habitability system described in Section 6.4, provides a controlled environment for the comfort and safety of control room personnel and ensures the operability of control room and nearby components during normal operating, anticipated operational transient, and design-basis accident conditions.

9.4.1.2 Summary of Application

The Turkey Point Units 6 and 7 COL FSAR, Section 9.4 incorporates by reference Section 9.4 of the AP1000 DCD. Section 9.4 of the DCD includes Section 9.4.1, describing the VBS.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Sections 9.4.1, 9.4.1.4, and 9.4.12, (and in a letters dated May 6, 2016 and May 16, 2016 (ADAMS Accession Nos. ML16131A674, and ML16140A087 respectively)), the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Section 9.4.1 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the MCR and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR is reviewed in Section 21.2 of this SER.

- PTN DEP 6.4-2

The applicant provided additional information in Section 9.4.1 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the MCR are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the Turkey Point Units 6 and 7 COL FSAR is reviewed in Section 21.3 of this SER.

AP1000 COL Information Items

- STD COL 9.4-1a

The applicant provided additional information in STD COL 9.4-1a to address the first part of COL Information Item 9.4-1 (COL Action Item 9.4.1-1), related to a program for inspections and testing applicable to the VBS.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 9.4.12, the applicant provided the following:

- PTN COL 9.4-1b

The applicant provided additional information in VCS COL 9.4-1b to address the second part of COL Information Item 9.4-1 (COL Action Item 6.4-3). The local toxic gas services are evaluated to determine the need for monitoring for control room habitability.

9.4.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements. In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the VBS are given in Section 9.4.1 of NUREG-0800.

The applicable regulatory guidance for the VBS is as follows:

- RG 1.140, “Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Normal Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants,” Revision 2.

9.4.1.4 Technical Evaluation

The staff reviewed Section 9.4.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the VBS. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.4.1.4 of the VEGP SER:

AP1000 COL Information Items

- STD COL 9.4-1a

The applicant provided additional information in STD COL 9.4-1a to resolve COL Information Item 9.4-1. COL Information Item 9.4-1a states:

The Combined License applicants referencing the AP1000 certified design will implement a program to maintain compliance with ASME AG-1, ASME N509, ASME N510 and Regulatory Guide 1.140 for portions of the nuclear island nonradioactive ventilation system and the containment air filtration system identified in subsection 9.4.1 and 9.4.7.

The commitment was also captured as COL Action Item 9.4.1-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will develop a program to maintain operability of the nuclear island nonradioactive ventilation system and the containment air filtration system.

The NRC staff reviewed STD COL 9.4-1a related to COL Action Item 9.4-1 included under Section 9.4.1.4 of the BLN COL FSAR. The NRC staff reviewed the resolution to STD COL 9.4-1a on the proposed implementation of a program to maintain compliance with industry standards and RGs for the VBS included under Section 9.4.1.4 and Section 9.4.12 of the BLN COL FSAR, and concludes that this item has been resolved for the VBS because the applicant has referenced the applicable regulatory guide and industry standards.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from Section 9.4.1.4 of the BLN SER that requires correction. The BLN SER includes the following statement: "The NRC staff reviewed STD COL 9.4-1a related to COL Action Item 9.4-1 included under Section 9.4.1.4 of the BLN COL FSAR." COL Action Item 9.4-1 does not exist and should be replaced with COL Information Item 9.4-1.

- PTN COL 9.4-1b

The applicant provided additional information in PTN COL 9.4-1b to resolve the second part of COL Information Item 9.4-1. The second part of COL Information Item 9.4-1 states:

The Combined License applicant will also provide a description of the [Main Control Room/Technical Support Center] MCR/TSC HVAC subsystem's recirculation mode during toxic emergencies, and how the subsystem equipment isolates and operates, as applicable, consistent with the toxic issues, including conformance with RG 1.78 to be addressed by the Combined License applicant as discussed in DCD Subsection 6.4.7.

The commitment was also captured as COL Action Item 6.4-3 in Appendix F of NUREG-1793, which states:

The COL applicant will determine the amount and location of possible sources of toxic chemicals in or near the plant and for seismic Category I Class 1E toxic gas monitoring, using methods discussed in RG 1.78.

The commitment was also captured as COL Action Item 9.4.1-1 in Appendix F of NUREG-1793, which states:

The COL applicant will develop a program to maintain operability of the nuclear island nonradioactive ventilation system and the containment air filtration system.

The staff review of PTN COL 9.4-1b is addressed in Section 6.4 of this SER.

9.4.1.5 *Post-Combined License Activities*

There are no post-COL activities related to this section.

9.4.1.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The applicant has provided sufficient information for satisfying the regulatory requirements and the acceptance criteria in Section 9.4.1 of NUREG-0800 and RG 1.140 related to the applicable inspection and testing standards. This addresses STD COL 9.4-1a for VBS. The staff based its conclusion on the following:

- PTN DEP 6.4-1, related to design changes affecting habitability of the MCR and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.

- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the MCR are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.
- STD COL 9.4-1a, related to a program for inspections and testing applicable to the VBS, is adequately addressed by the applicant and is resolved.
- PTN COL 9.4-1b, addressing the local toxic gas services are evaluated to determine the need for monitoring for control room habitability, is reviewed by the staff in Section 6.4 of this SER.

9.4.2 Annex/Auxiliary Buildings Nonradioactive HVAC System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.3, “Auxiliary and Radwaste Area Ventilation System”)

The annex/auxiliary building nonradioactive HVAC system maintains ventilation, permits personnel access, and controls the concentration of airborne radioactive material in the nonradioactive personnel and equipment areas, electrical equipment rooms, clean corridors, the ancillary diesel generator room and demineralized water deoxygenating room in the annex building, and the main steam isolation valve compartments, reactor trip switchgear rooms, and piping and electrical penetration areas.

The Turkey Point Units 6 and 7 COL FSAR, Section 9.4.2 incorporates by reference, with no departures or supplements, Section 9.4.2, “Annex/Auxiliary Buildings Nonradioactive HVAC System,” of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.6 the applicant provided the following:

Tier 2 Departures

- PTN DEP 18.8-1

The Operations Support Center (OSC) is being moved from the location identified in DCD Subsections 18.8.3.6, 12.5.2.2, and 12.5.3.2 and as identified on DCD figures in Subsections 1.2, 12.3, and Appendix 9A. There will be a single OSC for Units 6 and 7 located as described in the Emergency Plan.

The applicant provided additional information in Section 9.4.2 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 18.8-1 related to the OSC. This information is reviewed in Section 13.3 of this SER.

9.4.3 Radiologically Controlled Area Ventilation System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.2, “Spent Fuel Pool Area Ventilation System,” and C.I.9.4.3, “Auxiliary and Radwaste Area Ventilation System”)

The radiologically controlled area VBS maintains ventilation, permits personnel access, and controls the concentration of airborne radioactive material in the fuel handling area, the radiologically controlled areas of the auxiliary and annex buildings.

The Turkey Point Units 6 and 7 COL FSAR, Section 9.4 incorporates by reference, with no departures or supplements, Section 9.4.3, “Radiologically Controlled Area Ventilation System,” of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff’s technical evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.4.4 Balance-of-Plant Interface

This section is not applicable to AP1000.

9.4.5 Engineered Safety Features Ventilation System

This section is not applicable to AP1000.

9.4.6 Containment Recirculation Cooling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.5, “Engineered Safety Feature Ventilation System”)

The VCS provides a suitable and controlled environment for the containment building during normal plant operation and shutdown.

The Turkey Point Units 6 and 7 COL FSAR. Section 9.4 incorporates by reference, with no departures or supplements, Section 9.4.6, “Containment Recirculation Cooling System,” of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.4.7 Containment Air Filtration System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.5, “Engineered Safety Feature Ventilation System”)

9.4.7.1 Introduction

The containment air filtration system (VFS) serves no safety function, except containment isolation. The system conditions and filters outside air for the containment, the fuel handling

area, and the other radiologically controlled areas of the auxiliary and annex buildings, except for the hot machine shop and health physics areas, which are served by a separate VBS.

9.4.7.2 Summary of Application

Section 9.4 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.4 of the AP1000 DCD. Section 9.4 of the DCD includes Section 9.4.7, "Containment Air Filtration System," which addresses Section 9.4.5, "Engineered Safety Feature Ventilation System," of NUREG-0800.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 9.4.7.4, the applicant provided the following:

AP1000 COL Information Item

- STD COL 9.4-1a

The applicant provided additional information in STD COL 9.4-1a to address COL Information Item 9.4-1 related to a program for inspections and testing applicable to the VFS included under Section 9.4.7.4 of the Turkey Point Units 6 and 7 COL FSAR.

9.4.7.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the VFS are given in Section 9.4.5 of NUREG-0800.

The applicable regulatory guidance for the VFS is as follows:

- RG 1.140

9.4.7.4 Technical Evaluation

The staff reviewed Section 9.4.7 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the VFS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.4.7.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 9.4-1a*

The applicant provided additional information in STD COL 9.4-1a to resolve COL Information Item 9.4-1. COL Information Item 9.4-1 states:

The Combined License applicants referencing the AP1000 certified design will implement a program to maintain compliance with ASME AG-1, ASME N509, ASME N510, and Regulatory Guide 1.140 for portions of the nuclear island nonradioactive ventilation system and the containment air filtration system identified in subsection 9.4.1 and 9.4.7. The Combined License applicant will also provide a description of the MCR/TSC HVAC subsystem's recirculation mode during toxic emergencies, and how the subsystem equipment isolates and operates, as applicable, consistent with the toxic issues, including conformance with Regulatory Guide 1.78, to be addressed by the Combined License applicant as discussed in DCD subsection 6.4.7.

The commitment was also captured as COL Action Item 9.4.1-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will develop a program to maintain operability of the nuclear island nonradioactive ventilation system and the containment air filtration system.

The NRC staff reviewed STD COL 9.4-1a related to COL Action Item 9.4-1 included under Section 9.4.7.4 of the BLN COL FSAR.

The NRC staff reviewed the resolution to STD COL 9.4-1a on the proposed implementation of a program to maintain compliance with industry standards and RGs for the VFS included under Section 9.4.7.4 of the BLN COL FSAR, and concludes that this item has been resolved for the VFS because the applicant has appropriately referenced the applicable regulatory guide and industry standards.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from Section 9.4.7.4 of the BLN SER that requires correction. The BLN SER includes the following statement: “The NRC staff reviewed STD COL 9.4-1a related to COL Action Item 9.4-1 included under Section 9.4.7.4 of the BLN COL FSAR.” COL Action Item 9.4-1 does not exist and should be replaced with COL Information Item 9.4-1.

9.4.7.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.4.7.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In conclusion, the applicant has provided sufficient information for satisfying Section 9.4.7 of NUREG–0800 and RG 1.140 related to the applicable inspection and testing standards. This addresses STD COL 9.4-1a for the VFS.

9.4.8 Radwaste Building HVAC System

The radwaste building HVAC system serves the radwaste building, which includes the clean electrical/mechanical equipment room and the potentially contaminated HVAC equipment room, the packaged waste storage room, the waste accumulation room, and the mobile systems facility.

Section 9.4 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.8, “Radwaste Building HVAC System,” of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff’s technical evaluation of the information incorporated by

reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.4.9 Turbine Building Ventilation System

The turbine building VBS operates during startup, shutdown, and normal plant operations. The system maintains acceptable air temperatures in the turbine building for equipment operation and for personnel working in the building.

Section 9.4 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.9, “Turbine Building Ventilation System,” of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.4.10 Diesel Generator Building Heating and Ventilation System

The diesel generator building heating and VBS serves the standby diesel generator rooms, electrical equipment service modules, and diesel fuel oil day tank vaults in the diesel generator building and the two diesel oil transfer modules located in the yard near the fuel oil storage tanks. Local area heating and ventilation equipment is used to condition the air to the stairwell and security room.

Section 9.4 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.10, “Diesel Generator Building Heating and Ventilation System,” of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.4.11 Health Physics and Hot Machine Shop HVAC System

The health physics and hot machine shop HVAC system serves the annex building stairwell, S02; the personnel decontamination area; frisking and monitoring facilities; containment access corridor; and health physics facilities on the 100'-0" elevation of the annex building and the hot machine shop on the 107'-2" elevation of the annex building.

Section 9.4 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.11, “Health Physics and Hot Machine Shop HVAC System,” of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point

Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.5 Other Auxiliary Systems

9.5.1 Fire Protection System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.1, "Fire Protection Program")

9.5.1.1 *Introduction*

The FPS provides assurance, through a defense-in-depth philosophy, that the Commission's FP objectives are satisfied. These objectives are (1) to prevent fires from starting, (2) to detect rapidly, control, and extinguish promptly those fires that do occur, and (3) to provide protection for SSCs important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant. In addition, FPSs must be designed such that their failure or inadvertent operation does not adversely impact the ability of the SSCs important to safety to perform their safety functions. These objectives are stated in NUREG-0800, Section 9.5.1, "Fire Protection Program," and are identified as the FP Program goals and objectives in RG 1.189, "Fire Protection for Nuclear Power Plants."

9.5.1.2 *Summary of Application*

Section 9.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.5 of the AP1000 DCD. Section 9.5 of the AP1000 DCD includes Section 9.5.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.5.1 the applicant provided the following:

Departures

- PTN DEP 6.3-1

The applicant revised DCD Table 9.5.1-1, "AP1000 Fire Protection Program Compliance with BTP CMEB 9.5-1," Sheet 11 of 33, as new Turkey Point Units 6 and 7 COL FSAR, Table 9.5.1-1R, providing additional information about PTN DEP 6.3-1 related to quantifying the duration that the passive residual heat removal system heat exchanger can maintain safe shutdown conditions, changing the indefinite duration to greater than 14 days. This information, as well as related PTN DEP 6.3-1 information appearing in other chapters of the Turkey Point Units 6 and 7 COL FSAR is reviewed in Section 21.1 of the SER.

- PTN DEP 18.8-1

The applicant provided this departure from the AP1000 DCD to address the relocation of the OSC. This departure is evaluated both in this SER section and in SER Section 13.3.

AP1000 COL Information Items

- STD COL 9.5-1 and STD COL 9.5-3

The applicant provided additional information in STD COL 9.5-1 and STD COL 9.5-3 to resolve COL Information Items 9.5-1 and 9.5-3 (COL Action Item 9.5.1-1(a) through 9.5.1-1(o)) by establishing the site-specific implementation of the fire protection program in Section 9.5.1.8, “Fire Protection Program,” and in Appendix 9A of the Turkey Point Units 6 and 7 COL FSAR.

- STD COL 9.5-4

The applicant provided additional information in STD COL 9.5-4 to resolve COL Information Item 9.5-4 (COL Action Item 9.5.1-5) by establishing Table 9.5-201, “AP1000 Fire Protection Program Compliance with BTP CMEB 9.5-1,” and Table 9.5-202, “Exceptions to NFPA Standard Requirements,” of the Turkey Point Units 6 and 7 COL FSAR.

- STD COL 9.5-6

The applicant provided additional information in STD COL 9.5-6 to resolve COL Information Item 9.5-6 (COL Action Item 9.5.1-6) by specifying a preoperational testing program to verify field-installed fire barriers are as tested, and to provide disposition for any deviation.

- STD COL 9.5-8

The applicant provided additional information in STD COL 9.5-8 to resolve COL Information Item 9.5-8 (COL Action Item 9.5.1-3) by establishing an administrative control procedure to address fire barrier breaches.

- PTN COL 9.5-1

The applicant provided additional information in PTN COL 9.5-1 to resolve COL Information Item 9.5-1 for plant-specific fire protection issues in Turkey Point Units 6 and 7 COL FSAR Section 13.1.2.1.3.9.

- PTN COL 9.5-2

The applicant provided additional information in PTN COL 9.5-2 to resolve COL Information Item 9.5-2 (COL Action Item 9.5.1-2) by providing site-specific fire hazard analysis of the yard area and outlying buildings in Turkey Point Units 6 and 7 COL FSAR, Appendix 9A, Section 9A.3.3.

Supplemental Information

- STD SUP 9.5-1

The applicant provided supplemental information in Section 9.5.1.2.1.3, “Fire Water Supply System,” by adding additional text to address the piping threads compatibility requirement between onsite hydrants, hose couplings, and standpipe risers and equipment used by the offsite fire department.

License Conditions

- Part 10, License Condition 3, Items C.2, D.1, and G.6

The applicant proposed a license condition in Part 10 of the Turkey Point Units 6 and 7 COL application addressing the Fire Protection Program implementation milestones.

- Part 10, License Condition 6

The applicant proposed a license condition in Part 10 of the Turkey Point Units 6 and 7 COL application to provide a schedule to support the staff's inspection of operational programs, including the Fire Protection Program.

9.5.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the FPS are given in Section 9.5.1 of NUREG-0800.

The regulatory basis for acceptance of STD COL 9.5-1, STD COL 9.5-3, STD COL 9.5-4, STD COL 9.5-6, STD COL 9.5-8, PTN COL 9.5-1, and PTN COL 9.5-2 includes the following:

- RG 1.189
- Branch Technical Position Chemical Engineering Branch (BTP CMEB) 9.5-1, in NUREG-0800, Revision 3
- 10 CFR 50.48, "Fire Protection"

The regulatory basis for acceptance of STD SUP 9.5-1 includes the following:

- RG 1.189

9.5.1.4 Technical Evaluation

The staff reviewed Section 9.5.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the fire protection system. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard

content that were documented in the SER for the reference COL application (VEGP Units 3 and 4 COL application) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced ² from Section 9.5.1.4 of the VEGP SER:

Supplemental Information

- *STD SUP 9.5-1 provided supplemental information within Section 9.5.1.2.1.3, "Fire Water Supply System," addressing compatibility of piping threads with equipment used by the off-site fire department.*

The NRC staff reviewed the information on the compatibility of piping threads with off-site equipment included under Section 9.5.1.2.1.3 of the BLN COL, and determined that the applicant conforms to the guidance of RG 1.189. In accordance with the applicant's response to RAI 14.2-9, the requirement to verify fire equipment hose thread compatibility, or alternatively, an adequate supply of readily available thread adapters will be verified. This was added to the Initial Test Program outlined in Section 14.2 of the BLN COL FSAR.

AP1000 COL Information Items

- *STD COL 9.5-1 (COL Action Item 9.5-1(a)), involving qualification requirements for the fire protection program*

² Only the BLN SER text relevant to PTN is reproduced here. For example, the BLN SER included a discussion of BLN SUP 9.5-2 after the discussion of STD SUP 9.5-1. Since BLN SUP 9.5-2 does not apply to Virgil C. Summer Nuclear Station (VCSNS), it was not reproduced here. Also, the discussion of PTN COL 9.5-2 (corresponds to BLN COL 9.5-2) was moved to the end of this technical evaluation section.

The applicant provided additional information in STD COL 9.5-1 to resolve COL Information Item 9.5-1. COL Information Item 9.5-1 states:

The Combined License applicant will address qualification requirements for individuals responsible for development of the fire protection program, training of firefighting personnel, administrative procedures and controls governing the fire protection program during plant operation, and fire protection system maintenance.

The commitment was also captured as COL Action Item 9.5-1(a) in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will establish a fire protection program at the facility for the protection of structures, systems, and components (SSCs) important to safety. The COL applicant will also establish the procedures, equipment, and personnel needed to implement the program.

The NRC staff reviewed the resolution to STD COL 9.5-1 on the qualification requirements for the Fire Protection Program included under Section 9.5.1.6, Section 9.5.1.8, and Section 9.5.1.9 of the BLN COL application, and determined that the above sections provided adequate details to ensure conformance with the regulatory positions contained in RG 1.189 regarding the implementation of the BLN Fire Protection Program. Such details include personnel qualifications and training, organization and responsibilities, fire brigade training, etc.

- *STD COL 9.5-3 (COL Action Items 9.5.1-1(b) through 9.5.1-1(o)), addressing regulatory conformance*

The applicant provided additional information in STD COL 9.5-3 to resolve COL Information Item 9.5-3. COL Information Item 9.5-3 states:

The Combined License applicant will address BTP CMEB 9.5-1 issues. The acronym 'WA' is the identifier in Table 9.5.1-1 for "will address."

The commitment was also captured as COL Action Items 9.5.1-1(b) through 9.5.1-1(o) in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

9.5.1-1(b) – The COL applicant will implement the fire protection program prior to receiving fuel onsite for fuel storage areas, and for the entire unit prior to reactor startup.

9.5.1-1(c) – The COL applicant will establish administrative controls to maintain the performance of the fire protection system and personnel.

9.5.1-1(d) – The COL applicant will establish a site fire brigade that is trained and equipped for fire fighting to ensure adequate manual fire fighting capability for all plant areas containing SSCs important to safety.

9.5.1-1(e) – The COL applicant will establish a quality assurance (QA) program to ensure that the guidelines for the design, procurement, installation, and testing, as well as the administrative controls for fire protection systems are satisfied.

9.5.1-1(f) – The COL applicant is responsible for the inspection and maintenance of fire doors, access to keys for the fire brigade, and the marking of exit routes.

9.5.1-1(g) – The COL applicant is responsible for the collection and sampling of water drainage from areas that may contain radioactivity.

9.5.1-1(h) – The COL applicant is responsible for controlling the use of compressed gases inside structures.

9.5.1-1(i) – The COL applicant is responsible for the use of portable radio communication by the plant fire brigade.

9.5.1-1(j) – The COL applicant is responsible for fire protection inside containment during refueling and maintenance.

9.5.1-1(k) – The COL applicant is responsible for controlling combustible materials in the remote shutdown workstation.

9.5.1-1(l) – The COL applicant is responsible for fire protection for cooling towers.

9.5.1-1(m) – The COL applicant is responsible for the proper storage of welding gas cylinders.

9.5.1-1(n) – The COL applicant is responsible for the proper storage of ion exchange resins.

9.5.1-1(o) – The COL applicant is responsible for the proper storage of hazardous chemicals.

The NRC staff reviewed the resolution to STD COL 9.5-3 provided in Section 9.5.1.8, Fire Protection Program, and Table 9.5-201 of the BLN COL application. The staff determined that the applicant has incorporated the appropriate portions of RG 1.189 into the BLN Fire Protection Program, pending some changes to be included in Revision 2 to the BLN COL FSAR. The applicant provided the following clarifications related to the BLN Fire Protection Program:

- (1) *The applicant confirmed that no operator manual actions outside of the Main Control Room are credited or required for post-fire safe shutdown.*
- (2) *The applicant stated that the wireless telephone system is credited as the portable communication system used by the fire brigade. In the applicant's response to RAI 9.5.1-12, the wireless telephone system was confirmed to be designed with multiple antennas (repeaters) throughout the plant to maintain communication capability if individual repeater(s) are damaged from fire. Also, preoperational and periodic testing during fire drills will be performed to verify that the fire brigade portable communication system operates without excessive interference at different locations inside and outside the plant.*
- (3) *In its response to RAI 9.5.1-9, the applicant stated that a housekeeping program is provided in order to maintain cleanliness and minimize fire hazards in the Main Control Room areas.*
- (4) *In its response to RAI 9.5.1-14, the applicant stated that no probabilistic risk assessment (PRA) or fire modeling results will be credited to demonstrate acceptable fire hazards or post-fire safe shutdown capability for specific fire areas or scenarios.*
- (5) *In its response to RAI 9.5.1-15, the applicant confirmed that the supply of reserve air is sufficient to provide at least 6 hours of additional breathing air for "each" of the 10 self-contained breathing apparatus (SCBA) units.*
- (6) *In its response to RAI 9.5.1-16, the applicant proposed a change to BLN COL FSAR Section 9.5.1.8.6 to clarify that testing and inspection of fire protection systems are to be performed per NFPA 25 and NFPA 72 as appropriate. This is **Confirmatory Item 9.5-1**.*
- (7) *In its response to RAI 9.5.1-17, the applicant confirmed that the design pressure of the High Pressure Air Subsystem that is used to recharge fire brigade's SCBAs is 4000 psig, and that 2216 psig SCBAs are used to ensure that the cylinders are adequately charged to provide an operating life of at least 30 minutes.*

- *STD COL 9.5-4 (COL Action Item 9.5.1-5), involving NFPA exceptions*

The applicant provided additional information in STD COL 9.5-4 to resolve COL Information Item 9.5-4. COL Information Item 9.5-4 states:

The Combined License applicant will address updating the list of NFPA exceptions in the plant-specific DCD, if necessary.

The commitment was also captured as COL Action Item 9.5.1-5 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant is responsible for ensuring that any deviations from the applicable National Fire Protection Association (NFPA) codes and standards in addition to those in the DCD are incorporated into the final safety analysis report (FSAR) with appropriate technical justification.

The NRC staff reviewed the resolution to STD COL 9.5-4 under Section 9.5.1.8.1.1 and Section 9.5.1.9.4 of the BLN COL. The applicant provided for BLN COL FSAR Table 9.5-202, "Exceptions to NFPA Standard Requirement," to document and justify deviations from applicable NFPA codes and standards in addition to those identified in the DCD. This provision satisfies FSER Action Item 9.5.1-5. The staff also reviewed the exception to NFPA 804 related to the intake structure as documented in Table 9.5-202 although NFPA 804 is not formally endorsed by the NRC as a regulatory guidance document. Since the exception and the provided justification are consistent with the guidance of RG 1.189, the staff finds it acceptable. Based on the above, the staff concludes that FSER Action Item 9.5.1-5 is resolved.

- *STD COL 9.5-6 (COL Action Item 9.5.1-6), involving verification of field installed fire barriers, also designated as a COL information item*

The applicant provided additional information in STD COL 9.5-6 to resolve COL Information Item 9.5-6. COL Information Item 9.5-6 states:

The Combined License applicant will address the process for identifying deviations between the as-built installation of fire barriers and their tested configurations.

The commitment was also captured as COL Action Item 9.5.1-6 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will establish the process for identifying deviations between the as-built installation of fire barriers and their tested configurations.

The NRC staff reviewed the resolution to STD COL 9.5-6 under Section 9.5.1.8.6 and Section 9.5.1.9.6. The applicant provided that new installation or modification of fire barriers not part of the AP1000 DCD will be controlled through administrative procedures. These procedures impose inspection and testing requirements to ensure that the as-built fire barrier configurations match tested configurations. These procedures also describe the process for identifying and dispositioning deviations. Based on the above, the staff concluded that FSER Action Item 9.5.1-6 is resolved.

- *STD COL 9.5-8 (COL Action Item 9.5.1-3), establishing procedures to minimize risk for fire areas breached during maintenance*

The applicant provided additional information in STD COL 9.5-8 to resolve COL Information Item 9.5-7. COL Information Item 9.5-7 states:

The Combined License applicant will establish procedures to minimize risk when fire areas are breached during maintenance. These procedures will address a fire watch for fire areas breached during maintenance.

The commitment was also captured as COL Action Item 9.5.1-3 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will establish procedures to address a fire watch for fire areas breached during maintenance.

The NRC staff reviewed the resolution to STD COL 9.5-8 on the establishment of procedures to minimize risk for fire areas breached during maintenance included under Section 9.5.1.8.1.2 and Section 9.5.1.9.7 of the BLN COL, and determined that the applicant has adequately included a provision to have procedures and administrative controls in place, including fire watches, when fire barriers are breached.

License Conditions

- *License Condition 3, addressing the Fire Protection Program implementation milestones*
- *License Condition 6, addressing the Fire Protection Program implementation schedule*

In Part 10 of the BLN COL FSAR, License Condition 3, "Operational Program Implementation," the applicant proposed a license condition for the implementation of operational programs as described in Table 13.4-201 of the FSAR. This license condition included implementation milestones for the Fire Protection Program, namely D.1 and G.6. Specifically:

- *Milestone D.1 states that the applicable portions of the Fire Protection Program will be implemented prior to initial receipt of fuel onsite.*
- *Milestone G.6 states that the Fire Protection Program will be implemented prior to initial fuel load.*

In Part 10 of the BLN COL FSAR, proposed License Condition 6, "Operational Program Readiness," the applicant states:

The licensee shall submit to the appropriate Director of the NRC, a schedule, no later than 12 months after issuance of the COL, that supports planning for and conduct of the NRC inspection of the operational programs listed in the operation program

FSAR Table 13.4-201. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operation programs in the FSAR table have been fully implemented or the plant has been placed in commercial service.

Based on the above, the staff concludes that the applicant satisfied the documentation and implementation requirements for the Fire Protection Program in accordance with RG 1.189 by identifying and providing the implementation schedule for each of the operational program aspects of the Fire Protection Program.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from Section 9.5.1.4 of the BLN SER that requires correction. The BLN SER includes the following statement: "The applicant provided additional information in STD COL 9.5-8 to resolve COL Information Item 9.5-7. COL Information Item 9.5-7 states:" The reference to COL Information Item 9.5-7 should be to COL Information Item 9.5-8.

Resolution of Standard Content Confirmatory Item 9.5-1

To resolve Confirmatory Item 9.5-1, the VEGP applicant revised FSAR Section 9.5.1.8.6 to clarify that procedures governing the inspection, testing, and maintenance of fire protection alarm and detection systems, and water-based suppression and supply systems, use the guidance of NFPA 72 and NFPA 25 as appropriate. NFPA 25 standard is also added to VEGP COL FSAR Section 9.5.5. The staff determined that these documentation changes satisfy the requirement of standard content Confirmatory Item 9.5-1; therefore Confirmatory Item 9.5-1 is resolved.

Proposed License Condition 3, Item C.2

The VEGP applicant proposed to add another implementation milestone associated with the Fire Protection System to License Condition 3. Specifically, the applicant added Milestone C.2, which states that the applicable portions of the Fire Protection Program will be implemented prior to initial receipt of byproduct, source, or special nuclear materials onsite (excluding Exempt Quantities as described in 10 CFR 30.18). The staff concludes that the applicant satisfied the documentation and implementation requirements for the Fire Protection Program in accordance with RG 1.189 by identifying and providing the implementation schedule for each of the operational program aspects of the Fire Protection Program.

AP1000 COL Information Item

- PTN COL 9.5-1 (COL Information Item 9.5-1)

The applicant provided additional information in PTN COL 9.5-1 to resolve COL Information Item 9.5-1 for plant-specific fire protection issues. These plant-specific issues include:

- the responsibilities of the engineer in charge of fire protection and his staff
- the organization of the fire brigade
- the engineer in charge of fire protection being responsible for the formulation and implementation of the fire protection program and meeting the qualification requirements listed in Turkey Point Units 6 and 7 COL FSAR, Section 13.1.2.1.3.9

The staff reviewed the resolution of PTN COL 9.5-1 on the associated plant-specific fire protection issues and determined that the issues have been acceptably resolved by information provided in Turkey Point Units 6 and 7 COL FSAR, Sections 9.5 and 13.1.2.1.3.9.

- PTN COL 9.5-2 (COL Action Item 9.5.1-2), involving fire protection analysis information

The applicant provided additional information in PTN COL 9.5-2 to resolve COL Information Item 9.5-2. COL Information Item 9.5-2 states:

The combined license applicant will provide site-specific fire protection analysis information for the yard area, the administration building, and for other outlying buildings consistent with Appendix 9A.

The commitment was also captured as COL Action Item 9.5.1-2 in Appendix F of NUREG-1793, which states:

The COL applicant will provide site-specific fire protection analysis information for the yard area, the administration building, and other outlying buildings.

The staff reviewed the resolution to PTN COL 9.5-2 on the site-specific fire protection analysis information included under Section 9.5.1.9.2 and Section 9A.3.3 of the Turkey Point Units 6 and 7 COL FSAR and determined that the yard area, administration building, and other outlying areas are adequately described in the fire hazard analysis in accordance with RG 1.189, which is therefore acceptable.

Resolution of PTN DEP 18.8-1

The AP1000 annex building does not contain any system or equipment credited for achieving and maintaining post-fire safe shutdown. As such, the relocation of the OSC in the annex building as prescribed in PTN DEP 18.8-1 has no adverse impact on the post-fire safe shutdown capability. Therefore, the staff concludes that the proposed departure, relative to post-fire safe shutdown capability, is acceptable.

9.5.1.5 Post-Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

- License Condition (9-2) – The licensee shall implement the Fire Protection Program or applicable portions thereof as described in the milestones below:
 1. The fire protection measures in accordance with RG 1.189 for designated storage building areas (including adjacent fire areas that could affect the storage area) implemented before initial receipt of byproduct or special nuclear materials that are not fuel (excluding exempt quantities as described in 10 CFR 30.18);
 2. The fire protection measures in accordance with RG 1.189 for areas containing new fuel (including adjacent areas where a fire could affect the new fuel) implemented before receipt of fuel onsite;
 3. All fire protection program features implemented before initial fuel load;
- License Condition (9-3) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the NRO a schedule that supports planning for and conduct of NRC inspections of the FP Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the FP Program has been fully implemented.

9.5.1.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidance in Section 9.5.1 of NUREG-0800 and RG 1.189. The staff based its conclusion on the following:

- PTN DEP 6.3-1, related to quantifying the duration that the passive residual heat removal system heat exchanger can maintain safe shutdown conditions, is reviewed and found acceptable by the staff in Section 21.1 of this SER.
- PTN DEP 18.8-1, regarding the relocation of the OSC relative to the post-fire safe shutdown capability, is adequately addressed by the applicant and is resolved.

- STD SUP 9.5-1, addressing compatibility of piping threads with equipment used by the offsite fire department, is adequately addressed by the applicant and is resolved.
- STD COL 9.5-1, addressing the qualification and training requirements for the fire protection program at Turkey Point Units 6 and 7, is adequately addressed by the applicant and is resolved.
- STD COL 9.5-4, addressing the deviations from the applicable NFPA codes and standards and to those in the AP1000 DCD, is also adequately addressed by the applicant and is resolved.
- STD COL 9.5-6, addressing the establishment of a process for identifying deviations between the as-built installation of fire barriers and their tested configurations, is adequately addressed by the applicant and is resolved.
- STD COL 9.5-8, addressing establishment of procedures to minimize risk for fire areas breached during maintenance, is adequately addressed by the applicant and is resolved.
- STD COL 9.5-3, addressing the site-specific implementation of the Fire Protection Program, is adequately addressed by the applicant and is resolved.
- PTN COL 9.5-1, addressing site-specific fire protection issues, is adequately addressed by the applicant and is resolved.
- PTN COL 9.5-2, regarding the site-specific fire protection analysis information for the Turkey Point Units 6 and 7 yard areas and outlying buildings, is adequately addressed by the applicant and is resolved.

9.5.2 Communication System

9.5.2.1 Introduction

The communication system provides intra-plant communications and plant-to-offsite communications during normal, maintenance, transient, fire, and accident conditions, including loss of offsite power (LOOP).

9.5.2.2 Summary of Application

Section 9.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.5 of the AP1000 DCD. Section 9.5 of the AP1000 DCD includes Section 9.5.2, which the Turkey Point Units 6 and 7 COL application references without departures.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 9.5.2, the applicant provided the following:

AP1000 COL Information Items

- PTN COL 9.5-9, involving offsite interfaces

The applicant provided additional information in PTN COL 9.5-9 to resolve COL Information Item 9.5-9 (COL Action Item 9.5.2-3).

- PTN COL 9.5-10, involving emergency offsite communications

The applicant provided additional information in PTN COL 9.5-10 to resolve COL Information Item 9.5-10 (COL Action Item 9.5.2-1).

- STD COL 9.5-11, involving security communications

The applicant provided additional information in STD COL 9.5-11 to resolve COL Information Item 9.5-11 (COL Action Item 9.5.2-2).

9.5.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the communications system are given in Section 9.5.2 of NUREG–0800.

The regulatory basis for PTN COL 9.5-9, addressing interfaces to offsite locations, is based on:

- 10 CFR Part 50, Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities,” Subpart IV.E(9), “Emergency Planning and Preparedness for Production and Utilization Facilities”)

The regulatory basis for PTN COL 9.5-10, addressing the emergency offsite communication system, including the crisis management radio system, is based on:

- 10 CFR 50.47(b)(8), “Emergency Plans – Adequate Facilities and Equipment”

The regulatory basis for STD COL 9.5-11, addressing the description of the security communication system, is based on:

- 10 CFR 73.45(g)(4)(i), “Performance capabilities for fixed site physical protection systems-response”
- 10 CFR 73.46(f), “Fixed site physical protection systems, subsystem, components, and procedures-communications subsystems”

- 10 CFR 73.55(e), “Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage-physical barriers”
- 10 CFR 73.55(f), “Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage-target sets”

9.5.2.4 Technical Evaluation

The staff reviewed Section 9.5.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff review of this application is limited to information items described in Sections 9.5.2.2.5 through 9.5.2.5.3 of the Turkey Point Units 6 and 7 COL FSAR. On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the communications system. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 9.5.2.2.5, the applicant provided the following:

AP1000 COL Information Items

- PTN COL 9.5-9

In PTN COL 9.5-9 the applicant provided additional information via its Emergency Plan to resolve COL Information Item 9.5-9. COL Information Item 9.5-9 states:

Combined license applicants referencing the AP1000 certified design will address interfaces to required offsite locations; this will include addressing the recommendations of BL-80-15 ([DCD] Reference 21) regarding loss of the emergency notification system due to a loss of offsite power.

The commitment was also captured as COL Action Item 9.5.2-3 in Appendix F of NUREG-1793, which states:

The COL applicant will address interfaces to offsite locations; this will include addressing the recommendations of NRC Bulletin (BL) 80-15 regarding loss of the emergency notification system as a result of loss of offsite power.

The staff reviewed PTN COL 9.5-9, which is included under Section 9.5.2.5.1 of the Turkey Point Units 6 and 7 COL FSAR, concerning offsite interfaces. Section 9.5.2.5.1 of the Turkey Point Units 6 and 7 COL FSAR states the Emergency Plan describes offsite interfaces to address PTN COL 9.5-9. Table 1.6-201 of the Turkey Point Units 6 and 7 COL FSAR maps the Emergency Plan to Turkey Point Units 6 and 7 COL FSAR, Section 13.3. Part 5, Section F, of the Emergency Plan, Revision 4, presents the methods used for emergency communications, including offsite interfaces.

The following excerpt from the Emergency Plan identifies communication equipment along with planned use:

- (1) **Plant Page System:** The Plant Page System is a public address system with speakers and handsets located throughout the plant, including the Control Rooms and TSC. The system provides for transmission of warning and instructions in the event of an emergency. Plant alarms are broadcast over the Plant Page System. The system is primarily used for intra-plant communications and permits merging with and separation from other units of the plant. Power to the system is supplied from a variety of sources, and an alternate power supply is provided.
- (2) **Private Branch Exchange (PBX) Telephone System:** The PBX telephone system provides communication capability between telephones located in the Turkey Point facilities through direct dialing. The PBX is used to connect the affected unit's Control Room, TSC, OSC, EOF and ENC. The PBX telephone system also provides for outside communications through interconnections with the FPL Intelligent Tandem Network (ITN) corporate telephone communications system and local commercial telephone lines. This system may be utilized as a secondary communication link to the county governments. Power to the PBX is provided from non-Class 1E dc and uninterruptible power supply system.
- (3) **Local Commercial Telephone System:** This system provides standard commercial telephone service which is installed by the local telephone company for normal dial telephone service in the plant. This system includes connections to the PBX and FPL ITN System, dedicated lines to emergency response facilities, and is the primary system for routine communication with areas outside the plant. This system may be utilized as a secondary communication link to the county governments. The commercial vendor provides primary and secondary power for their lines.
- (4) **FPL Intelligent Tandem Network (ITN) System:** The ITN System can be accessed in most plant locations and allows direct dial capability to company office locations, access to Wide Area Telephone Services (WATS) line, and local telephone calls.
- (5) **State Hot Ring Down Telephone:** The state hot ring down is a dedicated communications system that has been installed for the purpose of notifying state and county authorities of declared emergencies at Turkey Point. This system links together the Control Rooms, TSC, EOF and state and county government agencies as appropriate and is the primary means of communication.
- (6) **Emergency Satellite Communication System (EMNET):** EMNET is an emergency satellite communication system that is available in the Control Rooms, TSC, and EOF. The initial notification of all emergencies and other required notifications to the State Division of Emergency Management (DEM) and the County's Department of Public Safety will

be made via the Hot Ring Down telephone with EMNET as the alternate communications pathway.

- (7) **Automated ERO Callout System**: Turkey Point uses an automated callout system that employs pagers and telephones to notify the ERO. If the callout system fails, plant personnel may be required to manually activate the ERO group page feature and/or directly callout ERO personnel.
- (8) **Dedicated Phone Lines**: A dedicated phone link is established by limiting a phone line to one purpose, blocking its use for all other purposes. Several dedicated telephone links have been established for use by the ERO to perform key communication tasks.
- (9) **Satellite Telephones**: This satellite system is a portable satellite phone with international calling capabilities. The system is capable of communication with any telephone (public network, cellular, satellite, etc.). This system is available to Control Room, TSC, and EOF personnel and provides a backup or secondary communication link in the event that the landlines are rendered inoperative.
- (10) **Company Radio System**: Radio systems are provided for offsite communication with other FPL facilities and government agencies. This radio system consists of a variety of fixed base radio equipment. The system operations power coordinator's office, trouble dispatcher offices, service centers, power plants, and mobile service vehicles are equipped with one or more of these radio systems. The radio may be used to communicate with the EOF System Operations, Storm Headquarters, and other FPL facilities and mobile units throughout Miami-Dade County, including the EOC. The radio may be used for longer range communications to the EOF and FPL Corporate Offices in Juno Beach. A repeater channel for plant use is also available to DOH-BRC for communication with emergency response teams and/or from the Mobile Emergency Radiological Laboratory (MERL) sites. In addition, the U.S. Coast Guard and NOAA Weather Radio Channels are also available on the systems for emergency communications, as required, and to monitor weather conditions and receive weather advisories. In the event of interruption of onsite electric service to the base radio stations, backup power is available to equipment.
- (11) **900 Megahertz Radio System**: The 900 megahertz radio system is available to supplement fixed communications in the plant and is used for Field Monitoring Team communications. This system consists of necessary hardware to allow radio communication between the affected unit Control Room, EOF and mobile units in FPL vehicles. Commercial cell phones are available as backup to the primary field team communications system. This radio system also provides the ability to be used as a crisis management radio system.

The following excerpt from the Emergency Plan identifies phone lines dedicated for NRC communications along with planned use.

- (1) **Emergency Notification System (ENS)**: The ENS is used for initial notification from the plant to the NRC, as well as ongoing information on plant systems, status, and parameters. The ENS is located in each Control Room, the TSC, and EOF. A separate line is available in the EOF with the capability of being patched with the plant through the NRC. Backup power is provided for these lines, which complies with the requirements of NRC BL 80-15 regarding LOOP to the ENS.
- (2) **Health Physics Network (HPN)**: The HPN is used to transmit information to the NRC regarding radiological conditions (in-plant and offsite), meteorological conditions, and assessment of trends and needs for protective measures onsite and offsite. The HPN is located in the TSC and EOF and may be used as an open communication line with the NRC. Backup power is provided for these lines.
- (3) **Reactor Safety Counterpart Link (RSCL)**: This system allows for internal NRC discussions regarding plant and equipment conditions. RSCL lines are located in the TSC and EOF.
- (4) **Protective Measures Counterpart Link (PMCL)**: This system allows for conduct of internal NRC discussions on radiological releases, meteorological conditions, and protective measures. PMCL lines are located in the TSC and EOF.
- (5) **Management Counterpart Link (MCL)**: This system has been established for internal discussions between the NRC executive team director/members and the NRC Site Team Director or FPL management. MCL lines are located in the TSC and EOF.
- (6) **Emergency Response Data System (ERDS)**: As prescribed by 10 CFR 50 Appendix E.VI, ERDS will supply the NRC with selected plant data points on a near real-time basis. ERDS is activated by the ERO as soon as possible but not later than 1 hour after declaration of an *Alert, Site Area Emergency, or General Emergency*. The selected data points are transmitted via modem to the NRC at approximately 1-minute intervals. The ERO has backup methods available to provide required information to the NRC in the event that ERDS is inoperable during the declared emergency.

Appendix E to 10 CFR Part 50, Section IV.E (9), requires at least one onsite and one offsite communications system; each system shall have a backup power source. The applicant has stated that the PBX telephone system is powered by a “non-Class 1E dc and uninterruptible power supply”; power for the commercial telephone system is provided by the commercial vendor. In addition, NRC BL 80-15, “Possible Loss of Emergency Notification System (ENS) with Loss of Offsite Power,” states that the applicant should provide backup power sources for the ENS in case of LOOP. The applicant states that backup power is provided for the ENS, which conforms to the requirements of NRC BL 80-15.

On February 4, 2011, the staff sent RAI Question 09.05.02-1, requesting further details on the primary and secondary means of communications between the plant (CR and TSC) and State/local governments, Federal emergency response organizations (EROs), the emergency operations facility (EOF), the staff, the emergency operations centers (EOCs), and the field assessment teams, and for this information to be added to the FSAR or the Emergency Plan or both. In the letter dated March 3, 2011, the applicant provided its response to RAI 5192, Question 09.05.02-1 (ADAMS Accession No. ML110660200). The applicant response provides a more detailed description of the emergency response communications, including each party, organizational titles, initial notification paths, and primary and alternate methods of communications among the parties. Additionally, the response states the applicant would enhance its Emergency Plan to incorporate these details.

The applicant incorporated the additional details it had identified in the letter response within Emergency Plan, Revision 3, and these changes remain in Revision 4. As such, the Emergency Plan identifies the primary and secondary means of communication. The staff finds the applicant's response acceptable and that the applicant has demonstrated sufficient means for onsite and offsite communications, with adequate backup power sources, to meet the requirements of Appendix E to 10 CFR Part 50, Part IV.E(9). The staff also finds that the use of a battery system and a diesel generator to provide backup power to the ENS, in case of LOOP, adequately addresses NRC BL 80-15. Therefore, the staff concludes that COL Action Item 9.5-9 has been adequately addressed and RAI Question 09.05.02-1 is resolved.

- PTN COL 9.5-10

The applicant provided additional information in PTN COL 9.5-10 to resolve COL Information Item 9.5-10. COL Information Item 9.5-10 states:

The emergency offsite communication system, including the crisis management radio system, will be addressed by the combined license applicant.

The commitment was also captured as COL Action Item 9.5.2-1 in Appendix F of NUREG-1793, which states:

The COL applicant will provide a description of the emergency offsite communication system, including the crisis management radio system.

The staff reviewed PTN COL 9.5-10, which is included under Section 9.5.2.5.2 of the Turkey Point Units 6 and 7 COL FSAR, concerning the emergency offsite communication system and the crisis management radio system. The staff addressed offsite communications interfaces under its review of PTN COL 9.5-9 in this evaluation. Section 9.5.2.5.2 of the Turkey Point Units 6 and 7 COL FSAR states the Emergency Plan describes emergency offsite communications to address PTN COL 9.5-10. Table 1.6-201 of the Turkey Point Units 6 and 7 COL FSAR maps the Emergency Plan to Turkey Point Units 6 and 7 COL FSAR, Section 13.3.

On February 4, 2011, the staff sent RAI 5192, Question 09.05.02-1, in which the staff requested additional clarification as to the design of the site's crisis management radio system. In the letter, dated March 3, 2011, the applicant provided its response to RAI 5192, Question 09.05.02-1 (ML110660200). The applicant response provides a more detailed description of the

crisis management radio system including the use of the 900 Megahertz Radio System. Additionally, the response states the applicant would enhance its Emergency Plan to incorporate these details.

The applicant incorporated the additional details it had identified in the letter response within Emergency Plan, Revision 3. The changes to the Emergency Plan provide a more detailed description of the 900 Megahertz Radio System and identify its use as a crisis management radio system.

Section 50.47(b)(8) of 10 CFR requires provisions and maintenance of adequate emergency facilities and equipment to support the emergency response. As discussed in the evaluation of PTN COL 9.5-9, the staff finds the offsite communications systems provide adequate emergency communications equipment and facilities to meet the requirements of 10 CFR 50.47(b)(8). Furthermore, the staff finds the 900 Megahertz Radio System adequately serves as the crisis management radio system. Therefore, the staff concludes that COL Action Item 9.5.2-1 has been adequately addressed.

- **STD COL 9.5-11**

The applicant provided additional information in STD COL 9.5-11 to resolve COL Information Item 9.5-11. COL Information Item 9.5-11 states:

This COL item is addressed in the Physical Security Plan.

The commitment was also captured as COL Action Item 9.5.2-2 in Appendix F of NUREG-1793, which states:

The COL applicant will provide a description of the security communication system.

Table 1.6-201 of the Turkey Point Units 6 and 7 COL FSAR maps the Physical Security Plan to Turkey Point Units 6 and 7 COL FSAR, Section 13.6. The NRC Office of Nuclear Security and Incident Response evaluates compliance with 10 CFR 73.55(e) and 10 CFR 73.55(f) as part of its review of Physical Security for Turkey Point Units 6 and 7 COL FSAR, Section 13.6.

Therefore, the staff's review of STD COL 9.5-11, which relates to security communications, is provided under Section 13.6 of this SER, and Section 13.6 of this SER provides the staff's evaluation of the applicant's resolution of STD COL 9.5-11.

9.5.2.5 *Post-Combined License Activities*

There are no post-COL activities related to this section.

9.5.2.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidelines given in Section 9.5.2 of NUREG-0800. The staff based its conclusion on the following:

- PTN COL 9.5-9, has been adequately addressed by the applicant in that the onsite and offsite communications interfaces meet the communications requirements of 10 CFR Part 50, Appendix E, Section IV.E(9). In addition, the staff finds the use of a battery system and a diesel generator to provide backup power for the ENS in case of LOOP meets the guidance in NRC BL 80-15.
- PTN COL 9.5-10, has been adequately addressed by the applicant in that the Turkey Point Units 6 and 7 emergency offsite communications system, including the crisis management radio system, is capable of providing for notification of personnel and implementation of evacuation procedures in case of emergency and meets the requirements of 10 CFR 50.47(b)(8).
- STD COL 9.5-11, which involves security communications, is documented in Section 13.6 of this SER.

9.5.3 Plant Lighting System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.3, "Lighting Systems")

The plant lighting system provides normal, emergency, panel, and security lighting. The normal lighting provides normal illumination during plant operating, maintenance, and test conditions. The emergency lighting provides illumination in areas where emergency operations are performed upon loss of normal lighting. The panel and security lighting is designed to provide the minimum illumination required.

Section 9.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.5.3, "Plant Lighting System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.5.4 Diesel Generator Fuel Oil System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.4, "Diesel Generator Fuel Oil Storage and Transfer System")

9.5.4.1 Introduction

The standby diesel generator fuel oil system maintains the fuel oil system for the diesel engines that provide backup onsite power. This system includes all piping up to the connection to the engine interface, fuel oil storage tanks, fuel oil transfer pumps, day tanks, and the tank storage vaults.

9.5.4.2 Summary of Application

Section 9.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.5 of the AP1000 DCD. Section 9.5 of the AP1000 DCD includes Section 9.5.4.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.5.4.5.2, the applicant provided the following:

AP1000 COL Information Item

- STD COL 9.5-13

The applicant provided additional information in STD COL 9.5-13 to resolve fuel oil sampling and testing to protect against degradation.

9.5.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the diesel generator fuel oil system are given in Section 9.5.4 of NUREG–0800.

9.5.4.4 Technical Evaluation

The staff reviewed Section 9.5.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the diesel generator fuel oil system. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside of the scope of the DC and use this review in evaluating subsequent COL applications. To ensure the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.

- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.5.4.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 9.5-13*

The applicant provided additional information in STD COL 9.5-13 to resolve COL Information Item 9.5-13. COL Information Item 9.5-13 states:

Address the diesel fuel specifications grade and the fuel properties consistent with manufacturers' recommendations and the measures to protect against fuel degradation by a program of fuel sampling and testing.

The commitment was also captured as COL Action Item 9.5.9-2 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will develop site-specific factors in the fuel oil storage tank installation specification to reduce the effects of sun heat input into the stored fuel, as well as the diesel fuel specifications grade and fuel properties consistent with manufacturers' recommendations, and will develop a program of fuel sampling and testing to protect against fuel degradation.

Revision 17 of the DCD addressed the requirement for limiting heat input by specifying a white epoxy-urethane coating system. Therefore, this information is no longer required from COL applicants.

The COL information in Revision 0 of the applicant's FSAR added Section 9.5.4.5.2, "Fuel Oil Quality." The new section addressed fuel quality as follows:

High fuel oil quality is provided by specification of the required grade and properties of the fuel oil for procurement, by testing of samples of new fuel oil prior to addition into the tanks, and by monitoring the fuel oil for contamination and degradation with periodic testing of samples from the storage tanks in accordance with manufacturer's recommendations.

The fuel oil storage tanks are inspected at least once per 92 days to check for and remove accumulated water.

The fuel oil quality is verified by sampling and testing from the storage tanks at least once per 92 days. New fuel oil is tested prior to its addition to the storage tanks to verify that the sample meets the following minimum requirements:

- *Water and sediment content of less than or equal to 0.05 volume percent.*
- *Kinematic viscosity at 40°C of greater than or equal to 1.9 mm²/s (1.9 centistokes), but less than or equal to 4.1 mm²/s (4.1 centistokes).*
- *Specific gravity as specified by the manufacturer at 16/16°C (60/60°F), or an API [American Petroleum Institute] gravity at 16°C (60°F), within limits established in accordance with manufacturer's recommendations.*
- *Tested impurity level of less than 2 mg of insolubles per 100 ml. The analysis is completed within 7 days after obtaining the sample, but may be performed after the addition of new oil.*

As a result of the staff's review of BLN COL FSAR Section 9.5.4.5.2, the staff identified two questions that were submitted to the applicant in RAIs.

In RAI 9.5.4-1(a), the staff requested that the applicant identify the controls in place to ensure the fuel oil quality program is implemented according to BLN COL FSAR Section 9.5.4.5.2. In response, the applicant stated that implementation of the fuel oil program according to the FSAR is ensured by the Quality Assurance Program Description (QAPD) described in Chapter 17 and Part 11 of the COL application. The applicant stated QAPD Part III, Section 1, contains quality controls for non-safety-related SSCs that would require and verify implementation of the fuel oil program based on the FSAR description. The staff reviewed the information provided and concludes the proposed quality control requirements can ensure implementation of the fuel oil program in accordance with the BLN COL FSAR.

In RAI 9.5.4-1(b), the staff requested that the applicant provide quality requirements for the periodic testing of stored fuel oil. Section 9.5.4.5.2 of the BLN COL stated that diesel fuel oil from the storage tanks is sampled and tested, but no requirements were listed. The application listed quality requirements that appeared to apply only to new fuel oil. In its response, the applicant proposed the following revised BLN COL FSAR Section 9.5.4.5.2:

The diesel fuel oil testing program requires testing both new fuel oil and stored fuel oil. High fuel oil quality is provided by specifying the use of ASTM [American Society for Testing and Materials] Grade 2D fuel oil with a sulfur content as specified by the engine manufacturer.

A fuel sample is analyzed prior to addition of ASTM Grade 2D fuel oil to the storage tanks. The sample moisture content and particulate or color is verified per ASTM 4176. In addition, kinetic [sic] viscosity is tested to be within the limits specified in Table 1 of ASTM D975. The remaining critical parameters per Table 1 of ASTM D975 are verified compliant within 7 days.

Fuel oil quality is verified by sample every 92 days to meet ASTM Grade 2D fuel oil criteria. The addition of fuel stabilizers and other conditioners is based on sample results.

The fuel oil storage tanks are inspected on a monthly basis for the presence of water. Any accumulated water is to be removed.

The staff reviewed this revision and finds it acceptable because it addresses both the new and stored fuel oil and the requirements are the manufacturer's specifications and the same ASTM standards applied to safety-related diesel generators. The staff also confirmed that the revised fuel oil testing program was included as shown above in Revision 1 of the BLN COL FSAR.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from Section 9.5.4.4 of the BLN SER that requires correction. The BLN SER includes the following statement: "In addition, kinetic [sic] viscosity is tested to be within the limits specified in Table 1 of the ASTM D975." The word "kinetic" should read as "kinematic." The staff thought this was a typographical error on the applicant's part because Table 1 of ASTM D975, "Standard Specification for Diesel Fuel Oils," which is the appropriate reference, specifies "kinematic viscosity." Therefore, the staff concludes that STD COL 9.5-13 has been resolved pending incorporation of the proposed revision in the VEGP COL FSAR, which is being tracked as Confirmatory Item 9.5-3.

Resolution of Standard Content Confirmatory Item 9.5-3

Confirmatory Item 9.5-3 is an applicant commitment to revise its FSAR Section 9.5.4.4 to correct a typographical error. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 9.5-3 is now closed.

9.5.4.5 Post-Combined License Activities

There are no post-COL activities related to this section.

9.5.4.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidelines given in Section 9.5.4 of NUREG-0800. The staff based its conclusion on the following:

- STD COL 9.5-13 has been adequately addressed by the applicant in that it ensures that the manufacturers' recommendations using industry standards are met and provides a fuel sampling and testing program to protect against fuel degradation.

9.5.5 Standby Diesel Generator Cooling Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.5, "Diesel Generator Cooling Water System")

Section 9.5.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.5.5, "Standby Diesel Generator Cooling Water System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.5.6 Standby Diesel Generator Starting Air System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.6, "Diesel Generator Starting System")

Section 9.5.6 of the Turkey Point Units 6 and 7 COL FSAR, incorporates by reference, with no departures or supplements, Section 9.5.6, "Standby Diesel Generator Starting Air System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.5.7 Standby Diesel Generator Lubrication System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.7, "Diesel Generator Lubrication System")

Section 9.5.7 of the Turkey Point Units 6 and 7 COL FSAR, incorporates by reference, with no departures or supplements, Section 9.5.7, "Standby Diesel Generator Lubrication System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point

Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.5.8 Standby Diesel Generator Combustion Air Intake and Exhaust System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.8, "Diesel Generator Combustion Air Intake and Exhaust System")

Section 9.5.8 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.5.8, "Standby Diesel Generator Combustion Air Intake and Exhaust System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

10.0 STEAM AND POWER CONVERSION

10.1 Summary Description

10.1.1 Introduction

The steam and power conversion (S&PC) system is designed to remove heat energy from the reactor coolant system via the two main steam generators (SGs) and to convert it to electrical power in the turbine-generator (T-G). The main condenser deaerates the condensate and transfers heat that is not used in the steam cycle to the circulating water system (CWS). The regenerative turbine cycle heats the feedwater, and the main feedwater system returns it to the SG. This section also addresses the materials selection, fabrication, and fracture toughness requirements applicable to American Society of Mechanical Engineers (ASME) Code Section III, Class 2 and Class 3 pressure boundary components of the steam and feedwater systems and also discusses material issues identified through operating experience.

10.1.2 Summary of Application

Section 10.1 of the Florida Power and Light (FPL) combined license (COL) for Turkey Point Units 6 and 7 Final Safety Analysis Report (FSAR), Revision 8, incorporates by reference Section 10.1 of the AP1000 Design Control Document (DCD), Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 10.1.3, the applicant provided the following:

AP1000 COL Information Item

- Standard (STD) COL 10.1-1

The applicant provided additional information in STD COL 10.1-1 to address COL Information Item 10.1-1, providing information related to the monitoring of flow-accelerated corrosion (FAC).

License Condition

- Part 10, License Condition 6, Operational Program Readiness

The applicant proposed a license condition to provide a schedule to support the U.S. Nuclear Regulatory Commission's (NRC) inspection of operational programs including the FAC program.

10.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design."

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the FAC program are given in Section 10.3.6 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)."

The applicable regulatory guidance for STD COL 10.1-1 is as follows:

- Generic Letter (GL) 89-08, “Erosion/Corrosion-Induced Pipe Wall Thinning”

The staff notes that request for additional information (RAI) numbering was based on NUREG-0800, Section 10.3.6. The evaluation is presented in this section because the applicant provided information in Section 10.1.3 of the Turkey Point Units 6 and 7 COL FSAR.

10.1.4 Technical Evaluation

The NRC staff reviewed Section 10.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff’s review confirmed that the information in the application and incorporated by reference addresses the required information relating to the S&PC summary description. The results of the NRC staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the design certification (DC) and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant (VEGP) Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application.

¹ See Section 1.2.2 for a discussion of the staff’s review related to verification of the scope of information to be included in a COL application that references a DC.

The following portion of this technical evaluation section is reproduced from Section 10.1.4 of the VEGP SER:

AP1000 COL Information Item

- STD COL 10.1-1

The applicant also provided information (STD COL 10.1-1) in BLN COL FSAR Section 10.1.3.1 to address a COL information item as described in AP1000 DCD Section 10.1.3. BLN COL FSAR Section 10.1.3.1, "Erosion-Corrosion Monitoring," describes general attributes of the applicant's program for monitoring and managing degradation (e.g., thinning) of piping and components susceptible to FAC, sometimes called erosion-corrosion.

In AP1000 DCD Section 10.1.3, Westinghouse identified a COL information item on FAC monitoring. The COL information item identified the need for a COL applicant to address the preparation of a FAC monitoring program for carbon steel portions of the S&PC systems that contain water or wet steam in order to address the concerns identified in GL 89-08. Similarly, in the NRC staff's FSER (NUREG-1793), Section 10.3.2, the staff identified COL Action Item 10.3.2-1 for the COL applicant to develop a FAC monitoring program to address industry guidelines and the concerns identified in GL 89-08.

The staff reviewed the information provided by the applicant in Section 10.1.3.1 of the BLN COL FSAR (STD COL 10.1-1) addressing a monitoring program for FAC. The staff also reviewed additional information provided in letters dated June 27, 2008 (ML081830410) and May 26, 2009 (ML091480012). In the letters, the applicant provided additional information requested by the staff about implementation of the FAC program during the plant construction phase, pre-service thickness measurements, and the basis for determining minimum allowable thickness.

In RAI 10.3.6-1, the staff requested that the applicant discuss its implementation schedule for the detailed FAC program (i.e., the FAC program activities that will be conducted during the plant construction phase and the schedule for those activities). This information was not provided in the application and was needed by the staff to make its reasonable assurance finding that the FAC concerns discussed in GL 89-08 are adequately addressed.

In RAI 10.3.6-2, the staff asked the applicant to confirm that its program for addressing and monitoring FAC will include pre-service thickness measurements of as-built components considered susceptible to FAC, and that these measurements will use grid locations and measurement methods most likely to be used for inservice inspection (ISI) according to industry guidelines. In addition, the staff requested that the applicant describe how the pre-service testing requirement was documented in the COL application.

In RAI 10.3.6-3, the staff asked the applicant to identify the industry guidelines or established procedures for determining the minimum allowable wall thickness at which components must be repaired or replaced.

In the June 27, 2008, letter, the applicant responded that susceptibility of piping and components to FAC will be evaluated prior to fuel load as design and as-built information becomes available, and those categorized as high risk for FAC failure will be evaluated for baseline testing prior to startup. For other piping, nominal dimensions may be used until baseline wall thickness is measured, but the applicant did not state when this will occur.

The applicant also proposed revising FSAR Section 10.1.3.1 by deleting the following sentence and replacing it with a paragraph that identifies a specific industry guideline (Electric Power Research Institute (EPRI) NSAC-202L) that contains more details about the approach to FAC monitoring.

In addition, the FAC monitoring program considers the information of Generic Letter 89-08 and industry guidelines.

This revision addressed the staff's concern about the basis for determining the minimum allowable thickness because it references the industry guidance (EPRI NSAC-202L) that addresses the concerns in GL 89-08. The response also addressed the staff's concern about pre-service thickness testing because it affirms the need for pre-service testing, and because the application will reference the guidance of NSAC-202L. The response confirmed that the EPRI CHECWORKS computer program will be used for wall thickness evaluations. Based on operating experience, the staff considers the EPRI guidance document and CHECWORKS program an effective approach to managing FAC. However, the staff also identified open items on this topic as discussed below. The open items are related to information that must be either clarified or added to the COL application.

The response to RAI 10.3.6-1 described how susceptibility to FAC will be evaluated as the design and as-built information becomes available, and high-risk (of FAC) components will be evaluated for baseline testing prior to startup. The staff had the following concerns:

- a) The applicant stated that piping and/or components with a high risk of FAC failure will be "evaluated for baseline testing prior to startup." This statement suggests baseline testing may not be performed on high-risk components.*
- b) The reference to piping and/or components "deemed to have a high risk of failure due to FAC" led the staff to question the extent to which FAC prevention was included in the plant design. Given that the plant has not yet been constructed and a predictive model such as CHECWORKS can estimate FAC rates, it is the staff's understanding that materials susceptible to FAC can be avoided where FAC is a potential degradation mechanism.*
- c) The applicant did not add the FAC program implementation schedule and construction phase activities to the COL application.*

The response to RAI 10.3.6-2 and the associated COL application revisions include the terms "Pass 1 analysis" and "Pass 2 analysis." Since these are terms

defined in EPRI NSAC-202L in the context of the CHECWORKS analysis program, reference to CHECWORKS needs to be addressed in the application.

The response to RAI 10.3.6-3 refers to "Systems Not Modeled components." Based on the context of this statement, the staff understands that this statement refers to "Susceptible Not Modeled lines," as discussed in EPRI NSAC-202L.

The applicant submitted a supplemental RAI response dated May 26, 2009 (ML091480012). In the revised responses to the RAIs the applicant clarified that the plant is designed to prevent FAC, and no piping/components are expected to have a high risk of FAC failure, but the possibility of a high-risk piping/component cannot be ruled out until the as-built design is analyzed. The response also clarified that baseline testing would be performed on all high-risk piping/components, and it corrected the wording to reference "Susceptible-Not-Modeled" lines. In the response to RAI 10.3.6-2 the applicant also proposed the following revision to FSAR Section 10.1.3.1:

In addition, the FAC monitoring program considers the information of Generic Letter 89-08, EPRI NSAC-202L-R3, and industry operating experience. The program requires a grid layout for obtaining consistent pipe thickness measurements when using Ultrasonic Test Techniques. The FAC program obtains actual thickness measurements for highly susceptible FAC locations for new lines as defined in EPRI NSAC-202L-R3. At a minimum, a CHECWORKS type Pass 1 Analysis is used for low susceptible FAC locations and a CHECWORKS type Pass 2 Analysis for highly susceptible FAC locations will be considered. To determine wear of piping and components where operating conditions are inconsistent or unknown the guidance provided in EPRI NSAC-202L is used to determine wear rates.

The revised response to RAIs 10.3.6-1, 10.3.6-2, and 10.3.6-3 therefore addressed all of the concerns identified above, with the exception of identifying the program implementation schedule in the application. This is **Open Item 10.1-1**. The staff identifies the FSAR revisions proposed by the applicant in its May 26, 2009 letter as **Confirmatory Item 10.1-1**. Pending resolution of the open item and confirmatory item, the staff finds the COL information item on the FAC program addresses the concerns expressed in GL 89-08.

Resolution of Standard Content Open Item 10.1-1

In a letter dated July 16, 2009, the VEGP applicant addressed Open Item 10.1-1 by proposing to include the FAC program as part of License Condition 6, "Operational Program Readiness." Specifically, the applicant stated that in a future application revision License Condition 6 will include the requirement to submit a FAC program implementation schedule, including the construction phase activities. The proposed license condition is consistent with SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and

Acceptance Criteria.” The staff verified that this change was incorporated into Revision 2 of the COL application. As a result, Open Item 10.1-1 is resolved.

Resolution of Standard Content Confirmatory Item 10.1-1

In a letter dated September 9, 2009, the BLN applicant revised the May 26, 2009, response to RAI 10.3.6-2 related to preservice inspection. The letter clarified that the CHECWORKS Pass 1 analysis (corrosion rates based on the plant model) would be performed for locations with both low and high FAC susceptibility. In addition, the response stated that the Pass 2 analysis (use of inspection data for model refinement, corrosion measurement, and trending) will be performed for high-susceptibility locations if warranted by the Pass 1 analysis. The original response stated that the Pass 2 analysis “will be considered” for high-susceptibility locations. The response includes the following revised wording in FSAR Section 10.1.3.1:

The FAC program obtains actual thickness measurements for highly susceptible FAC locations for new lines as defined in EPRI NSAC-202L-R3 (Reference 201). At a minimum, a CHECWORKS type Pass 1 analysis is used for low and highly susceptible FAC locations and a Pass 2 analysis is used for highly susceptible FAC locations when Pass 1 results warrant.

The staff determined that this revised FSAR text is acceptable because it clarified how the plant predictive model is used to perform FAC analysis, and the approach conforms to the EPRI NSAC-202L guidelines. The VEGP applicant has endorsed the standard RAI responses, and has incorporated the associated changes into Revision 2 of the FSAR. The staff determined that the VEGP applicant has fully addressed all RAI responses, and as a result, Confirmatory Item 10.1-1 is now resolved.

10.1.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff proposes to include the following license condition:

- License Condition (10-1) – Prior to initial fuel load, the licensee shall implement the flow accelerated corrosion (FAC) program including construction phase activities. No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors (NRO) a schedule that supports planning for and conduct of NRC inspections of the FAC program implementation including construction phase activities. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the FAC program has been fully implemented.

10.1.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to FAC, and there is no outstanding information to be addressed in the Turkey Point Units 6 and 7 COL

FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the acceptance criteria provided in Section 10.3.6 of NUREG-0800 and the guidance in GL 89-08. The staff based its conclusion on the following:

- STD COL 10.1-1, relating to the monitoring of the FAC program, is acceptable because it conforms to the acceptance criteria and guidelines provided under Section 10.3.6 of NUREG-0800 and GL 89-08.

10.2 Turbine-Generator

10.2.1 Introduction

The turbine generator system (TGS) and its associated equipment (including moisture separator), involves the use of extraction steam for feedwater heating, and control functions. Details of TGS component construction materials are included in the AP1000 DCD. The T-G control and overspeed system is described in detail in the DCD; this detail includes redundancy and diversity of controls, types of control utilized, overspeed setpoints, and valve actions required for each set point. Because turbine rotors have large masses and rotate at relatively high speeds during normal reactor operation, failure of a rotor may cause excessive vibration of the turbine rotor assembly and result in the generation of high energy missiles. Measures taken by the applicant to ensure turbine rotor integrity and reduce the probability of turbine rotor failure are included in this section of the application.

10.2.2 Summary of Application

Section 10.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 10.2 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 10.2, the applicant provided the following:

Supplemental Information

- STD Supplement (SUP) 10.2-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 10.2.2, "System Description," which describes the probability of generating a turbine missile.

- STD SUP 10.2-3

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 10.2.3.6, "Maintenance and Inspection Program Plan," which describes the inservice inspection (ISI) program for the turbine assembly.

- STD SUP 10.2-4

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 10.2.2, "System Description," which describes the turbine assembly preoperational and startup tests.

- STD SUP 10.2-5

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 10.2.3, "Turbine-Rotor Integrity," which describes the turbine assembly operations and maintenance procedures.

AP1000 COL Information Item

- STD COL 10.2-1

The applicant provided additional information in STD COL 10.2-1, which states that a turbine maintenance and inspection program will be submitted to the NRC for review prior to initial fuel load. This addresses the COL information item in Section 10.2.6, "Combined License Information on Turbine Maintenance and Inspection," of the AP1000 DCD (COL Action Item 10.5-2).

License Condition

- License Condition 2, Item 10.2-1, relating to a turbine maintenance and inspection program

The applicant proposed a license condition to provide a schedule to support the NRC's inspection of a turbine maintenance and inspection program.

10.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for turbine rotor integrity are given in Sections 10.2 and 10.2.3 of NUREG-0800.

10.2.4 Technical Evaluation

The NRC staff reviewed Section 10.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the T-G system design. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 10.2.4 of the VEGP SER:

Supplemental Information

- STD SUP 10.2-1

The applicant provided supplemental information as part of the BLN COL FSAR regarding the probability of generating a turbine missile. In FSAR Section 10.2.2, "System Description," the applicant stated that Section 3.5.1.3 addresses the probability of generation of a turbine missile for AP1000 plants in a side-by-side configuration. The staff's review of the acceptability of the probability of generating a turbine missile is documented in Section 3.5.1, "Missile Selection and Description," of this SER.

The following portion of this technical evaluation section is reproduced from Section 10.2.4 of the VEGP SER:

- STD SUP 10.2-3

The applicant provided supplemental information as part of the BLN COL FSAR regarding the ISI program for the turbine assembly. The applicant added text to the end of Section 10.2.3.6 of the AP1000 DCD, Revision 17, to describe the breadth of the turbine assembly ISI program.

The NRC staff reviewed the standard supplemental information provided in STD SUP 10.2-3 regarding the text added to Section 10.2.3.6 related to the turbine assembly ISI program. The staff concludes that STD SUP 10.2-3 is acceptable because it is a statement of the scope of the turbine ISI program consistent with the acceptance criteria of Section 10.2.3 of NUREG-0800.

- **STD SUP 10.2-4**

The applicant provided supplemental information as part of the FSAR regarding the turbine assembly preoperational and startup tests. The NRC staff reviewed the standard supplemental information provided in STD SUP 10.2-4 regarding the text added to Section 10.2.2 related to the turbine assembly preoperational and startup testing. The staff determined that this additional information provides further clarity regarding the turbine system startup tests. This additional information does not affect the design aspects of the system or its regulatory basis.

- **STD SUP 10.2-5**

The applicant provided supplemental information as part of the BLN COL FSAR regarding turbine assembly operations and maintenance procedures. The applicant added text to the end of Section 10.2.3 of the AP1000 DCD, Revision 17, to note that operations and maintenance procedures mitigate potential degradation mechanisms in the turbine rotor and buckets/blades. STD SUP 10.2-5 is a general statement about the purpose of operations and maintenance procedures and does not affect those procedures that are part of the staff's review of Section 10.2.3 of the DCD application.

AP1000 COL Information Item

- **STD COL 10.2-1**

The applicant provided additional information (STD COL 10.2-1) in BLN COL FSAR Section 10.2.6, "Combined License Information on Turbine Maintenance and Inspection," to resolve a COL information item identified in AP1000 DCD, Section 10.2.6. STD COL 10.2-1 identifies the turbine maintenance and inspection program, plant-specific turbine rotor test data, and plant-specific calculated toughness curves as items that must be submitted by the COL holder to the NRC staff for review prior to fuel load.

The AP1000 COL information item identified in DCD Section 10.2.6 states:

The Combined License holder will submit to the NRC staff for review prior to fuel load and then implement a turbine maintenance and inspection program. The program will be consistent with the maintenance and inspection program plan activities and inspection intervals identified in Subsection 10.2.3.6. The Combined License holder will have available plant-specific turbine rotor test data and calculated toughness curves that

support the material property assumptions in turbine rotor analysis after the fabrication of the turbine and prior to fuel load.

BLN COL FSAR Section 10.2.6, "Combined License Information on Turbine Maintenance and Inspection," replaces Section 10.2.6 of the AP1000 DCD with the following:

A turbine maintenance and inspection program will be submitted to the NRC staff for review prior to fuel load. The program will be consistent with the maintenance and inspection program plan activities and inspection intervals identified in DCD Subsection 10.2.3.6. Plant-specific turbine rotor test data and calculated toughness curves that support the material property assumptions in the turbine rotor analysis will be available for review after fabrication of the turbine and prior to fuel load.

The applicant proposed License Condition 2, Item 10.2-1 related to the above. The staff is currently reviewing Revision 17 of the DCD which contains the turbine maintenance and inspection program elements. License Condition 2 provides that the applicant will submit, prior to fuel load, its turbine maintenance and inspection program for the as-built rotor, including its material properties. The staff finds this condition acceptable because the inspection program, updated with as-built information, will be submitted to verify consistency with the maintenance and inspection program plan activities and inspection intervals identified in Section 10.2.3.6 of the DCD.

10.2.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff proposes to include the following license condition:

- License Condition (10-2) – Prior to initial fuel load, the licensee shall implement a turbine maintenance and inspection program, which will be consistent with the maintenance and inspection program plan activities and inspection intervals identified in FSAR Section 10.2.3.6. No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO a schedule that supports planning for and conduct of NRC inspections of the turbine maintenance and inspection program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the turbine maintenance and inspection program has been fully implemented.

10.2.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the T-G, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the acceptance criteria of Section 10.2 of NUREG-0800. The staff based its conclusions on the following:

- STD SUP 10.2-1, related to the probability of generating a turbine missile, is reviewed by the staff in Section 3.5.1, "Missile Selection and Description," of this SER.
- STD SUP 10.2-3, related to the ISI program for the turbine assembly, is acceptable to the staff because the description of the ISI program is consistent with Section 10.2.3 of NUREG-0800.
- STD SUP 10.2-4, relating to the turbine assembly preoperational and startup tests, is acceptable to the staff because the proposed valve testing is consistent with the guidance in Section 10.2 of NUREG-0800.
- STD SUP 10.2-5, relating to mitigation of potential degradation mechanisms for the turbine rotor and buckets/blades, is acceptable to the staff because it is a general statement about the purpose of operations and maintenance procedures and does not affect those procedures that are part of the staff's review of Section 10.2.3 of the DCD application.
- STD COL 10.2-1, relating to the turbine maintenance and inspection program, is acceptable to the staff because the applicant proposed a license condition that appropriately addresses this information item.

10.3 Main Steam Supply System

10.3.1 Introduction

The main steam supply system (MSSS) transports the steam generated by the nuclear steam supply system to the S&PC system and various non-safety-related auxiliaries. Portions of the MSSS are used as part of the heat sink that removes heat from the reactor facility during certain operations. The MSSS for the pressurized-water reactor (PWR) plant extends from the connections to the secondary sides of the SGs up to and including the turbine stop valves.

10.3.2 Summary of Application

Section 10.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 10.3 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 10.3, the applicant provided the following:

Supplemental Information

- STD SUP 10.3-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 10.3.2.2.1, "Main Steam Piping," which addresses operations and maintenance procedures.

- STD SUP 10.3-2

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 10.3.5.4, "Chemical Addition," related to secondary-side water chemistry.

- STD SUP 10.3-3

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 10.3.6.2, "Material Selection and Fabrication," which addresses intergranular stress corrosion cracking (IGSCC).

10.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the MSSS are given in Sections 10.3 and 10.3.6 of NUREG-0800.

The applicable regulatory requirements and guidance for STD SUP 10.3-1, STD SUP 10.3-2, and STD SUP 10.3-3 are as follows:

- Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 4, "Environmental and Dynamic Effects Design Bases"
- Regulatory Guide (RG) 1.37, Revision 1, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants"
- Branch Technical Position (BTP) 5-1, "Monitoring of Secondary Side Water Chemistry in PWR Steam Generators"

The regulatory basis for acceptance of the supplemental information on controls to prevent stress-corrosion cracking of stainless steels and nickel alloys is the quality assurance requirements in Appendix B, "Quality assurance criteria for nuclear power plants and fuel reprocessing plants," of 10 CFR Part 50, "Domestic licensing of production and utilization facilities," and the guidance in RG 1.37, as they relate to quality assurance requirements for the design, fabrication, and construction of safety-related structures, systems, and components (SSCs).

10.3.4 Technical Evaluation

The NRC staff reviewed Section 10.3 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the MSSS. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 10.3.4 of the VEGP SER:

Supplemental Information

- *STD SUP 10.3-1*

The applicant provided additional information as part of the BLN COL FSAR regarding operations and maintenance procedures. The applicant added text to Section 10.3.2.2.1 of the AP1000 DCD, Revision 17, to address steam hammer and relief valve discharge reaction loads.

The NRC staff reviewed the standard supplemental information provided in STD SUP 10.3-1 regarding the text added to Section 10.3.2.2.1 related to MSSS operations and maintenance procedures.

During its review of Revision 0 of the BLN COL FSAR, the staff did not find any further details regarding these procedures. Therefore, the staff raised a concern regarding the adequacy of these procedures. Also, Section 10.3 of NUREG-0800, "MAIN STEAM SUPPLY SYSTEM," Item II, related to GDC 4, describes that the main steam system should adequately consider water (steam) hammer and relief valve discharge loads to assure that system safety functions can be performed and should assure that operating and maintenance procedures include adequate precautions to prevent water (steam) hammer and relief valve loads. In order to ensure the adequacy of the MSSS and its agreement with the NUREG-0800 criteria, the staff requested the key elements of the procedures for staff's review in RAI 10.3-1.

In its response, dated July 21, 2008, concerning precluding or mitigating water hammer events, the applicant identified that good operating practice and operating experience including, but not limited to Institute of Nuclear Power Operations (INPO) significant event reports and significant operating event reports, NRC information notices and bulletins, and other industry operating experience information are programmatically integrated into the AP1000 Operations Procedure development. The applicant also stated that specific operating experience to preclude or mitigate water hammer is included in this population of operating experience. In addition, the applicant explained that the AP1000 has been designed to prevent or minimize steam and water hammer. The applicant stated that BLN COL FSAR Section 10.3.2.2.1 will be revised to include additional precautions, when appropriate, to minimize the potential for steam and water hammer.

With respect to the relief valve discharge loads, in its response, the applicant explained that Westinghouse addressed these loads for main steam safety valves in the AP1000 DCD, Section 10.3.2.2.2, "Main Steam Safety Valves," which BLN incorporated by reference with no departures and supplements. Further, the applicant stated that as described in NUREG-0927, Revision 1, "Evaluation of Water Hammer Occurrence in Nuclear Power Plants," preventive measures for relief valve loading are addressed by design. Therefore, the applicant stated that the COL application Part 2, BLN COL FSAR Section 10.3.2.2.1 will be revised to remove the associated procedure precautions as related to the relief valve discharge reaction loading. In addition, Section 10.3.2.2.1 will be revised to state that operations and maintenance procedures include precautions, when appropriate, to minimize the potential for steam and water hammer. The applicant listed several precautionary items, such as: prevention of rapid valve motion, process for avoiding voids and flashing in water-filled lines and venting these lines, process for avoiding introduction of water into steam lines and proper warm-up and drainage of these lines, and effects of valve alignments on line conditions.

Based on its review, the staff finds the applicant's response acceptable because a detailed list of the procedural precautions (identified above) is provided and

included as a proposed revision to COL application Part 2, BLN COL FSAR Section 10.3.2.2.1. The staff reviewed the precautions and compared them to the industry experience and staff guidance, and finds that they adequately address steam and water hammer. Therefore, the staff agrees that the deletion of the relief valve discharge reaction load occurrences from BLN COL FSAR Section 10.3.2.2.1 is acceptable, because its discussion was already identified in the AP1000 DCD Section 10.3.2.2.1. In BLN COL FSAR Section 10.3.2.2.1, Revision 1, the applicant revised STD SUP 10.3-1 as indicated above in its response to RAI 10.3-1. Therefore, the staff's concern in RAI 10.3-1 is resolved.

- **STD SUP 10.3-2**

The applicant provided additional information as part of the BLN COL FSAR regarding the secondary chemistry. In FSAR Section 10.3.5.4, "Chemical Addition," the applicant proposed adding the following at the end of DCD Subsection 10.3.5.4:

Alkaline chemistry supports maintaining iodine compounds in their nonvolatile form. When iodine is in its elemental form, it is volatile and free to react with organic compounds to create organic iodine compounds, which are not assumed to remain in solution. It is noted that no significant level of organic compounds is expected in the secondary system. The secondary water chemistry, thus, does not directly impact the radioactive iodine partition coefficients.

The staff reviewed the secondary water chemistry under Section 10.4.6 of this SER and found it acceptable with respect to the EPRI PWR Secondary Water Chemistry Guidelines. As discussed in Section 10.4.6, the staff considers application of the guidance of the EPRI PWR Secondary Water Chemistry Guidelines, and a programmatic commitment to use these guidelines, to be an acceptable method for the applicant to ensure compliance with GDC 14 as it relates to ensuring the integrity of the reactor coolant boundary (specifically, as the secondary water chemistry program ensures the integrity of the SG tubing). As the applicant stated in STD SUP 10.3-2, the secondary water chemistry does not directly impact the iodine partition coefficients. In addition, radioactive iodine is not a consideration in the EPRI Secondary Water Chemistry Guidelines. The staff finds that STD SUP 10.3-2 is a statement of fact that does not affect the staff's review. The management of radioactive compounds, including iodine, is addressed by the staff in Chapter 11.

- **STD SUP 10.3-3**

The applicant provided additional information as part of the BLN COL FSAR regarding IGSCC. The applicant added text to the end of Section 10.3.6.2 "Material Selection and Fabrication" of the AP1000 DCD, Revision 17, to include providing the necessary controls to minimize the susceptibility of components made of stainless steel and nickel-based materials to IGSCC. The applicant proposed adding the following at the end of DCD Section 10.3.6.2:

Appropriate operations and maintenance procedures provide the necessary controls during operation to minimize the susceptibility of components made of stainless steel and nickel-based materials to IGSCC by controlling chemicals that are used on system components.

The staff finds the supplemental information, addressing IGSCC concerns related to stainless steels and nickel-base alloys, acceptable because the AP1000 DCD meets the technical guidelines specified in RG 1.37. In addition, the staff notes that these materials are not proposed for use in the main steam and feedwater piping systems at BLN Units 3 and 4.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from the BLN SER, Section 10.3.4, that requires correction. The BLN SER states that the staff reviewed the secondary water chemistry in Section 10.4.6 of the SER. Secondary water chemistry is actually reviewed in Section 10.4.7 of the SER.

10.3.5 Post Combined License Activities

There are no post-COL activities related to this section.

10.3.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to MSSS, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 4 and 10 CFR 52.79, "Contents of applications; technical information in final safety analysis report," through the methods described in Sections 10.3 and 10.3.6 of NUREG-0800, BTP 5-1, and RG 1.37. The staff based its conclusions on the following:

- STD SUP 10.3-1, relating to operations and maintenance procedures, is acceptable because the applicant provided sufficient information to satisfy GDC 4 as related to MSSS design considering the water (steam) hammer effects on the safety-related SSCs.
- STD SUP 10.3-2, relating to secondary chemistry, is a statement of fact that does not affect the staff's review.
- STD SUP 10.3-3, relating to IGSCC, is acceptable to the staff because the AP1000 DCD meets the technical guidelines specified in RG 1.37.

10.4 Other Features of Steam and Power Conversion System

10.4.1 Main Condensers

During normal operation, the main condenser receives, condenses and deaerates exhaust steam from the main turbine and the turbine bypass system whenever the turbine bypass system is operated. The main condenser is also a collection point for other steam cycle miscellaneous drains and vents.

Section 10.4 of the Turkey Point Units 6 and 7 FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 10.4.1 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

10.4.2 Main Condenser Evacuation System

10.4.2.1 *Introduction*

Main condenser evacuation is performed by the condenser air removal system. The system removes noncondensable gases and air from the main condenser during plant startup, cooldown, and normal operation. This action is performed by liquid ring vacuum pumps.

10.4.2.2 *Summary of Application*

Section 10.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 10.4 of the AP1000 DCD, Revision 19. Section 10.4 of the DCD includes Section 10.4.2.2.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 10.4.2.2, the applicant provided the following:

Site-Specific Information Replacing Conceptual Design Information

- PTN CDI

The applicant provided additional information to replace conceptual design information (CDI) in Turkey Point Units 6 and 7 COL FSAR Section 10.4.2.2.1, "General Description," which describes the plant-specific cooling water source for the vacuum pump seal water heat exchangers.

- PTN CDI

The applicant provided additional information to replace CDI in Turkey Point Units 6 and 7 COL FSAR Section 10.4.2.2.2, "Component Description," which describes the plant-specific tube side water flow in the seal water heat exchangers.

10.4.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

Additionally, Appendix A to 10 CFR Part 50, GDC 60, "Control of Releases of Radioactive Materials to the Environment" forms a portion of the regulatory basis.

Acceptance criteria associated with the relevant requirements of the Commission regulations for the main condenser evacuation system are given in Section 10.4.2 of NUREG-0800.

10.4.2.4 Technical Evaluation

The NRC staff reviewed Section 10.4.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the main condenser evacuation system. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff's review of this application is limited to the following Turkey Point Units 6 and 7 plant-specific design information that replaces the CDI identified in the AP1000 DCD:

Site-Specific Information Replacing Conceptual Design Information

- PTN CDI

The plant-specific design information was annotated as "PTN CDI" in Turkey Point Units 6 and 7 COL FSAR Section 10.4.2. In this section, the applicant replaced bracketed (conceptual design) text in Sections 10.4.2.2.1, "General Description," and 10.4.2.2.2, "Component Description," of the AP1000 DCD to provide specific information regarding the sources of cooling water for the vacuum pump seal water heat exchangers.

The PTN CDI in Turkey Point Units 6 and 7 COL FSAR Section 10.4.2.2.1 is related to the CWS supplying cooling water for the vacuum pump seal water heat exchangers. The PTN CDI in FSAR Section 10.4.2.2.2 clarifies that the seal water flows through the shell side of the seal water heat exchanger and CWS water flows through the tube side. Based on its review of the application, the staff concludes that this Turkey Point Units 6 and 7 plant-specific design information will have no adverse effects on the capability of the main condenser evacuation system and CWS. Also, the staff concludes that adding this Turkey Point Units 6 and 7 plant-specific design information will not affect the functions of any safety-related equipment, components, or systems of the plant. The staff accepts the information provided in this PTN CDI because it meets the acceptance criteria in Section 10.4.2 of NUREG-0800, and therefore, meets GDC 60 as it relates to the main condenser evacuation system design for the control of releases of radioactive materials to the environment.

10.4.2.5 Post Combined License Activities

There are no post-COL activities related to this section.

10.4.2.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the main condenser evacuation system, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the acceptance criteria of Section 10.4.2 of NUREG-0800 and the requirements of GDC 60. The staff based its conclusions on the following:

- PTN CDI, relating to Turkey Point Units 6 and 7 COL FSAR Section 10.4.2.2.1, "General Description," concerning cooling water source for the vacuum pump seal water heat exchanger, is acceptable to the staff because it meets GDC 60 for the control of releases of radioactive materials to the environment.
- PTN CDI, relating to Turkey Point Units 6 and 7 COL FSAR Section 10.4.2.2.2, "Component Description," concerning the tube side water flow in the seal water heat exchangers, is acceptable to the staff because it meets GDC 60 for the control of releases of radioactive materials to the environment.

10.4.3 Gland Sealing System (Related to RG 1.206, Section C.III.1, Chapter 10, C.I.10.4.3, "Turbine Gland Sealing System")

The gland seal system prevents the escape of steam from the turbine shaft, turbine casing penetrations, and valve stems. The gland seal system also prevents air in-leakage through sub-atmospheric turbine glands. The system provides a source of sealing steam to the annulus space where the turbine and large steam valve shafts penetrate the turbine casings.

Section 10.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 10.4.3 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

10.4.4 Turbine Bypass System

The turbine bypass system provides the capability to discharge a certain percentage of main steam from the steam generators directly to the main condenser, bypassing the turbine, which

minimizes load transient effects on the nuclear steam supply system. The system is also used to discharge main steam during reactor hot standby and cooldown operations.

Section 10.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 10.4.4 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

10.4.5 Circulating Water System

10.4.5.1 Introduction

The CWS removes waste heat from the main condenser. This waste heat is subsequently transferred to the power cycle heat sink. The CWS provides a continuous supply of cooling water to the main condenser to remove the heat rejected by the turbine cycle and auxiliary systems.

10.4.5.2 Summary of Application

Section 10.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 10.4 of the AP1000 DCD, Revision 19. Section 10.4 of the DCD includes Section 10.4.5.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 10.4.5, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 10.4-1

The applicant provided additional information related to the CWS design parameters in Turkey Point Units 6 and 7 COL 10.4-1 to resolve the COL information item in Section 10.4.12.1 of the AP1000 DCD (COL Action Item 10.5-3).

Site-Specific Information Replacing Conceptual Design Information

- PTN CDI

The applicant provided additional information to replace CDI in Turkey Point Units 6 and 7 COL FSAR Section 10.4.5, which describes the following aspects of the site-specific CWS:

- Power generation design basis
- General description
- Component description
- System operation
- Tests and inspections

- Instrumentation applications

10.4.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the regulatory basis for acceptance of COL Information Item 10.4-1 (COL Action Item 10.5-3) is established in GDC 4, as it relates to design provisions provided to accommodate the effects of discharging water that may result from a failure of a component or piping in the CWS.

In accordance with Section 10.4.5 of NUREG-0800, the requirements of GDC 4 are met when the CWS design includes provisions to accommodate the effects of discharging water that may result from failure of a component or piping in the CWS. Means should be provided to prevent or detect and control flooding of safety-related areas so that the intended safety function of a system or component will not be precluded due to leakage from the CWS. Malfunction or failure of a component or piping of the CWS, including an expansion joint, should not have unacceptable adverse effects on the functional performance capabilities of safety-related systems or components.

10.4.5.4 Technical Evaluation

The NRC staff reviewed Section 10.4.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the CWS. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Items

- PTN COL 10.4-1

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.5, the applicant provided additional information in PTN COL 10.4-1 to resolve the COL information item in Section 10.4.12.1, "Circulating Water System," of the AP1000 DCD, which states:

The Combined License applicant will address the final configuration of the plant circulating water system including piping design pressure, the cooling tower or other site-specific heat sink.

As applicable, the Combined License applicant will address the acceptable Langelier or Stability Index range, the specific chemical selected for use in the CWS water chemistry control, pH adjuster, corrosion inhibitor, scale inhibitor, dispersant, algicide and biocide applications reflecting potential variations in site water chemistry and in micro macro biological life forms. A biocide such as

sodium hypochlorite is recommended. Toxic gases such as chlorine are not recommended. The impact of toxic gases on the main control room habitability is addressed in Section 6.4. The Combined License applicant will also be responsible for the design, routing, and disposition requirements associated with the main condenser water box drains.

This COL information item was also captured as COL Action Item 10.5-3 in Appendix F of NUREG-1793:

The COL applicant is responsible for the site-specific configuration of the plant circulating water system (including piping design pressure), the cooling tower, or other site-specific heat sink.

The applicant addressed the above COL information item of the AP1000 DCD in Turkey Point Units 6 and 7 COL FSAR Sections 10.4.5.2.1, "General Description"; 10.4.5.2.2, "Component Description"; and 10.4.5.5, "Instrumentation Applications"; by providing additional information concerning CWS heat sink capability, design parameters, cooling towers, water box drains, and CWS water chemistry control. The staff reviewed the applicant's information in these FSAR sections.

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.2.1, the applicant described the site-specific CWS. The CWS and the cooling towers provide a heat sink for waste heat exhausted from the main steam turbine. Also, to address COL Information Item 10.4-1 of the AP1000 DCD, the applicant provided specific design parameters in Turkey Point Units 6 and 7 COL FSAR Table 10.4-201, "Supplemental Design Parameters for Major Circulating Water System Components."

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.2.2, the applicant stated that the design pressure of the condenser portions of the piping is identified in AP1000 DCD Table 10.4.1-1, "Main Condenser Design Data," and the design pressure of the remaining piping is 110 pounds per square inch gauge (psig). The design pressure of the condenser portions of the piping (water box design pressure) is identified in the table as 90 psig. The staff finds the design pressure of 110 psig for the remaining piping is compatible with the 90 psig for the condenser portion and is, therefore, acceptable. The staff also reviewed the Turkey Point Units 6 and 7 COL FSAR Table 10.4-202 site-specific design parameters and compared them to the corresponding data in AP1000 DCD Table 10.4.5-1, "Design Parameters for Major Circulating Water Components," and finds them acceptable as the site-specific parameters are similar to those for the certified design.

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.2.2, the applicant provided information on the chemical treatment program for the CWS. Also, the applicant stated that specific chemicals used within the system are based on water conditions as determined by the CWS water chemistry, and as committed in FSAR Section 10.4.7.2.1 are consistent with the EPRI PWR Secondary Water Chemistry Guidelines. Additionally, in Section 10.4.5.5, the applicant identified that circulating water chemistry is controlled by regulating the CWS blowdown valve, and by chemical addition. The staff finds that the applicant addressed the site-specific chemicals and control and maintenance of CWS chemistry in order to be consistent with the DCD, Sections 10.4.5.2.2 and 10.4.5.5, and as specified in COL Information Item 10.4-1.

Further, in Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.2.2, the applicant provided information on the design, routing, and disposition requirements associated with the main condenser water box drains. The applicant stated that the condenser water box drains allow the condenser to be drained to the cooling tower basin. Piping is routed from each water box to the condenser water box drain pump, which in turn pumps the water back to the cooling tower basin. Each water box contains drain valves and vents so that a water box can be drained individually. Piping is sized to support an adequate drain down in the event of emergency maintenance. Based on the discussion above, the staff finds that the applicant adequately addressed the site-specific design, routing, and disposition requirements associated with the main condenser water box drains as specified in COL Information Item 10.4-1.

The staff reviewed the information provided in the above Turkey Point Units 6 and 7 COL FSAR sections and finds that the applicant addressed the final configuration of the CWS as specified in the COL Information Item 10.4-1. The staff finds that the CWS design parameters of temperature and flow rates in Turkey Point Units 6 and 7 COL FSAR Table 10.4-202 are consistent with the design parameters in AP1000 DCD Table 10.4.5-1. The staff also finds that the design piping pressures of the Turkey Point Units 6 and 7 CWS are consistent with the design pressures of the conceptual (non-site-specific) design of the AP1000 CWS, and are, therefore, acceptable.

The staff's evaluation of the CWS final configuration is addressed below under the CDI discussions.

Site-Specific Information Replacing Conceptual Design Information

- PTN CDI

The applicant provided Turkey Point Units 6 and 7 site-specific design information as part of the FSAR to replace the CDI in the AP1000 DCD regarding the CWS. The applicant replaced bracketed text throughout Section 10.4.5 of the AP1000 DCD to provide site-specific CWS power generation design basis information, general CWS description, component description, system operation, tests and inspections, and instrumentation applications. The staff reviewed the text added in PTN CDIs throughout Turkey Point Units 6 and 7 COL FSAR Section 10.4.5 related to the CWS system, and the following provides the staff's evaluation of these CDIs in the application.

In Turkey Point Units 6 and 7 COL FSAR Sections 10.4.5.1, "Design Bases," and 10.4.5.2, "System Description," the applicant provided a description of its CWS system configuration. The CWS is a non-safety-related system. The CWS supplies cooling water to remove heat from the main condensers, the turbine building closed cooling water system (TCS) heat exchangers and the condenser vacuum pump seal water heat exchangers under varying conditions of power plant loading and design weather conditions.

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.2.1, "General Description," the applicant provided site-specific design information in that the Turkey Point Units 6 and 7 CWS consists of three 33-1/3 percent capacity circulating water pumps. In addition, each pump discharge line has a motor-operated butterfly valve located between the pump discharge and the main header. This permits isolation of one pump for maintenance and allows two-pump operation.

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.2.2, "Component Description," the applicant provided specific design information regarding the CWS major components, such as circulating water pumps, cooling tower, cooling tower makeup and blowdown, and piping and valves, which address the final configuration of the CWS.

The three cooling towers are mechanically induced-draft, counterflow cooling towers. Each cooling tower is designed to cool the water to 91°F (32.7°C) with a hot water inlet temperature of 115.4°F (46.3 °C). The staff finds that the above temperature values are acceptable as they demonstrate an equally effective cooling tower design as listed in AP1000 DCD Table 10.4.5-1.

In its review of the Turkey Point Units 6 and 7 COL application, the staff notes that the applicant submitted PTN DEP 2.0-2 in its COL Part 7, which identified a departure (DEP) from the DCD site parameter value for the maximum normal air temperature wet-bulb (noncoincident) in DCD Tier 2, Table 2-1 from 80.1 °F to a site-specific value of 81.5 °F. The applicant stated that operation of the cooling towers during conditions that are more restrictive than design conditions may result in higher condenser back pressure. Further in a PTN CDI, in Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.2.2, the applicant stated that when more than one cooling tower is located on site, through the phenomenon of "interference," a portion of the saturated effluent of an upwind tower can intermix with the air entering a tower located downwind; therefore, elevating its inlet wet-bulb temperature. It is further stated that proper cooling tower placement and orientation can minimize the effect of this "interference" phenomenon and that since the Turkey Point Units 6 and 7 service water system (SWS) and CWS towers are located remotely to each other and the saturated effluent dissipates before it interferes with the intake of the SWS, the CWS towers would not adversely affect the performance of the SWS towers. Additionally, in response to the staff's RAI 5399, Question 09.02.01-1, dated August 17, 2011, the applicant stated that it is unlikely that a CWS cooling tower plumes would interact with the SWS cooling towers such that a significant degradation in performance would occur. Regarding the PTN DEP 2.0-2 and CWS cooling towers plume interference and interaction with the safety-related SWS cooling towers; more details are provided in Turkey Point Units 6 and 7 COL FSAR Section 9.2, "Water Systems," and associated NRC staff's SER.

The CWS cooling tower makeup is provided by the RWS, described in Turkey Point Units 6 and 7 COL FSAR Section 9.2.11, "Raw Water System." Makeup to and blowdown from the CWS is controlled by the makeup and blowdown control valves. The evaluation of RWS capabilities is provided in Section 9.2.11 of this SER.

The underground portions of the CWS piping are constructed of prestressed concrete pressure piping. The remainder of the piping is carbon steel and is coated internally with a corrosion resistant compound. Control valves provide regulation of cooling tower blowdown and makeup. The CWS is designed to withstand the maximum operating discharge pressure of the circulating water pumps. As discussed earlier in the staff's evaluation of PTN COL 10.4-1, the staff finds the CWS piping design pressure of 110 psig to be consistent with the DCD value and, therefore, acceptable.

With respect to flooding, the staff finds that the effects of flooding due to a CWS failure, which were evaluated in NUREG-1793 and its supplements, apply to the Turkey Point Units 6 and 7 CWS. CWS failures, such as a rupture of an expansion joint, will not result in detrimental effects on safety-related equipment, because the turbine building does not house safety-related equipment and the base slab of the turbine building is located at grade elevation. Water from a

system rupture will run out of the building through a relief panel in the turbine building west wall before the level could rise high enough to cause damage. Small CWS leaks in the turbine building will drain into the waste water system. Large CWS leaks due to pipe failures will be indicated in the control room by a loss of vacuum in the condenser shell. The staff finds that these provisions of the Turkey Point Units 6 and 7 CWS design meet the requirements of GDC 4, as described in NUREG-0800, Section 10.4.5, Section II, Acceptance Criteria, and as it relates to design provisions to accommodate the effects of discharging water that may result from a failure of a component or piping in the CWS.

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.2.2, "Component Description," the applicant describes that piping is routed from each water box to the condenser water box drain pump, which in turn pumps the water back to the cooling tower basin. GDC 60 requires plants to be designed to control the release of radioactive materials in gaseous and liquid effluents. To comply with GDC 60, the design and routing of the water box drains must conform to GDC 60, so that it prevents an inadvertent transfer of contaminated fluids to the noncontaminated cooling tower basin. Based on the information provided in the FSAR, the staff is unable to reach a conclusion regarding compliance to GDC 60, because it cannot verify that the effluents routed to the cooling tower basin through the water box drains will be monitored for radiation prior to disposition. Therefore, the staff requested, in RAI 10.4.5-2, that the applicant provide additional information verifying that radioactive sources, such as the water box drains, that will drain downstream to the cooling tower basin are appropriately monitored, and if contamination is detected that the effluent is appropriately routed to the radioactive waste system. On July 23, 2013, the applicant responded to RAI 7129, Question 10.04.05-2 by stating that standard design features of the turbine building sump system (WWS) and additional administrative controls will prevent an inadvertent transfer of contaminated fluids from the condenser water box to the noncontaminated cooling tower basin. If radioactivity is detected, the condenser water box drains will be appropriately routed to the radioactive waste system via the turbine building sumps. A radiation monitor located on the turbine building sump common discharge piping, initiates an alarm and trips the turbine building sump pumps when radioactivity above a preset high level point is detected in the waste stream. The staff finds that the applicant has provided adequate information to satisfy GDC 60 with respect to the inadvertent transfer of contaminated fluids to the noncontaminated cooling tower basin. The applicant proposed to update the FSAR Section 10.4.5.2.2 to include the discussion of controls to prevent the release of CWS radioactivity from a condenser water box to the cooling tower basin. The staff verified that the applicant incorporated the associated changes in the Turkey Point Units 6 and 7 COL FSAR, Revision 4.

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.2.3, "System Operation," the applicant stated that each of the mechanical draft cooling towers is positioned so that its collapse would have no potential to damage SSCs required for safe shutdown of the plant. However, the staff could not find sufficient detail describing how the cooling tower failure would have no effect on the nearby safety-related system, equipment and/or structure of the plant. As described in NUREG-0800 Section 10.4.5, "Acceptance Criteria," the requirements of GDC 4 are met when the CWS design includes provisions to accommodate the effects of discharging water that may result from a failure of a component or piping in the CWS. Therefore, in order for the NRC staff to complete its evaluation of the site-specific CWS with respect to GDC 4 requirements, the staff requested, in RAI 5405, Question 10.04.05-1, that the applicant provide additional information to ensure that failure of any of the towers will not affect the safety-related systems or equipment that are located in the proximity of the cooling towers. In a letter dated August 3, 2011, the applicant responded to RAI 5405, Question 10.04.05-1 by stating that the mechanical induced

draft towers are less than 100 feet in height with a diameter greater than its height. Additionally, the tower closest to the nearest safety-related building is over 600 feet away as depicted on FSAR Figure 1.1-201. The configuration of the cooling towers and the large separation distance preclude the collapse of a cooling tower from damaging safety-related SSCs or nonsafety-related SSCs considered important to regulatory treatment of nonsafety systems (RTNSS). The site is graded to direct water that may result from a cooling tower failure or a circulating water yard piping failure away from the nuclear islands. The staff finds that the applicant has provided adequate information to satisfy GDC 4 with respect to external flooding events due to CWS failures. The applicant proposed to update FSAR Section 10.4.5.2.3 to include the greater than 600 foot distance, described in its response. The staff verified that the applicant incorporated the associated changes in the Turkey Point Units 6 and 7 COL FSAR, Revision 3.

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.2.3, "System Operation," the applicant stated that, if the CWS malfunctions such that the main condenser is not available to adequately support unit operation, cooldown of the reactor may be accomplished by using the power-operated atmospheric steam relief valves or safety valves rather than the turbine bypass system. The staff finds that this alternate cooldown method is acceptable, because the turbine bypass system will not function during accident conditions and the CWS is not required for safe shutdown following an accident. Also, the applicant stated that provisions are made during cold weather in that circulating water flow to the cooling towers can be diverted to the basins, bypassing the cooling towers' internals, by opening the bypass valves during plant startup or partial load or to maintain CWS temperatures above 4.4 °C (40 °F). The staff finds that these provisions of the site-specific CWS design meet the requirements of GDC 4, as described in NUREG-0800, Section 10.4.5.

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.5.5, "Instrumentation Application," the applicant identified the configuration and function of the CWS pressure, temperature and level instrumentation at the Turkey Point Units 6 and 7 site. Also, the motor-operated valve at each pump discharge is interlocked with the pump, so that the pump trips if the discharge valve fails to reach the full-open position shortly after starting the pump.

Based on its review, the staff concludes that the site-specific design of the CWS meets the requirements of GDC 4 with respect to the effects of discharging water that may result from a failure of component or piping in the CWS. Further, the staff finds that the CWS meets the design recommendations provided in the AP1000 DCD.

10.4.5.5 *Post Combined License Activities*

There are no post-COL activities related to this section.

10.4.5.6 *Conclusion*

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the CWS, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, PTN CDI involving the CWS is adequately addressed by the applicant in its application to meet the requirements of the DCD. The staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the acceptance criteria of Section 10.4.5 of NUREG-0800 and the requirements of GDC 4. The staff based its conclusions on the following:

- PTN COL 10.4-1, relating to the final configuration of the circulating water, is acceptable to the staff because the applicant addressed the site-specific chemicals and control and maintenance of the CWS chemistry in order to be consistent with AP1000 DCD.
- PTN CDI, relating to various aspects of the CWS, is acceptable to the staff because failure of the site-specific CWS design does not adversely impact any safety-related SSCs.

10.4.6 Condensate Polishing System (Related to RG 1.206, Section C.III.1, Chapter 10, C.I.10.4.6, “Condensate Cleanup System”)

The condensate polishing system can be used to remove corrosion products and ionic impurities from the condensate system during plant startup, hot standby, power operation with abnormal secondary cycle chemistry, safe shutdown, and cold shutdown operations.

Section 10.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 10.4.6 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff’s review confirmed that there is no outstanding issue related to this section. The results of the NRC staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

10.4.7 Condensate and Feedwater System

10.4.7.1 Introduction

The condensate and feedwater system provides feedwater at the required temperature, pressure, and flow rate to the SGs. Condensate is pumped from the main condenser hot well by the condensate pumps, passes through the low-pressure feedwater heaters to the feedwater pumps, and then is pumped through the high-pressure feedwater heaters to the SGs.

10.4.7.2 Summary of Application

Section 10.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 10.4 of the AP1000 DCD, Revision 19. Section 10.4 of the DCD includes Section 10.4.7.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 10.4.7.2.1, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 10.4-2

The applicant provided additional information in PTN COL 10.4-2 to address the COL information item in Section 10.4.12.2, "Condensate, Feedwater and Auxiliary Steam System Chemistry Control," of the AP1000 DCD (COL Action Item 10.5-4).

Supplemental Information

- STD SUP 10.4-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 10.4.7.2.1, "General Description," which addresses operations and maintenance procedures.

- PTN SUP 10.4-2

The applicant provided supplemental information, which states that the EPRI Secondary Water Chemistry Guidelines will be used for guidance on selection of pH control agents and pH optimization as described in Nuclear Energy Institute (NEI) 97-06, "Steam Generator Program Guidelines."

10.4.7.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the regulatory basis for acceptance of the COL information item and PTN SUP 10.4-2 is GDC 14, as it relates to ensuring the integrity of the reactor coolant pressure boundary (specifically as the secondary water chemistry program ensures the integrity of the SG tubing). The applicable acceptance criteria for meeting GDC 14 are found in NUREG-0800 Sections 10.4.6 and 5.4.2.1, including BTP 5-1. The regulatory basis for acceptance of STD SUP 10.4-1 is established in GDC 4, insofar as the GDC requires that the dynamic effects associated with possible fluid flow instabilities (e.g., water hammers) during normal plant operation, as well as during upset or accident conditions be considered, and that SSCs important to safety be designed to accommodate the effects of, and be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents.

GDC 4 can be complied with by meeting the relevant acceptance criteria specified in Section 10.4.7 of NUREG-0800, "Condensate and Feedwater System." In regard to fluid instabilities, the requirements of GDC 4, as related to protecting SSCs against the dynamic effects associated with possible fluid flow instabilities (e.g., water hammers) during normal plant operation, as well as during upset or accident conditions can be met by: (1) meeting the guidance in BTP 10-2, "Design Guidelines for Avoiding Water Hammers in Steam Generators,"

for reducing the potential for water hammers in SGs; and (2) meeting the guidance related to feedwater-control-induced water hammer. Guidance for water hammer prevention and mitigation is given in NUREG-0927, Revision 1.

10.4.7.4 Technical Evaluation

The NRC staff reviewed Section 10.4.7 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the condensate and feedwater system. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 10.4-2

In Turkey Point Units 6 and 7 COL FSAR Section 10.4.7.2.1, the applicant provided additional information in PTN COL 10.4-2 to address the COL information item in Section 10.4.12.2,

“Condensate, Feedwater and Auxiliary Steam System Chemistry Control,” of the AP1000 DCD, which states:

The Combined License applicant will address the oxygen scavenging agent and pH adjuster selection for the turbine island chemical feed system.

The commitment was also captured as COL Action Item 10.5-4 in Appendix F of NUREG-1793:

The COL applicant is responsible for chemistry control of the condensate, feedwater, and auxiliary steam system.

The Turkey Point Units 6 and 7 COL FSAR modified Section 10.4.7.2.1 of the AP1000 DCD, to state:

The oxygen scavenger agent is hydrazine and/or carbohydrazide and the pH control agent is morpholine.

The NRC staff reviewed the resolution to PTN COL 10.4-2 regarding the text added to Section 10.4.7.2.1, related to condensate, feedwater, and auxiliary steam system chemistry control.

The description of the secondary water chemistry control program is addressed in the AP1000 DCD, Section 10.3.5. Consistency with industry guidelines was addressed in the AP1000 DCD, Section 10.3.5.5, which stated that action taken when chemistry parameters are outside normal operating ranges will, in general, be consistent with action levels described in Reference 1 (“PWR Secondary Water Chemistry Guidelines,” EPRI technical report (TR) TR-102134-R5, March 2000). However, the AP1000 DCD does not specify the oxygen scavenger or pH control chemicals to be used. This is to be addressed by COL Information Item 10.4-2 of the AP1000 DCD.

Revision 6 of the EPRI Secondary Water Chemistry Guidelines (EPRI Guidelines), which is the latest published version of these guidelines, does not require a specific oxygen scavenging agent. However, the guidelines do note that hydrazine is the most commonly used oxygen scavenger for PWR secondary systems and is generally recognized as effective for this purpose. Therefore, the staff finds the identified oxygen scavenger agent is consistent with the EPRI guidelines identified in the AP1000 DCD.

For pH control, the EPRI secondary water chemistry guidelines do not require specific amines. Section 3.3.1 of the EPRI Guidelines recommends a plant-specific amine be selected based on a number of listed factors. Section 3.3.1 of the EPRI Guidelines lists several amines that have been used or are being used in PWR plants as pH control agents, including morpholine. Section 3.3.1.2 of the EPRI Guidelines states that if implementing advanced amine treatment, a site-specific materials compatibility review will be necessary to ensure that components, particularly elastomers, are compatible with the amine. The EPRI Guidelines, in Table 5-4, “Recirculating Steam Generator Power Operation ($\geq 30\%$ Reactor Power) Feedwater Sample,” refer to several other EPRI reports for guidance for optimization of the pH in conjunction with the amine selected.

Although the applicant did not explicitly describe how the selected amines were qualified, STD SUP 10.4-2 ensures that the qualification of the chosen oxygen scavenging and pH control

chemicals will be consistent with the EPRI PWR Secondary Water Chemistry Guidelines. (See evaluation of STD SUP 10.4-2 below under evaluation of supplemental information).

The staff finds the pH control and oxygen scavenger chemical acceptable because the proposed chemicals will be qualified and the resulting pH optimized following the guidance of the EPRI PWR Secondary Water Chemistry Guidelines, which is referenced in Section 10.4.7 of NUREG-0800 as acceptable guidance to ensure that the secondary water chemistry program meets GDC 14. On the basis of the information provided by the applicant and the acceptance criteria in BTP 5-1, the staff concludes that the proposed secondary chemistry that uses hydrazine and/or carbohydrazide and morpholine is acceptable.

The following portion of this technical evaluation section is reproduced from Section 10.4.7.4 of the VEGP SER:

Supplemental Information

- STD SUP 10.4-1

The applicant provided supplemental information as part of the BLN COL FSAR regarding operations and maintenance procedures. The applicant added the following text to the end of Section 10.4.7.2.1 of the AP1000 DCD, Revision 17:

Operations and maintenance procedures include appropriate precautions to avoid steam/water hammer occurrences.

The NRC staff reviewed the standard supplemental information provided in STD SUP 10.4-1 regarding the text added to Section 10.4.7.2.1 related to operations and maintenance procedures.

In Section 10.4.7 of NUREG-0800, Acceptance Criteria 2, provides acceptable methods of compliance with the requirements in GDC 4, as it applies to fluid flow instabilities, (e.g., water hammer). Criteria 2B, "Meeting the guidance related to feedwater-control-induced water hammer," states that guidance for water hammer and mitigation is found in NUREG-0927. The supplemental information added to the BLN COL FSAR states that operations and maintenance procedures include appropriate precautions to avoid steam/water hammer occurrences; however, the supplemental information being proposed by the applicant did not identify what type of precautions included in the procedures minimize the potential for water hammer occurrences. In order to ensure that the procedures adequately address water hammer prevention and mitigation, the staff requested in RAI 10.4-7-1, in a letter dated June 3, 2008, that the applicant provide a more detailed statement concerning the use of operations and maintenance procedures, including information on what specific elements in the procedures (i.e., venting) will result in reduced potential of water hammer occurrences.

In its response, dated July 17, 2008, concerning reducing the potential for water hammer events, the applicant identified that they programmatically integrate into the AP1000 Operations Procedure development good operating practice and operating experience including, but not limited to, Institute of Nuclear Power

Operations (INPO) significant event reports and significant operating event reports, NRC information notices and bulletins, and other industry operating experience information. Further, the applicant explained that specific operating experience to preclude or mitigate water hammer is included in this population of operating experience. In addition, the applicant explained that the AP1000 has been designed to prevent or minimize steam and water hammer. The applicant agreed to revise the procedure elements in BLN COL FSAR Section 10.4.7.2.1, and described in STD SUP 10.4-1, to include additional precautions to minimize the potential for steam and water hammer.

The revised STD SUP 10.4-1, in BLN COL FSAR Section 10.4.7.2.1 now reads as follows:

Operations and maintenance procedures include precautions, when appropriate, to minimize the potential for steam and water hammer, including:

- Prevention of rapid valve motion.*
- Process for avoiding introduction of voids into water-filled lines and components.*
- Proper filling and venting of water-filled lines and components.*
- Process for avoiding introduction of steam or heated water that can flash into water-filled lines and components.*
- Cautions for introduction of water into steam-filled lines or components.*
- Proper warmup of steam-filled lines.*
- Proper drainage of steam-filled lines.*
- The effects of valve alignments on line conditions.*

Based on its review, the staff finds the applicant's response acceptable because a detailed list of the procedural precautions that would reduce or minimize the occurrence of water hammer was provided and included as a proposed revision to the COL application, Part 2, BLN COL FSAR Section 10.4.7.2.1. Further, the staff reviewed the precautions and compared them to the industry experience and staff guidance in accordance with Section 10.4.7 of NUREG-0800 and BTP 10-2. The staff finds that the applicant has adequately addressed the steam and water hammer. Therefore, the staff's concern described in RAI 10.4.7-1 is resolved.

- STD SUP 10.4-2 [PTN SUP 10.4-2 for the Turkey Point Units 6 and 7]*

The applicant provided supplemental information explaining that the EPRI PWR Secondary Water Chemistry Guidelines will be used for guidance on selection of pH control agents and pH optimization as described in NEI 97-06.

EPRI documents provide detailed guidelines for both qualification of the selected pH control chemicals and the optimization of the secondary pH. While the staff does not review or accept the EPRI PWR Secondary Water Chemistry Guidelines through a safety evaluation, these guidelines are recognized as representing the industry consensus on best practices in water chemistry control and have been proven to be effective via many years of successful operating experience. As such, the staff finds the application of the guidance of the EPRI PWR Secondary Water Chemistry Guidelines, and a programmatic commitment to use these guidelines, to be an acceptable method for the applicant to ensure compliance with GDC 14. As discussed in a Federal Register (FR) notice, dated March 2, 2005, 70 FR 10298, the reference to NEI 97-06 and the associated water chemistry guidelines provide reasonable assurance that SG tube integrity will be maintained.

10.4.7.5 Post Combined License Activities

There are no post-COL activities related to this section.

10.4.7.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the condensate and feedwater system, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of GDC 4 and GDC 14 through the methods described in Sections 10.4.6, 10.4.7, and 5.4.2.1 of NUREG-0800, NUREG-0927, BTP 5-1, and BTP 10-2. The staff based its conclusions on the following:

- PTN COL 10.4-2 and PTN SUP 10.4-2, relating to the condensate, feedwater, and auxiliary system chemistry control program, are in accordance with EPRI PWR Secondary Water Chemistry Guidelines, which is referenced in NUREG-0800 Sections 10.4.6 and 5.4.2.1, including BTP 5-1 of NUREG-0800. Meeting these guidelines ensures that GDC 14 is met with respect to integrity of the reactor coolant pressure boundary, specifically as the secondary water chemistry program ensures the integrity of the SG tubing.
- STD SUP 10.4-1, relating to operations and maintenance, is acceptable to the staff because the applicant has provided a detailed list of the procedural precautions that are consistent with Section 10.4.7 of NUREG-0800 and the BTP 10-2 acceptance criteria.

10.4.8 Steam Generator Blowdown System (Related to RG 1.206, Section C.III.1, Chapter 10, C.I.10.4.8, “Steam Generator Blowdown System (PWR)”)

The SG blowdown system assists in maintaining acceptable secondary coolant water chemistry during normal operation and during anticipated operational occurrences, such as main condenser inleakage or primary to secondary SG tube leakage. It does this by processing water from each SG and removing impurities.

Section 10.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 10.4.8 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff’s review confirmed that there is no outstanding issue related to this section. The results of the NRC staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

10.4.9 Startup Feedwater System

The startup feedwater system provides a supply of feedwater to the SGs during plant startup, hot standby and shutdown conditions, and during transients in the event of main feedwater system unavailability. The startup feedwater system is composed of components from the AP1000 main and startup feedwater system and SG system.

Section 10.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 10.4.9 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff’s review confirmed that there is no outstanding issue related to this section. The results of the NRC staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

10.4.10 Auxiliary Steam System

The auxiliary steam system provides the steam required for plant use during startup, shutdown, and normal operation. Steam is supplied from either the auxiliary boiler or the main steam system.

Section 10.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 10.4.10 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff’s review confirmed that there is no outstanding issue related to this section. The results of the NRC staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

10.4.11 Turbine Island Chemical Feed

The turbine island chemical feed system injects required chemicals into the condensate, feedwater, auxiliary steam, service water, and demineralized water treatment. Chemical feed system components are located in the turbine building.

Section 10.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 10.4.11 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

10.4.12 Combined License Information

Section 10.4.12 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference with no departures or supplements, Section 10.4.12, "Combined License Information," of Revision 19 of the AP1000 DCD. The NRC staff reviewed Section 10.4.12 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹

The applicant addressed COL Information Items 10.4-1, 10.4-2, and 10.4-3. These items are discussed and evaluated in Sections 10.4.5, 10.4.7, and 9.2.5 of this SER, respectively.

11.0 RADIOACTIVE WASTE MANAGEMENT

The radioactive waste management systems (RWMSs) are designed to control, collect, handle, process, store, and dispose of liquid, gaseous, and solid wastes that may contain radioactive materials. The systems include the instrumentation used to monitor and control the release of radioactive effluents and wastes and are designed for normal operation (including refueling; purging; fuel handling and storage; radioactive material handling, processing, use, storage, and disposal; maintenance; routine operational surveillance; inservice inspection (ISI); and calibration) and anticipated operational occurrences (AOOs).

11.1 Source Terms

The radioactive source terms are used to identify the potential dose to members of the public and plant employees as a result of plant operation. This includes consideration of parameters used to determine the concentration of each isotope in the reactor coolant, fraction of fission product activity released to the reactor coolant, and concentrations of all nonfission product radioactive isotopes in the reactor coolant. Gaseous and liquid waste sources are considered in the evaluation of effluent releases.

Section 11.1 of the Turkey Point Units 6 and 7 combined license (COL) Final Safety Analysis Report (FSAR), Revision 8, incorporates by reference, Section 11.1, "Source Terms," of Revision 19 of the AP1000 Design Control Document (DCD).

In addition, in the Turkey Point Units 6 and 7 COL FSAR, the applicant provided the following:

Departure

- PTN DEP 6.4-1

The applicant provided information in Section 11.1 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this report.

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed Section 11.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that no issue relating to this section remained for review. The staff's review confirmed that there is no outstanding issue related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG 1793, "Final Safety Evaluation Report [FSER] Related to Certification of the AP1000 Standard Design," and its supplements.

11.2 Liquid Waste Management Systems

11.2.1 Introduction

The liquid waste management system (LWMS) is designed to control, collect, process, handle, store, and dispose of liquid radioactive waste generated as the result of normal operation, including AOOs.

11.2.2 Summary of Application

Section 11.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 11.2 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 11.2, the applicant provided the following:

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- STD COL 11.2-1

The applicant provided additional information in Standard (STD) COL 11.2-1 to resolve COL Information Item 11.2-1 (COL Action Item 11.2-1). The additional information addresses the use of mobile or temporary equipment to process liquid effluents in Turkey Point Units 6 and 7 COL FSAR, Sections 11.2.1.2.5.2 and 11.2.5.1.

- PTN COL 11.2-2

The applicant provided additional information in Turkey Point Nuclear Plant (PTN) COL 11.2-2 to resolve COL Information Item 11.2-2 (COL Action Item 11.2-2). The additional information addresses the dilution factors used for dose calculations and the cost-benefit analysis of population doses in Turkey Point Units 6 and 7 COL FSAR, Sections 11.2.3.5 and 11.2.5.2.

- PTN COL 2.4-5 and PTN COL 15.7-1

Turkey Point Units 6 and 7 COL FSAR, Section 11.2, does not identify PTN COL 2.4-5 and PTN COL 15.7-1 as COL information items applicable to Section 11.2. However, PTN COL 2.4-5 and PTN COL 15.7-1 provide information regarding a postulated liquid waste tank failure, which is evaluated by the staff as part of LWMS. Therefore, PTN COL 2.4-5 and PTN COL 15.7-1 are evaluated in Section 11.2.4 of this safety evaluation report (SER). In Turkey Point Units 6 and 7 COL FSAR, Section 2.4.13, the applicant performed the consequence analysis of a postulated liquid waste tank failure to address COL Information Items 2.4-5 and 15.7-1.

- PTN COL 11.5-3

The applicant provided additional information in PTN COL 11.5-3 to resolve COL Information Item 11.5-3 (COL Action Item 11.5-3). The additional information addresses compliance with Title 10 of the *Code of Federal Regulations* (CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation To Meet the Criterion 'As Low as Is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," Section II.A in Turkey Point Units 6 and 7 COL FSAR, Section 11.2.3.5.

Supplemental Information

- STD SUP 11.2-1

The applicant added, in Turkey Point Units 6 and 7 COL FSAR, Section 11.2.3.6, supplemental information to address the quality assurance (QA) program to be applied to the LWMS.

- PTN SUP 11.2-1

The applicant added, in Turkey Point Units 6 and 7 COL FSAR, Section 11.2.3.6, supplemental information related to the discharge of effluent to deep well injection wells.

- PTN SUP 11.2-2

The applicant added in, Turkey Point Units 6 and 7 COL FSAR, Section 11.2.3.5, supplemental information related to the QA program.

11.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

The regulatory requirements applicable to the LWMS are as follows:

- 10 CFR 20.1301(e)
- 10 CFR 20.1302, "Compliance with dose limits for individual members of the public"
- 10 CFR 20.1406, "Minimization of contamination"
- 10 CFR 20.2002, "Method for obtaining approval of proposed disposal procedures"
- 10 CFR 50.34a, "Design objectives for equipment to control releases of radioactive material in effluents—nuclear power reactors"
- 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 60, "Control of releases of radioactive materials to the environment"
- 10 CFR Part 50, Appendix A, GDC 61, "Fuel storage and handling and radioactivity control"
- 10 CFR Part 50, Appendix I, Sections II.A and II.D
- 10 CFR 52.80(a)

- 40 CFR Part 190, “Environmental Radiation Protection Standards for Nuclear Power Operations”

Guidance for accepting the supplementary information on the LWMS is in:

- the codes and standards listed in Table 1 of Regulatory Guide (RG) 1.143, Revision 2, “Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants”
- Regulatory Position C.1.1 of RG 1.143, Revision 2
- RG 1.109, Revision 1, “Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I”
- RG 1.110, “Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors”
- RG 1.113, Revision 1, “Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I”
- RG 4.21, “Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning”
- SECY-07-0060, “Basis and Justification for Approval Process for 10 CFR 20.2002 Authorizations and Options for Change”

The acceptance criteria associated with the LWMS are given in Section 11.2 of NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition,” and NUREG-0800, Section 2.4.13, Acceptance Criterion No. 5, including Branch Technical Position (BTP) 11-6.

11.2.4 Technical Evaluation

The staff reviewed Section 11.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic. The staff’s review confirmed that the information in the application and incorporated by reference addresses the required information relating to the LWMS. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff’s review of this application included the following COL information and supplementary items:

- STD COL 11.2-1, Processing of Liquid Waste by Mobile Equipment
- PTN COL 11.2-2, Liquid Radwaste Cost-Benefit Analysis Methodology
- PTN COL 2.4-5, Accidental Release of Liquid Effluents into Groundwater and Surface Water
- PTN COL 15.7-1, Consequences of Tank Failure
- PTN COL 11.5-3, Individual Dose Limits in 10 CFR Part 50, Appendix I
- STD SUP 11.2-1, Quality Assurance
- PTN SUP 11.2-1, Effluent Discharge Point
- PTN SUP 11.2-2, Quality Assurance

In addition to the above items, the staff reviewed the entire section against Section 11.2 of NUREG-0800 to determine whether the information in Turkey Point Units 6 and 7 COL FSAR, Section 11.2, met the regulatory requirements in the regulations stated above (SER Section 11.2.3) and the NUREG-0800 acceptance criteria. The relevant NUREG-0800 acceptance criteria are as follows:

- The LWMS should have the capability to meet the dose design objectives and include provisions to treat liquid radioactive wastes such that the following is true:
 - A. The calculated annual total quantity of all radioactive materials released from each reactor at the site to unrestricted areas will not result in an estimated annual dose or dose commitment from liquid effluents for any individual in an unrestricted area from all pathways of exposure in excess of 0.03 millisievert (mSv) (3 millirem (mrem)) to the total body or 0.1 mSv (10 mrem) to any organ. RGs 1.109, 1.112, and 1.113 provide acceptable methods for performing this analysis.
 - B. The LWMS should include all items of reasonably demonstrated technology that, when added to the system sequentially and in order of diminishing cost-benefit return for a favorable cost-benefit ratio, can effect reductions in doses to the population reasonably expected to be within 80 kilometers (km) (50 miles (mi)) of the reactor. RG 1.110 provides an acceptable method for performing this analysis.
 - C. The concentrations of radioactive materials in liquid effluents released to unrestricted areas should not exceed the concentration limits in Table 2, Column 2, of Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent

Concentrations; Concentrations for Release to Sewerage” to
10 CFR Part 20, “Standards for protection against radiation.”

- The LWMS should be designed to meet the anticipated processing requirements of the plant. Adequate capacity should be provided to process liquid wastes during periods when major processing equipment may be down for maintenance (single failures) and during periods of excessive waste generation. Systems that have adequate capacity to process the anticipated wastes and that are capable of operating within the design objectives during normal operation, including anticipated operational occurrences, are acceptable. To meet these processing demands, interconnections between subsystems, redundant equipment, mobile equipment, and reserve storage capacity will be considered.
- System designs should describe features that will minimize, to the extent practicable, contamination of the facility and environment; facilitate eventual decommissioning; and minimize, to the extent practicable, the generation of radioactive waste, in accordance with the guidelines of RG 1.143, for liquids and liquid wastes produced during normal operation and anticipated operational occurrences, and the requirements of 10 CFR 20.1406. These system design features should be provided in the FSAR, or the COL application, to the extent that they are not addressed in a referenced certified design.
- BTP 11-6, as it relates to the assessment of a potential release of radioactive liquids following the postulated failure of a tank and its components, located outside of containment, and impacts of the release of radioactive materials at the nearest potable water supply, located in an unrestricted area, for direct human consumption or indirectly through animals, crops, and food processing.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the design certification (DC) and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant (VEGP) Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding STD content evaluation were endorsed.
- The staff confirmed that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the STD content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This STD content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the

reference COL application (VEGP) contains evaluation material from the SER for the Bellefonte Nuclear Plant (BLN) Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 11.2.4 of the VEGP SER:

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The following portion of this technical evaluation section is reproduced from Section 11.2.4 of the BLN SER:

- *STD COL 11.2-1*

The applicant provided additional information in STD COL 11.2-1 to resolve COL Information Item 11.2-1. COL Information Item 11.2-1 states:

The Combined License applicant will discuss how any mobile or temporary equipment used for storing or processing liquid radwaste conforms to Regulatory Guide 1.143. For example, this includes discussion of equipment containing radioactive liquid radwaste in the non-seismic Radwaste Building.

The commitment was also captured in COL Action Item 11.2-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will provide information on how any mobile or temporary equipment used for storing or processing liquid radwaste conforms to RG 1.143.

The applicant provided information in BLN COL FSAR Section 11.2.1.2.5.2 that addresses how any mobile or temporary equipment that will be used for storing or processing liquid radwaste conforms to RG 1.143. For example, this includes discussion of equipment containing radioactive liquid radwaste in the non-seismic Radwaste Building. The staff issued Request for Additional Information (RAI) 11.2-5 to clarify some of the language used in the COL concerning the extent of compliance with RG 1.143 for the temporary and mobile equipment. The applicant responded to this RAI by proposing a revision to the BLN COL FSAR text to clearly state that the applicable requirements in RG 1.143 pertain to mobile and temporary equipment.

The NRC staff reviewed the resolution of COL Information Item 11.2-1 related to the use of mobile or temporary equipment included under Section 11.2 of the BLN COL FSAR and found that the applicant's commitments for installing and operating mobile systems meets the acceptance criteria in Section 11.2 of NUREG-0800 and RG 1.143. The NRC staff verified that Revision 1 of the BLN COL FSAR (STD COL 11.2-1) adequately incorporates the above. As a result, RAI 11.2-5 is closed.

While BLN RAI 11.2-5 and COL FSAR, Section 11.2.1.2.5.2, address mobile and temporary processing equipment, neither the response to BLN RAI 11.2-5 nor information already contained in this FSAR section included a discussion of how the cumulative source term inventories of all relevant radioactive materials present in the radwaste building (RWB), including that in mobile or temporary equipment, conform with the RG 1.143, Revision 2, dose acceptance criteria. Specifically, Regulatory Position C.5.1 of RG 1.143, Revision 2, states, “for a given structure housing radwaste processing systems or components, if the total design basis unmitigated radiological release (considering the maximum inventory) at the boundary of the unprotected area is greater than 500 millirem per year or the maximum unmitigated exposure to site personnel within the protected area is greater than 5 rem per year, the external structures are classified as RW-IIa.” Since the AP1000 RWB is classified as RW-IIc (a classification less stringent than RW-IIa), the inventories of radioactive materials in this building should be managed and controlled in a way that will not result in these dose criteria being exceeded.

After reviewing the response to BLN RAI 11.2-5 and the FSAR information addressing COL Information Item 11.2-1, the staff issued RAI 11.02-4 to the Levy Nuclear Plant (LNP) requesting that the applicant provide information related to the types and quantities of radioactive material within the RWB and describe how the unmitigated dose criteria to a worker and members of the public will be met, given the guidance and acceptance criteria of RG 1.143, Revision 2.

In a letter dated October 23, 2014, Florida Power & Light Company (FPL) submitted a site-specific response to LNP RAI 11.02-4 applicable to the Turkey Point Units 6 and 7 COL application. This response also resolved questions asked in LNP RAI 11.02-5, for the Turkey Point Units 6 and 7 COL application. The staff notes that Turkey Point Units 6 and 7 each has its own RWB; however, in following the guidance of RG 1.143, Revision 2, each RWB is considered independently for determining the building classifications. Since each RWB is essentially the same and contains the same equipment (the only difference between the buildings for the purposes of radiological classification is the distance to the protected area boundary, in which case the applicant assumed the most limiting distance as applicable to both buildings), the analysis provided by the applicant and discussion below applies to both RWBs, equivalently.

In the response, the applicant indicated that there will be three primary types of radioactive waste within the RWBs. The three types of waste are: (1) liquid waste stored within the three 56,780-L (15,000-gal) monitor tanks, (2) waste associated with liquid mobile waste processing systems, which may be utilized within the radwaste buildings (the AP1000 DCD Chapter 11 indicates that up to three mobile skids may be located in the radwaste building), and (3) solid wastes and wastes that have been packaged and are ready for shipment.

The applicant provided information explaining how operational programs and procedures will ensure that the RG 1.143, Revision 2, dose criteria are not exceeded from the monitor tanks and mobile equipment. In its response, the applicant assumed that each monitor tank and mobile skid-mounted processing system located in the radwaste buildings have the same radionuclide distributions and inventories as the design-basis (0.25-percent failed fuel fraction) reactor coolant activity listed in FSAR Table 2.4.13-201, normalized to the 10 CFR Part 71, Appendix A, A₂ limit. The total radioactivity in each mobile skid-mounted processing skid was assumed to be analogous to the radioactivity that would be contained in a 1,415.8-L (50-ft³) demineralizer used for the same functional purpose (the monitoring tanks and the mobile equipment each have the same activity; however, each mobile skid is modeled as a 1,415.8-L

(50-ft³) demineralizer and the monitoring tanks are modeled based on the specific dimensions of the monitoring tanks). The A₂ activity for radionuclides in monitor tanks and mobile equipment can be found in Table 1 of the response.

Using the source term for the monitoring tanks and mobile equipment, as described above, the applicant calculated the dose rate at the nearest protected area boundary for an unmitigated release from the Turkey Point Units 6 and 7 RWBs. The applicant indicated that the closest distance to the protected area boundary from either of the Turkey Point Units 6 and 7 RWBs is 110 m (360.9 ft). This distance appears consistent with figures found within Chapter 1 of the FSAR. Since the monitoring tanks contain liquid radwaste, the applicant conservatively assumed that the entire liquid inventory of all three monitor tanks combined is released from the building and flows on the surface of the ground to the protected area boundary. The source is modeled as a rectangular source 53.3 m (175 ft) by 110 m (360 ft), with a depth of 2.92 cm (1.15 in.), extending from the radwaste building to the protected area boundary.

This source term is conservative as it does not account for any drainage of the liquid into the ground. The applicant calculated a dose rate 3 ft above the surface of the water of 0.47 mSv/hr (47.0 mrem/hr) to a member of the public at the protected area boundary. The applicant also calculated the dose from each mobile skid assuming that the activity in each skid remains attached to the media used to remove radioactive contaminants from the process fluids. The direct dose from the mobile skids was calculated at the protected area boundary from each skid. The total dose rate from three skids was calculated at 6.46E-3 mSv/hr (0.646 mrem/hr). Therefore, the total dose at the protected area boundary over a period of 2 hours was calculated as 0.952 mSv (95.2 mrem). The 2-hour timeframe is consistent with the timeframe used in similar radiological analyses and is therefore acceptable. The staff confirmed that the assumptions, calculations, and results seem reasonable and finds them to be acceptable for the dose at the protected area boundary, in accordance with RG 1.143, Revision 2.

To calculate the unmitigated exposure to a worker, the applicant assumed that a worker stood 3 m (10 ft) away from the unshielded monitor tank source term and separately 3 m (10 ft) away from the unshielded mobile processing system source term. The resulting worker doses were calculated as 0.49 mSv/hr (49 mrem/hr) and 3.23 mSv/hr (323 mrem/hr), respectively. Both dose rates were multiplied by 3 and added together to account for the total dose from three tanks and three mobile skids. The resulting 2-hour unmitigated exposure to site personnel was calculated as 22.3 mSv (2,230 mrem). This dose is less than the 50 mSv (5,000 mrem) specified in RG 1.143, Revision 2. The 3-m (10-ft) distance was chosen because unlimited worker occupancy workstations and low dose rate waiting areas are located no closer than 3 m (10 ft) from a mobile radwaste processing system or a waste monitoring tank. In addition, routine work practices limit stay times in close proximity to high dose rate radiation sources. Therefore, the staff finds the 3-m (10-ft) distance to be acceptable for the purposes of calculating the unmitigated dose to a worker for the purposes of RG 1.143, Revision 2. The staff confirmed the applicant's calculation results for the dose to a worker and finds these doses to be acceptable.

In the response, the applicant also provided additional information in FSAR Sections 11.2.1.2.5.2, 11.4.6, and 13.5.2.2.6, which fully address COL Information Items 11.2-1 and 11.4-1 (a parallel discussion related to the resolution of COL Information Item 11.4-1 is provided in SER Section 11.4.4 below) and the guidance and criteria of RG 1.143, Revision 2. In order to ensure that the total activity in the RWB is accounted for, the revisions to FSAR Sections 11.4.6 and 13.5.2.2.5 include a statement indicating that the waste removed from mobile radwaste processing systems will be packaged and ready for shipment

prior to placing the processing equipment back into service. Waste that is packaged and ready for shipment is outside the scope of RG 1.143, Revision 2.

While the calculations described above are acceptable for determining the unmitigated dose at the protected area boundary and the unmitigated exposure to workers for preoperational calculational purposes, the applicant and the staff acknowledge that, during operation, there will be unknown quantities of low to moderate activity unpackaged solid waste stored in the RWB. Since the exact types and quantities of this material cannot be determined at this time and because the procedures for ensuring that the criteria in RG 1.143, Revision 2, and the FSAR are being met have not yet been developed, the applicant proposed a license condition. The license condition ensures that procedural controls will be developed to ensure that the source terms are appropriately limited (the monitor tanks and mobile equipment are limited to the 10 CFR Part 71, Appendix A, A_2 values), that the total cumulative inventory of all unpackaged radioactive materials are accounted for in the unmitigated release and exposure calculations, and that doses are calculated, in accordance with RG 1.143, Revision 2. The license condition is discussed in more detail in SER Section 11.2.5 below.

While the applicant's response generally satisfies the staff's questions and concerns related to LNP RAI 11.02-4, the response indicated that high-activity filter cartridges are stored in shielded portable casks in the RWB. This statement is inconsistent with DCD Section 11.4.2.1, which indicates that high-activity filter cartridges are stored in the auxiliary building. High-activity dry waste is defined, in DCD Section 11.4.2.3.3, as waste with a contact dose rate greater than 1 mSv/hr (100 mrem/hr). A modification allowing storage of high-activity filter cartridges in the radwaste building would have to be reviewed in accordance with RG 1.143, Revision 2, if unpackaged, or SRP Section 11.4-A, if packaged, and this evaluation was not performed in the applicant's RAI response. Therefore, on February 3, 2015, the applicant submitted a revision to the initial response, removing the statement indicating that high-activity filter cartridges will be stored in the RWB. The staff finds this to be acceptable.

In summary, the applicant's responses, FSAR changes, and proposed license condition provide reasonable assurance that the total cumulative inventory of all unpackaged waste in the RWB (including the waste in the monitoring tanks, mobile processing systems, and any additional equipment, as well as any other unpackaged waste in the radwaste building) is limited consistent with the RG 1.143, Revision 2, dose acceptance criteria, given the safety classification RW-IIc assigned to the radwaste building. In addition, the response fully and adequately addresses COL Information Items 11.2-1 and 11.4-1. The proposed FSAR changes have been incorporated into the FSAR.

- PTN COL 11.2-2, Liquid Radwaste Cost-Benefit Analysis Methodology

The discussion of PTN COL 11.2-2 addresses the site-specific cost-benefit analysis performed to address the requirements of 10 CFR Part 50, Appendix I, regarding population doses due to liquid effluents. The applicant provided additional information in PTN COL 11.2-2 to resolve COL Information Item 11.2-2 with regard to the cost-benefit analysis methodology.

The staff reviewed the resolution to COL Information Item 11.2-2 related to the cost-benefit analysis methodology described in Turkey Point Units 6 and 7 FSAR, Revision 4, Section 11.2.3.5, and issued RAI 5695, Questions 11.02-1 and 11.02-2 dated May 21, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12142A044). RAI 5695, Question 11.02-1 stated that the applicant needed to provide information to support dose estimates or explain why some exposure scenarios

(e.g., hypothetical future intrusion) may be excluded from consideration. The staff reviewed the applicant's response to RAI 5695, Question 11.02-1 in its letter dated July 13, 2012 (ADAMS Accession No. ML12199A149), and has summarized key points below.

The applicant's analysis indicated no credible exposure scenarios for drinking water existed since the Boulder Zone is highly brackish (i.e., not potable), is more than 883.9 m (2,900 ft) below soil level, and more than 274.3 m (900 ft) below the base of any drinking water source. The applicant then concluded that no cost-benefit analysis was required since no credible exposure pathway existed. The staff issued RAI 6985, Question 11.02-6, dated February 20, 2013, which requested additional information on other potential exposure pathways.

RAI 5695, Question 11.02-2 asked the applicant for clarification regarding the applicant's cost-benefit analysis. In two responses to RAI 5695, Question 11.02-2 dated July 13, 2012, and supplemental response dated April 7, 2015, the applicant proposed to include clarifying details to address the calculation for the cost-benefit analysis. The details of this analysis are provided in the discussion below.

After RAI 5695, Questions 11.02-1 and 11.02-2 were issued on May 21, 2012, the staff recognized additional unique challenges related to the use of deep injection wells. Supplemental RAI 6985, Question 11.02-6 expanded upon and replaced RAI 5695, Questions 11.02-1 and 11.02-2. RAI 5695, Questions 11.02-1 and 11.02-2 were closed pending resolution of Supplemental RAI 6985, Question 11.02-6.

As described in FSAR Section 11.2.3.5, Turkey Point Units 6 and 7 will use a nontraditional disposal method for U.S. Nuclear Regulatory Commission (NRC)-licensed radioactive material in liquid effluents (i.e., deep well injection into the Boulder Zone (about 883.9 m (2,900 ft) below ground surface)) versus the traditional liquid effluent disposal methods that involve the direct discharge into surface waters where the liquid effluent is diluted and dispersed in the receiving waters and is immediately available for potential dose to members of the public.

Migration within and out of the injection zone (Boulder Zone) was evaluated as part of the liquid effluent pathway analysis portion of the performance assessment (PA), to determine if the potential exists for increasing activity concentrations of long-lived radionuclides over the total assumed operation time period of 60 years for each unit. The applicant's evaluation focused on four long-lived radionuclides (tritium, cesium-134 (Cs-134), cesium-137 (Cs-137), and strontium-90 (Sr-90)) which were considered to be the most significant potential dose contributors.

The applicant's analysis of the potential for migration within the injection zone determined that the injectate plume is not expected to reach the hypothesized receptor location—3.54 km (2.2 mi) from the injection point in the Boulder Zone, the distance to the nearest privately owned land parcel—until more than 10 years after initiation of injection. Maximum activity concentrations over the model duration (100 years) at the hypothesized receptor location were estimated for the four radionuclides under consideration, which indicated maximum concentrations would be less than the as-injected concentrations. These maximum concentrations were used to compute the annual doses.

Additionally, the potential for vertical migration out of the injection zone toward drinking water sources in higher strata was evaluated. This analysis concluded that it is not anticipated, under normal operating conditions, that radioactivity injected into the Boulder Zone would reach either

an underground source of drinking water or the surface environment—primarily due to confinement, slow movement, and radioactive decay of the injectate plume.

Although the applicant intends to use a nontraditional disposal method which will serve to isolate the liquid radioactive waste, a cost-benefit analysis (in accordance with 10 CFR Part 50, Appendix I, Section II.D) is required to determine whether radwaste system augments can yield reductions in the 80.5-km (50-mi) population doses at a cost of less than \$10 per person-Sv (\$1,000 per person-rem). In estimating the potential 80.5-km (50-mi) population dose, the applicant selected the maximally exposed individual (MEI) doses in the inadvertent intrusion scenario because they bound those due to off-normal operation. The applicant calculated these annual doses to the MEI due to the ingestion of water and irrigated foods to be $2.7\text{E-}2$ mSv (2.7 mrem) to the total body and $3.8\text{E-}2$ mSv (3.8 mrem) to the liver (the organ receiving the maximum dose) per unit. While these doses are based on consumption rates for the MEI, it is conservatively assumed that the average member of the population also receives these doses.

The applicant's analysis noted that, of the liquid radwaste system (WLS) augments listed in RG 1.110, the one with the lowest annual cost (and thus the first potentially justifiable augment based on an averted dose consideration) is a 20-gpm cartridge filter at \$11,140. To be justified for installation, this augment would need to avert at least $1.11\text{E-}1$ person-Sv (11.14 person-rem) in a 50-mi population (\$11,400 divided by \$1,000 per person-rem averted).

Although 10 CFR Part 50, Appendix I, indicates that the thyroid is the only organ to be considered in the cost-benefit analysis, it is conservatively assumed that the bounding organ dose ($3.8\text{E-}2$ mSv (3.8 mrem) to the liver per unit) applies to the thyroid. Dividing $1.11\text{E-}1$ person-Sv (11.14 person-rem) by the MEI doses of $2.7\text{E-}5$ Sv ($2.7\text{E-}3$ rem) to the total body and $3.8\text{E-}5$ Sv ($3.8\text{E-}3$ rem) to the organ yields populations of 4,125 and 2,931 persons, respectively. Accordingly, the minimum 80.5-km (50-mi) population justifying installation of the cartridge filter augment is 2,931 persons. Consistent with the intruder exposure analysis, each member of this exposed population (cohort) would need to obtain all of their water from a well located 3.54 km (2.2 mi) from Turkey Point Units 6 and 7. The applicant stated that this cohort does not now exist, nor is it considered reasonable to assume it will exist in the future.

The applicant concluded that, due to regulatory constraints and the quality of water in the Boulder Zone, the postulated inadvertent intrusion scenario is not considered reasonable given that the cohort population would need to ingest water and irrigated foods produced from the postulated well on privately owned land.

The staff performed a thorough review of the applicant's analysis and, considering the conservatisms used in the analysis, the regulatory constraints, and the quality of water in the Boulder Zone, concurs with the applicant's conclusion that no liquid radwaste treatment system augment is justified.

- PTN COL 2.4-5 and PTN COL 15.7-1

The applicant provided additional information in PTN COL 2.4-5 and PTN COL 15.7-1 to resolve COL Information Items 2.4-5 and 15.7-1.

COL Information Item 2.4-5 states:

Combined License applicants referencing the AP1000 certified design will address site-specific information on the ability of the ground and surface water to

disperse, dilute, or concentrate accidental releases of liquid effluents. Effects of these releases on existing and known future use of surface water resources will also be addressed.

The commitment was also captured as COL Action Item 2.4.1-1 in Appendix F of NUREG-1793, which states:

The COL applicant will provide site-specific information on the ability of the ground and surface water to disperse, dilute, or concentrate accidental releases of liquid effluents. The COL applicant will also address the effects of such releases on existing and known future use of surface water resources.

COL Information Item 15.7-1 states:

Combined License applicants referencing the AP1000 certified design will perform an analysis of the consequences of potential release of radioactivity to the environment due to a liquid tank failure as outlined in subsection 15.7.3.

The commitment was also captured as COL Action Item 15.3.8-1 in Appendix F of NUREG-1793, which states:

The COL applicant will perform a site-specific analysis of the consequences of a potential release of radioactivity to the environment as a result of a liquid tank failure.

Section 2.4.13 of the applicant's FSAR addresses accidental release of liquid effluents into ground and surface water. The applicant postulated a release of the contents of the waste liquid system effluent hold-up tank, consistent with the guidance provided in BTP 11-6. BTP 11-6 provides guidance in assessing potential release of radioactive liquids at the nearest potable water supply located in an unrestricted area. BTP 11-6 states the evaluation of the release should consider the use of water for direct human consumption or indirect consumption through animals (livestock watering), crops (agricultural irrigation), and food processing (water as an ingredient).

The staff performed an independent dose assessment using the applicant's groundwater (GW) transport modeling coupled with the pathway modeling of RG 1.109. The staff's evaluation of the primary conceptual model resulted in a potential dose of 0.44 mSv (44 mrem) (fish and invertebrate pathways), where the primary difference with the applicant's doses is due to differences in consumption rates. The staff assumed the recommended maximum individual consumption rates of 27 kg/year fish and 5 kg/year invertebrate. For the alternate conceptual model, the staff's analysis resulted in a potential total body dose of 0.52 mSv (52 mrem), based on consumption of 27 kg/year fish and 5 kg/year invertebrate and inclusion of a near-field dilution factor for the receiving water body of Biscayne Bay.

The applicant's calculation presented radionuclide concentration in sediment at the entry point into Biscayne Bay. To model the aquatic food pathway, no additional dilution is taken for the invertebrate calculation, assuming the invertebrates reside in the sediments. However, for the fish pathway, tidal dilution is assumed, recognizing that the fish do not reside in the sediments and significant dilution is afforded by the tidal flow. A contaminated GW flux (conservatively evaluated based on applicant's data) into Biscayne Bay is diluted by the tidal flux. This application is consistent with DC/COL-ISG-013, where credit for the near-field dilution in the

receiving water body is acceptable. The assigned near-field dilution is evaluated, considering conservative tidal flow and the release rate into Biscayne Bay.

The staff's independent calculations yielded a dose of 0.52 mSv (52 mrem) total body for the invertebrate and fish pathways using consumption rates for the maximum exposed individual (adult) from RG 1.109, Revision 1. Based on the applicant's response to RAI 5643, Question 2.04.12-6, dated June 27, 2011, and the above evaluation, the staff finds potential doses to members of the public resulting from an accidental release of liquid effluents meet Acceptance Criterion 5 and the referenced BTP 11-6.

The staff confirmed the estimated total dose rate from radionuclides in the bay was below the exposure level of 1 mSv/yr (100 mrem/year) given in 10 CFR 20.1301, "Dose limits for individual members of the public."

- PTN COL 11.5-3

The applicant provided additional information in PTN COL 11.5-3 to resolve the COL responsibilities stated in Section 11.5.7 of the AP1000 DCD, which states:

The COL applicant is responsible for addressing the 10 CFR Part 50, Appendix I, Sections II.A and II.D guidelines for maximally exposed offsite individual doses and population doses via liquid and gaseous effluents.

The commitment was also captured in COL Action Item 11.5-3 in Appendix F of the staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant is responsible for addressing the guidelines of Appendix I to 10 CFR Part 50, as they relate to maximally exposed offsite individual doses and population doses attributable to liquid and gaseous effluents.

The applicant, in FSAR Section 11.2.3.5, discussed the planned discharge of liquid radioactive effluents via deep well injection to the Boulder Zone of the Lower Floridan aquifer, contending that this means of disposal would result in no doses to the population from normal operations. There was no other discussion presented relevant to ensuring that individual and estimated population doses are maintained "as low as is reasonably achievable" (ALARA) in accordance with 10 CFR Part 50, Appendix I (this information is also applicable to FSAR Sections 11.3.3.4 and 11.4).

The staff reviewed the applicant's response to PTN COL 11.5-3 related to compliance with 10 CFR Part 50, Appendix I, Sections II.A and II.D; determined that the proposed method of disposal of liquid radioactive effluents falls under alternate disposal requirements of 10 CFR 20.2002; and issued RAI 5695, Question 11.02-2 requesting the applicant to specifically address those requirements. As previously noted, the staff issued Supplemental RAI 6985, Question 11.02-6, on February 20, 2013, which expanded upon and replaced RAI 5695, Questions 11.02-1 and 11.02-2 (RAI 5695, Questions 11.02-1 and 11.02-2 were closed pending resolution of Supplemental RAI 6985, Question 11.02-6).

The staff's review of the applicant's described intrusion scenario raised a number of questions. The staff issued RAI 5695, Question 11.02-4 asking the applicant to address those questions. RAI 6985, Question 11.02-6 requested that the applicant provide an evaluation of potential

leakage of injectate along well casings upward toward the Upper Floridan and Biscayne Aquifers.

The staff's evaluation and conclusion of the acceptability of the proposed disposal method via deep well injection, potential radiological impacts to offsite intruders, and regulatory compliance with 10 CFR 20.1301, 20.1302, 20.1406, and 20.2002, and 10 CFR Part 50, Appendix I, design objectives and ALARA provisions are described below under "Demonstrating Compliance with 10 CFR 20.2002."

The following portion of this technical evaluation section is reproduced from Section 11.2.4 of the VEGP SER:

Supplemental Information

The following portion of this technical evaluation section is reproduced from Section 11.2.4 of the BLN SER:

- *STD SUP 11.2-1*

The applicant provided supplemental information in BLN COL FSAR Section 11.2.3.6, "Quality Assurance," addressing the quality assurance program to be applied to the liquid waste system and stated that the program complies with the guidance presented in RG 1.143.

The NRC staff reviewed this supplemental quality assurance information included in BLN COL FSAR Section 11.2.3.6 and finds that this supplemental statement commits the applicant to the regulatory positions in RG 1.143 related to quality assurance and is acceptable.

- PTN SUP 11.2-1

The applicant provided additional information in PTN SUP 11.2-1 stating that the liquid radwaste discharge release point is where the LWMS effluent discharge pipe connects to the blowdown sump discharge pipe to deep injection wells. The applicant also stated that the LWMS effluent discharge piping is double-walled piping up to this point.

The staff reviewed this supplemental information included in Turkey Point Units 6 and 7 COL FSAR Section 11.2.1.2.4 and finds that this supplemental statement is acceptable. A detailed evaluation of PTN SUP 11.2-1 is contained in Section 12.3 of this SER.

- PTN SUP 11.2-2

The applicant provided additional information in PTN SUP 11.2-2 stating that the quality assurance program for design, construction, procurement, materials, welding, fabrication, inspection, and testing activities conforms to the quality control provisions of the codes and standards recommended in Table 1 of RG 1.143.

Following a review of FPL, Turkey Point Units 6 and 7 FSAR, Revision 4, Section 11.2.3.6, the staff identified an issue on the QA plan and commitment to follow the guidance of RG 1.143 given that its guidance applies to LWMS systems and components not covered by the

requirements of Appendix B to 10 CFR Part 50. In RAI 7097, Question 11.02-7, the staff closed out the prior RAI on the same topic for the purpose of consolidating the technical and regulatory review. The closed RAI is RAI 6919, Question 11.02-5. In RAI 7097, Question 11.02-7, the applicant was requested to address and resolve the following regulatory and technical aspects in defining the scope of the QA program for the LWMS.

Turkey Point Units 6 and 7 FSAR, Revision 4, Section 11.2.3.6, presented supplemental information on QA and commits to follow the guidance of RG 1.143 in recognition that the guidance of RG 1.143 would apply to LWMS subsystems and components not covered by the requirements of Appendix B to 10 CFR Part 50. A review of FPL Quality Assurance Program Description (FPL-2, Revision 3, September 30, 2012) indicated that the commitment to NRC regulatory guides and quality standards did not identify the guidance of RG 1.143 for RWMSs.

Similarly, a review of FSAR, Revision 4, Section 17.3 (as related to design, procurement, fabrication, and installation) and Section 17.5 (as related to QA program descriptions) found the sections did not acknowledge the guidance of RG 1.143 in light of the provisions of Appendix B to 10 CFR Part 50. While Turkey Point Units 6 and 7 FSAR, Revision 4, Sections 11.2 to 11.4, on RWMS stated that the extent of control of Appendix B to 10 CFR Part 50 to such systems is limited, procedural controls would be established to ensure compliance with the guidance of RG 1.143.

However, the staff review of FSAR Revision 4, Sections 13.4 and 13.5, indicated that there was no information identifying the unique aspect of RG 1.143 on the development of a QA program since it was outside of the scope of Appendix B to 10 CFR Part 50. Since the applicant planned to rely on skid-mounted RWMS, there were no commitments as to how the guidance of RG 1.143 would be evaluated and applied in specifying design performance criteria, developing procurement specifications, and confirming proper installation and interfaces with permanently installed RWMS and building services. For permanently installed RWMS, the AP1000 DCD addresses the guidance of RG 1.143 for its design, but leaves the implementation of a supporting QA program to the applicant. Note that, for one type of skid-mounted RWMS, FSAR, Revision 19, Section 11.2.5.1, of the AP1000 DCD states that the applicant will address how mobile or temporary equipment used to process and store wastes will conform with the guidance of RG 1.143. The staff concludes that the applicant's COL FSAR, Revision 4, did not provide such information.

In light of the above, the staff finds that the application was incomplete in demonstrating how the provisions of RG 1.143 would be applied when using skid-mounted RWMS and silent on the implementation of operational programs (including QA) and procedures for all RWMSs. Accordingly, the staff issued RAI 7097, Question 11.02-7 on June 13, 2013, which requested that the applicant address the following concerns and revise the corresponding sections of the FSAR on the use of RWMS.

- (1) Describe how the guidance of RG 1.143 will be evaluated and applied in specifying design performance criteria, developing procuring specifications, and confirming the proper installation and operation, including operational system interfaces with radioactive systems and features in protecting nonradioactive plant systems and building services.
- (2) Describe the elements of the QA program for all RWMSs under the provisions of RG 1.143 and how this aspect of the QA program will be applied and integrated in operational programs and procedures in FSAR, Sections 13.4 and 13.5.

- (3) Given the above, the applicant is requested to make parallel reviews and revisions in FSAR, Section 11.2.3.6 (QA) for the LWMS; Section 11.3.3.6 (QA) for the gaseous waste management system (GWMS); and FSAR, Section 11.4.5 (QA) for the solid waste management system (SWMS).

The staff reviewed the applicant's response to RAI 7097, Question 11.02-7, dated July 31, 2013. The applicant explained how the provisions of RG 1.143 will be applied when using skid-mounted RWMS and on the implementation of operational programs (including QA) and procedures for all RWMSs. The staff finds that this clarifying information is acceptable because the applicant committed to the guidance of RG 1.143, and committed to the regulatory positions established within the RG for C.1 through C.6 by highlighting the DCD sections where the commitments were made and this requirement is also captured by License Condition (11-1). These commitments will ensure that the necessary regulatory requirements are met and this requirement is also captured by License Condition (11-1). NRC RAI 7097, Question 11.02-7 is therefore resolved.

Demonstrating Compliance with 10 CFR 20.1301(e)

In 10 CFR 20.1301(e), the staff requires that NRC-licensed facilities comply with the U.S. Environmental Protection Agency (EPA) generally applicable environmental radiation standards of 40 CFR Part 190 for facilities that are part of the fuel cycle. The EPA annual dose limits are 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid, and 0.25 mSv (25 mrem) to any other organ. Meeting the requirements of 10 CFR 20.1301(e) requires the consideration of all potential sources of external radiation and radioactivity, including liquid and gaseous effluents and external radiation exposures from buildings, storage tanks, radioactive waste storage areas, and nitrogen-16 skyshine from boiling-water reactor (BWR) turbine buildings. The EPA STDs apply to the entire site or facility, whether it has single or multiple units.

The staff's review of the FSAR (Revision 0) revealed that the applicant did not provide any information demonstrating compliance with 10 CFR 20.1301(e). Because of this, the staff issued RAI 5695, Question 11.02-1 requesting that the FSAR demonstrate compliance with the EPA standard.

The applicant provided the demonstration (FSAR Revision 4) by summing the annual individual liquid and gaseous effluent doses for the proposed Turkey Point Units 6 and 7 as well as the existing Units 3 and 4. It listed the results in FSAR Table 11.3-206. Table 11.2-1 below lists these dose summations and compares them to the dose requirements in 40 CFR Part 190. The expected doses are below the EPA dose limits.

**Table 11.2-1 Comparison of Maximum Individual Doses to
40 CFR Part 190 (mSv/yr) (mrem/year)**

Organ/Body	Application *	40 CFR Part 190
Total Body	7.8E-2 (7.8)	2.5E-1 (25)
Thyroid	1.5E-1 (15)	7.5E-1 (75)
Other Organ (Lung)	8.4E-2 (8.4)	2.5E-1 (25)
* Taken from FSAR Table 11.3-206		

Demonstrating Compliance with 10 CFR 20.1302

The annual average concentration of radioactive material released in liquid effluents at the boundary of the unrestricted area must not exceed the values specified in Table 2 of Appendix B to 10 CFR Part 20. The applicant demonstrated compliance with this requirement by referencing the AP1000 DCD. Subsection 11.2.3.4 of the DCD shows that even at the Technical Specification (TS) limit for percent failed fuel defects, the nominal blowdown flow provides sufficient dilution to ensure that the expected effluent release concentrations will be less than those specified in Table 2 of Appendix B to 10 CFR Part 20.

However, the liquid waste disposal for Turkey Point Units 6 and 7 is via deep injection well, not as an effluent with dilution by the normal blowdown flow. In response to RAI 6985, Question 11.02-6, Item 6, the applicant addresses the minimum dilution flow required to control liquid radwaste discharges. The applicant incorporates changes to Sections 11.2.1.2.4 and 11.5.3 that included a discussion about maintaining the effluent concentration limits (ECLs) found in 10 CFR Part 20, Appendix B, by specifying and maintaining flow rates at the blowdown sump discharge to at least the minimum dilution factor. To ensure compliance with the ECLs, the applicant calculated and applied dilution flow prior to each batch release of liquid radwaste. The staff has reviewed the description of the stated flow rates in its response and finds the response to item 6 of RAI 6985, Question 11.02-6 acceptable.

Based on this acceptance, the staff concludes that the applicant has complied with 10 CFR 20.1302.

Demonstrating Compliance with 10 CFR 20.1406

In 10 CFR 20.1406, the staff requires the applicant to provide a description of how facility design and procedures for operation will minimize, to the extent practicable, contamination of the facility and the environment; facilitate eventual decommissioning; and minimize, to the extent practicable, the generation of radioactive waste. The applicant demonstrated compliance with this requirement by incorporating by reference the design descriptions provided in the AP1000 DCD and providing the description of operating programs in SER Section 12.3.

With respect to the use of deep well injection for the disposal of treated liquid waste, the staff's evaluation of the related operational considerations in controlling and monitoring such discharges, via the Offsite Dose Calculation Manual (ODCM) and implementation of the Radiological Environmental Monitoring Program (REMP) for monitoring wells, is presented in

SER Section 11.5, using information drawn from this SER section and SER Sections 9.2.12 and 12.3. SER Section 12.3 contains the staff's evaluation and conclusion pertaining to compliance with 10 CFR 20.1406.

Evaluation of Proposed Disposal Method for Liquid Radioactive Effluents and Demonstrating Compliance with 10 CFR 20.2002

Following a review of FPL, Turkey Point Units 6 and 7 FSAR, Revision 4, Section 11.2, the staff identified several issues associated with the proposed disposal method for liquid radioactive waste via deep well injection into the Boulder Zone, using 12 injection wells and 6 monitoring wells installed on the site.

Regulatory Background

In FSAR Revision 6, Section 11.2.3.5, PTN COL 11.2-2, the applicant proposes a disposal method for liquid radioactive effluents using deep well injection into the Boulder Zone. When compared to routine effluent discharges in surface waters, the radioactivity injected in the Boulder Zone is expected to be isolated from the surface environment and out of reach of traditional radiation exposure scenarios and pathways considered by NRC regulations and guidance. Traditional effluent discharge methods dilute and disperse the radioactivity in the environment, but this disposal method confines the radioactivity into a slow-moving and expanding plume with the total inventory of long-lived radionuclides increasing over the operating life of the plant. As a result, radiological assessment methods and assumed exposure scenarios used to quantify radiological impacts and compliance with NRC regulations for effluents discharged in surface water bodies are not directly applicable.

The deep well injection method involves technical and regulatory considerations that are not explicitly addressed under 10 CFR 50.34a and 50.36a, "Technical specifications on effluents from nuclear power reactors," and 10 CFR Part 50, Appendix I, design objectives and ALARA provisions in controlling radioactive effluent releases. Similarly, the requirements of 10 CFR 20.1301 and 20.1302 and 40 CFR Part 190 (under 10 CFR 20.1301(e)), in complying with ECLs and doses to members of the public, also do not explicitly address deep well injection. However, the applicant must still meet applicable requirements under these regulations in applying the deep well injection method for waste disposal.

Accordingly, the applicant has performed and provided an analysis in its current application under the provisions of 10 CFR 20.2002.

In 10 CFR 20.2002, the staff provides an applicant with a method to obtain approval for proposed procedures, not otherwise authorized in the regulations, for disposal of licensed material generated in the applicant's activities. Under 10 CFR 20.2002, an applicant has to provide (a) a description of the waste, including the chemical and physical properties important to risk evaluation and the proposed manner and conditions of disposal; (b) an analysis of the environment in which wastes will be disposed; (c) the nature and location of other potentially affected licensed and unlicensed facilities; and (d) analyses and procedures to ensure that doses are maintained ALARA and within the dose limits of 10 CFR Part 20. The staff typically approves 10 CFR 20.2002 requests that will result in a dose to a member of the public (including all exposure groups) that is no more than "a few millirem/year" (this information is in SECY-07-0060, Attachment 1, and NUREG-1757, Volume 1, Revision 2, "Decommissioning Process for Materials Licensees," Section 15.12). As is noted in the SECY paper, the staff selected this criterion because it is a fraction of the dose associated with naturally occurring

background radiation, a fraction of the annual public dose limit, and an attainable objective in the majority of cases.

In this context, the staff considers its well-established 10 CFR Part 50 light-water-reactor criteria (including those prescribed by Appendix I) in determining whether all releases of radioactive material to the environment are ALARA and what monitoring, design criteria, and other conditions apply. As a result, the staff's evaluation of this disposal method under 10 CFR 20.2002 does not preclude the staff from considering the substantial technical requirements, design criteria, technical specification (TS), monitoring, and annual reporting called for by other provisions of 10 CFR Parts 20 and 50.

Moreover, the staff notes that there is a need to ensure that NRC and Florida Department of Environmental Protection (FDEP) requirements, when issued, are not conflicting and do not impose duplicative requirements, such as for radiological monitoring, periodic inspections and testing in confirming the mechanical integrity of the injection and monitoring wells, and requirements for well abandonment and closure at the end of their operational cycles or in the event of well failures and migration of radioactive materials in Upper Floridan aquifers.

For these reasons, there are a number of issues that the staff needed to consider in bridging and integrating these regulatory requirements and NRC acceptance criteria. The issues involved the resolution of geohydrological characteristics of the Boulder Zone; use of information described in the construction and testing of the first exploratory and monitoring wells (this information is in FPL reports of September 2012); development of an appropriate radioactive source term confined within an amorphous plume; development of an approach and method for modeling potential exposure scenarios that consider well failures and intrusion scenarios as expected operational occurrences using current land-use practices for this part of Florida; identification of surrogate criteria in achieving the same regulatory objectives since some current regulatory requirements do not apply to this disposal method; identification of FDEP permit conditions that would fulfill or supplement NRC requirements on installation, testing, operation, and environmental monitoring; and insertion of specific license conditions on the design features of injection and monitoring wells whose construction would not be completed before the issuance of the combined license.

RAI Questions on Proposed Deep Well Injection Disposal Method

The information provided in FSAR Revision 6, Sections 9.2, 10.4.5, and 11.2, and responses to the staff RAIs presented in FPL correspondence (May 22, 2012, and July 13, 2012) were not sufficient to validate and confirm the estimated doses of the assumed exposure scenario. Additional detail needed to be provided to enable the staff to confirm that the estimated doses in the FSAR are bounding and acceptable. Without this information, the staff was unable to make a determination that the applicant meets the acceptance criteria in SRP Section 11.2 and complies with the requirements of 10 CFR 20.2002, 20.1301, 20.1302, and 20.1406, and 10 CFR Part 50, Appendix I, numerical guides, design objectives, and ALARA provisions. A Supplemental RAI (RAI 6985, Question 11.02-6) on the proposed deep well injection method consolidates and subsumes the issues identified in prior NRC staff RAIs. As a result, the following RAIs are closed: RAI 5695, Questions 11.02-1, 11.02-2, 11.02-3, and 11.02-4.

The applicant provided responses to RAI 6985, Question 11.02-6, in two parts. In a letter dated August 9, 2013, the applicant provided responses to RAI 6985, Questions 11.02-6(5) to 11.02-6(11), while a January 15, 2014, letter included responses to RAI 6985,

Questions 11.02-6(1) to 11.02-6(4). The staff's evaluation and determination of acceptability of the responses are presented below.

In items 1 through 4 of RAI 6985, Question 11.02-6, the applicant was requested to consider radiological impacts of the disposal method should radioactivity be brought up to the surface by (1) drilling activities undertaken at a location beyond the control of the applicant and expose well drillers to radioactive material, (2) failure of a well casing or packing that could contaminate the Upper Floridan Aquifer and expose water users to radioactive material, and (3) upward migration of the injectate flow from the Boulder Zone into the base of the Upper Floridan aquifer. In item 2, the applicant was asked to consider several scenarios when assessing the radiological impacts of dose as seen in the original question above. Item 3 asked the applicant to consider the cumulative inventories of long-lived radionuclides expected to be present after 40 years of operation for both reactors. Item 4 requested the applicant to consider its application of retardation factors and to indicate the presence of residual concentrations of organic compounds in reclaimed municipal waste water was considered in developing distribution coefficients and retardation factors.

The response to RAI 6985, Question 11.02-6 (1-4), described three models used by the applicant to evaluate transport of radionuclides from the deep well injection. These models were evaluated by NRC hydrology staff to determine whether they provide a reasonable and conservative basis for dose calculations. The model results were also compared to results from independent confirmatory simulations conducted by the staff.

Radial Transport Model

The applicant used a two-dimensional cross-sectional model of the Boulder Zone to evaluate the maximum extent of injectate and radionuclide transport within the Boulder Zone. In addition, this model provided radionuclide concentrations as a function of distance from the injection well. The description of the model implementation in the SEAWAT code was reviewed, although a detailed examination of the input files was not conducted. The model implementation appears to use technically sound procedures. Parameters used in the modeling were based on data from the site investigation, appropriate literature values, and conservative assumptions. Transport was driven by advection, dispersion, and density differences. Radionuclide decay was considered, but no adsorption to solids was assumed. The applicant conducted an analysis to evaluate the sensitivity of model results to changes in parameter values. Key findings were that the injectate plume did not extend the 12.4 km (7.7 mi) to the Ocean Reef receptor location, but it did extend the 3.54 km (2.2 mi) to the closest private land parcel. Maximum tritium concentration 3.54 km (2.2 mi) from the injection location occurred at about 22 years after the start of injection. The maximum tritium concentration ratio (concentration at the receptor divided by the injectate concentration) was about 0.3.

The staff's confirmatory analysis assumed the injection displaced native water within the Boulder Zone to a constant depth of 74 m (242.8 ft) (the depth of the injection well) to create an expanding cylinder of injectate in the Boulder Zone. The radius of the injectate cylinder expands over time, reaching a radius of 3.54 km (2.2 mi) after 23.5 years. Assuming radionuclide decay, this travel time results in a concentration ratio for tritium of 0.27. The staff's results are bounded by the analysis of the applicant.

Vertical Transport Model

The applicant used a three-dimensional model, also implemented with SEAWAT, to evaluate vertical transport through the middle confining unit (MCU). No preferential pathway in the MCU was assumed. The primary model parameter controlling vertical flow in the MCU is the value of vertical hydraulic conductivity. Literature values reported for this parameter range over 10 orders of magnitude. The applicant used a value that is about 10 times smaller than the geometric mean, and one-half the harmonic mean, of the exploratory well EW-1 measurements. (Three of 16 values reported there were less than the value used by the applicant in the model.) Based on model results, the applicant reported that the injectate travelled approximately 94.4 m (310 ft) upward into the MCU during the 100-year simulation. The applicant evaluated the sensitivity of these results and reported that the travel distance into the MCU is linearly related to the vertical hydraulic conductivity and the inverse porosity.

The staff's confirmatory analysis used a one-dimensional analysis of density-dependent flow. Using the applicant's value of vertical hydraulic conductivity in the MCU, the staff's analysis results in the injectate travelling about 100 ft into the MCU in 100 years. For a layered hydrogeologic unit, vertical flow would be proportional to the harmonic mean of the individual layer hydraulic conductivities. Using the harmonic mean of the exploratory well EW-1 measurements, the staff estimated that the injectate would travel 68.9 m (226 ft) in 100 years. The staff's results are bounded by the applicant's results.

Liquid Dose Pathway

The applicant made conservative assumptions in evaluating transport through a preferential pathway in the MCU. The applicant assumed a continuous pathway from the Boulder Zone to the Upper Floridan aquifer and assumed that injectate in the Boulder Zone would be instantaneously transported, without dilution, through the pathway. Concentrations in the Upper Floridan aquifer were assumed to be those calculated using the Radial Transport model. The staff evaluated the applicant's assumptions and determined that these assumptions represent a bounding transport pathway between the Boulder Zone and the Upper Floridan aquifer.

The applicant performed a screening analysis using the LADTAP II code to determine what radionuclides were the largest contributors to dose from AP1000 DCD Table 11.2-7, considering the ingestion pathways of drinking water, and irrigated milk, meat, and vegetables for decay times spanning 5 to 100 years. The cumulative inventory present in the Boulder Zone at the end of Turkey Point Units 6 and 7 plant operations was also determined. The applicant presented a comparison of the subsurface activity present at the year in which both units cease operation. The applicant's analysis determined that tritium, Sr-90, Cs-134, and Cs-137 contribute over 99 percent of the dose to the total body and all organs after a decay time of 10 years or more from this comparison. This decay time is used because, according to the radial transport model, the plume does not reach the nearest resident until 10 years after the first injection. These four radionuclides would be retained and used as input for the dose analysis.

The model presented by the applicant contains the following assumptions: no soil retention or retardation by soil absorption is being accounted for, model period time of 60 years per unit, 1-year interval between startup for Turkey Point Units 6 and 7; entire simulation is 100 years leaving a 39-year interval to evaluate radionuclide migration after injection stops. Outages of 30 days or less are not modeled, and it is assumed that injection is continuous for 60 years per

reactor. The continuous injection assumption maximizes radionuclide concentrations at the receptors since it assumes greater liquid radwaste generation, release, and plume expansion. Since the plume expands faster, there is less time for radionuclides to decay before reaching the receptor. Considering these assumptions, the applicant stated that the approximate average annual injection rate is 23,583 L/min (6,230 gpm) for a single unit or 47,166 L/min (12,460 gpm) for two units. These flow rates are based on the DCD minimum dilution flow rate of 22,712 L/min (6,000 gpm), as found in DCD Section 11.2.3.3. Based on these assumptions, the staff determines that this approach appears to be conservative for an offsite exposure scenario.

The applicant identified two potential receptor locations. The first receptor location is 3.54 km (2.2 mi) northwest (NW) from the injection point, and the second is 12.4 km (7.7 mi) southeast. The receptor at 3.54 km (2.2 mi) is considered a highly improbable receptor since the flow of the Upper Floridan Aquifer is to the east of this location. The receptor located at 12.4 km (7.7 mi), however, does use water from the Upper Floridan Aquifer for irrigation purposes.

To provide a bounding analysis, the applicant determined that a tritium concentration of 1,369 Bq/L (37,000 pCi/L) would yield a limiting child total body dose of $6\text{E-}2$ mSv/yr (6 mrem/year) which is equivalent to the total body design objective of $3\text{E-}2$ mSv/yr (3 mrem/year) per unit. Tritium was used since it was also determined by the applicant to contribute 90 percent of the total dose. Then using the radial transport GW model, as discussed above, the applicant determined the distance that the 1,369 Bq/L (37,000 pCi/L) would travel over the selected timeframes of 5, 10, 25, 50, 75, and 100 years.

Based on the liquid pathway analysis, the applicant provided detailed dose calculations for the two locations identified above. From this analysis, the applicant determined that the model projected it would take more than 10 years for the plume to reach the nearest receptor at 3.54 km (2.2 mi) and the plume would not reach the receptor at 12.4 km (7.7 mi) during the 100-year simulation. The applicant's analysis showed that, for times after 100 years, the size of the plume, as a function of radionuclide concentration, is decreasing at a faster rate due to decay than increasing by migration since injection into the deep well stops at year 61 of the simulation.

As a result of the GW modeling, the applicant determined that the bounding exposure scenario was the extraction and use of water from directly above a hypothetical failure of the MCU after injection and flow through the Boulder Zone.

A detailed discussion was provided regarding potential future land uses, based on (a) Miami-Dade County Comprehensive Development Master Plan, considering wetlands identification; (b) the Future Land Use Map for Homestead; and (c) proposed Comprehensive Everglades Restoration Plan. This discussion determined that there were no future land uses that required special consideration in the GW use and exposure modeling.

In item 1 of RAI 6985, Question 11.02-6, the staff stated three different exposure scenarios for the applicant to consider. In the applicant's response, the applicant provided scenarios for analysis for each of the following: (1) Normal Operations, (2) Off-Normal Operations, and (3) Inadvertent Intrusion. In addition, the following areas were considered: (1) Plant Area, (2) Property Area, and (3) Beyond Property Area. Because of well design/construction, FDEP requirements, the applicant's site access restrictions, and the GW modeling, no Plant Area or Property Area exposure scenarios were identified as feasible since the restrictions to the site area and GW modeling did not yield a scenario where members of the public would be exposed.

However, for the Beyond Property Area scenario, the failure of the middle confining area and GW migration into the Upper Floridan Aquifer was considered. For this Beyond Property Area scenario, the 3.54-km (2.2-mi) and 12.4-km (7.7-mi) receptors were both considered.

The exposure scenarios described include: (1) off-normal operation with an MCU failure located 3.54 km (2.2 mi) from the effluent injection point and member of the public Upper Floridan aquifer use resulting in exposure through the drinking water pathway, (2) MCU failure and individual member of the public Upper Floridan aquifer use at 12.4 km (7.7 mi) for drinking water only, and (3) inadvertent intrusion with a member of the public drilling a well into the Upper Floridan aquifer immediately above a failure of the MCU located 3.54 km (2.2 mi) from the effluent injection point then unknowing use of the contaminated Upper Floridan groundwater for the use of drinking water ingestion, irrigation, milk animals, and livestock.

For the water exposure pathway, the dose modeling parameters as used for the RAI response were based on RG 1.109 exposure assumptions, such as age groups, exposure times, as used in the LADTAP II code. The GW modeling calculated was used to calculate the maximum radionuclide concentration in the Upper Floridan aquifer at the offsite location 3.54 km (2.2 mi) away. This modeling resulting in the following radionuclide concentrations:

- Tritium: 1.1E3 Bq/L (3.1E04 pCi/L)
- Cs-134: 2.9E-4 Bq/L (7.7E-03 pCi/L)
- Cs-137: 2.8E-2 Bq/L (7.6E-01 pCi/L)
- Sr-90: 2.1E-5 Bq/L (5.6E-04 pCi/L)

The annual effluent source term, conservatively adjusted to reflect a longer annual operations time and coupled with the GW migration and transit time, was used in the dose calculation. These maximum concentrations were assumed to occur concurrently for purposes of the dose calculations. The applicant's description of the dose modeling then proceeds to explain the use of the LADTAP II code, which requires the extrapolation of the source term and a derived dilution and transit time, for performing the dose calculations.

For the inadvertent intruder, it was assumed that a drinking water well was drilled into the Upper Floridan aquifer at the 3.54-km (2.2-mi) distance. It was assumed the well was located directly above a conduit (between the Boulder zone and the Upper Floridan aquifer). Exposure assumptions were presented addressing the drilling process, where the drillers would be exposed to the radioactive concentrations as modeled at the 2.2-mi distance. Direct exposure to the drilling mud (containing the transported injectate radionuclide concentration) and inhalation exposure to an evaporating puddle are assumed in this calculation.

The applicant's dose calculations, for Turkey Point Units 6 and 7, yielded a total body dose of 5.5E-2 mSv/yr (5.5 mrem/year) for the inadvertent intruder at 3.54 km (2.2 mi) NW of the injection point: 1.8E-2 mSv/yr (1.8 mrem/year) from drinking water and 3.6E-2 mSv/yr (3.6 mrem/year) from irrigated foods. Tritium accounted for 99 percent of the drinking water dose and 92 percent of the irrigated foods dose. The maximum organ (liver) dose was 7.6E-2 mSv/yr (7.6 mrem/year), with drinking water being 25 percent and irrigated foods 75 percent of total. Tritium constituted 95 percent of the organ drinking water dose and 58 percent of the irrigated food dose. The dose from the drilling operation was calculated to be less than 1E-3 mSv (0.1 mrem) (total body and maximum organ-liver).

In a supplemental clarification question asked by the staff, on RAI 6985, Question 11.02-6, the staff requested that the applicant provide a clarification to the response concerning the distribution coefficients (Kd). In the supplemental response dated June 4, 2014, the applicant provided a revision to its original response. This revision provided clarification on the use of Kd in evaluating the dose calculations in the scenario for a driller. The response from the applicant emphasized the contribution of tritium on the total dose and the small impact the other three radionuclides would have if they were retained in soil. To confirm this, the staff performed independent calculations to confirm that the doses from inhalation and immersion in the drilling scenario were small. The results of the staff's analysis agreed that the contribution from Sr-90, Cs-134, and Cs-137 is a small contributor to dose and the staff agrees with the approach taken by the applicant.

The staff reviewed the source term used to assess doses to a member of the public via the deep well injection pathway. In its review, the staff raised a question on whether the source term described in 11.2 for the inadvertent intruder scenario was based on a one-unit or two-unit source term contribution. In RAI 7908, Question 11.02-8, the staff requested clarification on the dose assessment included in FSAR Section 11.2, Revision 6, for the intruder scenario to show how doses, when calculated on a per-unit basis, remain in compliance with the design objective of 10 CFR Part 50, Appendix I.

In its response to RAI 7908, Question 11.02-8, dated June 23, 2015, the applicant described the plant blowdown sump pump discharge to the Lower Floridan aquifer (Boulder Zone) by the deep well injection system (DIS). In FSAR Section 11.2.3.5, the applicant described its PA to assess the environmental fate and transport of Turkey Point Units 6 and 7 liquid effluent releases by deep well injection. The PA coupled numerical GW modeling techniques with a liquid pathway analysis to identify the maximum exposed members of the public (MEI) in unrestricted areas as a result of the Turkey Point Units 6 and 7 liquid effluent releases. For the dose assessment, the AP1000 DCD single-unit source term is divided by dilution flow from a single unit to yield the injectate concentration. As described, the injectate concentrations in FSAR Table 11.2-201 are independent of the number of units operating since two units would produce twice the source term as well as twice the dilution flow.

The applicant's analysis indicated that concentrations at offsite receptors are sensitive to the number of units operating, since migration times to offsite locations would be influenced based on the injectate flow rate. Modeling two-unit source term and flows yields the highest calculated offsite dose. As indicated in FSAR Section 11.2.3.5.2.2, "the two-unit case is more limiting as it results in a greater extent of plume expansion at any given point in time as well as a higher cumulative radionuclide inventory." Also in response to RAI 7908, Question 11.02-8, the applicant provided some clarifying details on June 23, 2015, to make clear that the source term found in Section 11.2 is for two units. The staff finds this response and clarifying information acceptable because the basis of the source term is now clearly described in the DCD, and staff can confirm resulting dose calculations. The information provided in response to the RAI 7908, Question 11.02-8 is found acceptable and, hence, RAI 7908, Question 11.02-8 is resolved.

The applicant's dose assessment, as presented in FSAR Table 11.2-209, was based on RG 1.109 modeling assumptions, supplemented by an EPA model for exposure to a sludge or slurry from well excavation to model the potential dose during a well drilling operation. The resulting doses were divided by 2 to yield the doses per unit to facilitate comparisons with the per-unit limits in 10 CFR Part 50, Appendix I. The doses in Tables 11.2-208 and 11.2-210 are both for two units.

The staff's design-basis doses of 10 CFR Part 50, Appendix I, have been selected as suitable doses for evaluating compliance with the ALARA dose requirement of 10 CFR 20.2002(d). The 10 CFR Part 50, Appendix I, design objective doses are 3 mrem/year to total body and 10 mrem/year maximum organ from liquid effluents. These doses are consistent with the staff's acceptance criterion of a "few millirem" (this information is in SECY-07-0060, Attachment 1, and NUREG-1757, Volume 1, Revision 2, Section 15.12) for compliance with the ALARA requirement of 10 CFR 20.2002(d).

The applicant's dose assessment identified an intruder as the controlling scenario. This pathway analysis modeled a failure in the MCU with this failure occurring at the nearest offsite location of private ownership and with a private well used for irrigation purposes. The calculated maximum dose was to the child from the drinking water and irrigated crops pathway, where the total body dose was 5.5 mrem/year and maximum organ (liver) was 7.6 mrem/year.

The staff performed an independent dose assessment for the intruder scenario. The staff's verification calculations were in general agreement with the applicant's calculations, based on the assumptions and modeling assumptions presented by the applicant. The staff's calculation confirmed the overall conservatism of the applicant assessment, where the staff's results indicated a maximum individual (child) potential dose of $4.0\text{E-}2$ mSv/yr (4.0 mrem/year) to total body and $4.2\text{E-}2$ mSv/yr (4.2 mrem/year) to liver for the drinking water and irrigated crop pathways combined.

As identified in the applicant's response by letter dated January 15, 2014, in response to RAI 6985, Question 11.02-6, the assumed location for the intruder scenario (3.54 km (2.2 mi)) represents the closest privately owned land parcel, that could be occupied at some time in the future. Considering water use practices and the Miami-Dade County Comprehensive Development Master Plan, individual potable water systems, including private wells, are considered interim facilities with use when alternative public water supply is not available and land use and water resources are suitable for interim use. Considering these limitations, the assumption that the resident well is the primary drinking water source for the intruder scenario represents a highly unlikely situation. There are numerous situations of the use of GW for irrigation purposes; therefore, this exposure pathway is considered plausible.

Considering the above, the staff based its compliance dose assessment on the irrigated crop exposure scenario alone. For this assessment, MEI is $2.4\text{E-}2$ mSv/yr (2.4 mrem/year) child total body and $3.1\text{E-}2$ mSv/yr (3.1 mrem/year) child liver from the irrigated vegetable pathway. This dose is less than the Appendix I design objective doses of $3\text{E-}2$ mSv/yr (3 mrem/year) total body and $1\text{E-}1$ mSv/yr (10 mrem/year) maximum organ for liquid radioactive effluents, and therefore considered ALARA from a design standpoint.

The staff evaluated and agrees with the modeling scenarios proposed by the applicant and determines that the assumptions taken are conservative and acceptable for evaluating potential offsite doses. SER Table 11.2-2 provides a comparison of the resulting dose estimates between the applicant's analyses, the staff's analysis, and the 10 CFR Part 50, Appendix I, criteria. All doses are below the Appendix I, Section II.A, criteria. The staff concludes that the applicant has provided a bounding assessment demonstrating its capability to comply with regulatory requirements in 10 CFR Part 20 and Appendix I to 10 CFR Part 50.

**Table 11.2-2 Comparison of Maximum Annual Individual Doses with NRC Dose Limits
(mSv/yr) (mrem/year)**

Pathway of Exposure	COL Application *	NRC Staff's Analysis	10 CFR Part 50, Appendix I Section II.A Criteria
Drinking Water <ul style="list-style-type: none"> Total Body mSv (mrem) Liver mSv (mrem) 	** 0.018 (1.8) ** 0.036 (3.6)	0.018 (1.8) 0.020 (2.0)	Total Body 3E-2 (3)
Irrigated Vegetables <ul style="list-style-type: none"> Total Body mSv (mrem) Liver mSv (mrem) 	0.036 (3.6) 0.057 (5.7)	0.024 (2.4) 0.031 (3.1)	Max Organ 1E-1(10)
* Adapted from RAI 11.02-6 response ** Applicant presented one-half these values in FSAR Revision 6, Table 11.2-209, to represent a per-unit application for compliance with the Appendix I design basis, which is also on a per-unit basis.			

The applicant responded to RAI 6985, Questions 11.02-06-5 to 11.02-0-11 on August 9, 2013. On April 22, 2014, the applicant provided a supplement to RAI 11.02-6-5 to 11.02-6-11.

In item 5 of RAI 6985, Question 11.02-6 dated February 20, 2013, the applicant was requested to address: (1) a rise in pressure given the combined operation of multiple wells and (2) potential fractures and formation of hydraulic connections, followed by upwelling into the above confining units. In the supplemental response dated April 22, 2014, the applicant provided a detailed response to supplement questions the staff raised on the August 9, 2013, response. The response included information discussing the potential pressure rises, upwelling, or both due to the DIS and included short-term injection tests on the deep injection wells to establish a range of pressures. These short-term injection tests were also used to verify the SEAWAT models described above to estimate transport distances and times.

Within the discussion, the applicant made the following assumptions regarding to the deep well injection operational parameters: all 12 injection wells are operating concurrently at a rate of 26,498 L/min (7,000 gpm) (assumed maximum anticipated injection rate), there is no dissipation of the increased formation pressure between operating injection wells, and the cumulative formation pressure is additive for each well.

In observing the analysis conducted in the response, the applicant determined that the total pressure increase in the Boulder Zone due to pressure and buoyant forces is approximately 50.2 psi. Using the equations described by the applicant in its response, the applicant calculated the pressure increase needed to create a potential fracture in the confining zone to be 582.9 psi, a pressure that is about 12 times larger than the original calculated pressure increase. Additionally, the applicant calculated a minimum downhole pressure increase needed to create a potential fracture of 377 psi, a number 7.5 times greater than the calculated pressure increase.

The applicant also highlighted that Rule 62-528.415(1)(a) of the Florida Administrative Code (F.A.C.) prohibits operating at pressures that would initiate new fractures or propagate existing fractures in the injection zone, initiate new fractures in the confining zone, or significantly alter the fluid containment capabilities of the confining zone.

To address the second request of item 5, the applicant provided details regarding the integrity of the deep injection wells by describing the well casings, joints, and mechanic integrity of the system over time. Each injection well is constructed with concentric steel casing to isolate and protect GW from the injected fluid. Each well will be constructed with new and unused steel casings designed to last for at least 60 years. The well casings are selected to provide protection against casing failures during cementing operations, protect against failures during the operation of the well and subsequent pressure testing, and provide sufficient corrosion protection. Groundwater protection is achieved through encasing select piping in cement; the injection tubing is reinforced with a fiberglass reinforced plastic (FRP) injection tubing to protect the environment from injection fluids and subsequent corrosion. A corrosion inhibitor also fills the gaps of the injection tubing to maintain corrosion control.

To ensure proper installation, testing will be conducted prior to the operation of the DIS. The testing programs include testing each injection well and hydraulic pressure testing of the pipeline. Mechanical integrity testing is defined by FDEP and consists of a video survey, pressure testing of the annular space between the 61-cm (24-in.) diameter casing and the FRP injection tubing, performance of high-resolution temperature log, and a performance of a radioactive tracer survey to detect the presence of breaches in the cement at the base of the casing.

Should any upwelling or failures of the injection occur, the applicant has first identified that 11 wells (9 active and 2 backup) are sufficient for disposal of the cooling water. If GW monitoring detects an upwelling of the injected fluid, FPL is required to report this information to FDEP. Based on the nature of the problem, FPL would remove the problematic wells from service, investigate the problem, and repair the problematic wells. FPL must comply with the remedial measure set up by FDEP, and if plugging and abandonment is required, FPL will follow the imposed requirements of FDEP. Well Plugging and Abandonment procedures are described in the applicant's response and the response references Rule 62-528.435, F.A.C. A proposed plugging and abandonment plan for each Class I injection well is required to be submitted with each Class I injection well construction and operation permit application. The staff reviewed the description, including design and operational controls, to minimize potential for hydraulic connectivity following an upwelling into the above confining units. The staff finds the response to item 5 of RAI 6985, Question 11.02-6 acceptable because FPL is required to follow the programs and procedures set in place by FDEP, and the information provided to staff to describe the efforts in place to address upwelling is adequate.

In item 6 of RAI 6985, Question 11.02-6, the applicant was asked to reconcile differences in stated flow rates and citations for the location of such information. Several examples are provided in the question stated above. In the response dated April 22, 2014, the applicant provided clarifications on the stated flow rates and citations. The applicant provided discussions for the reclaimed water supply, makeup water supply using saltwater, makeup flow rates when using the reclaimed water supply, and makeup flow rates when using saltwater as cooling water. Each discussion contained the information about amounts and flow rates of water used.

The cooling tower blowdown flow to the blowdown sump is 36,770 L/min (9,714 gpm) for Turkey Point Units 6 and 7, and therefore an additional dilution flow of 8,650 L/min (2,286 gpm) is required to meet the 45,420 L/min (12,000 gpm) dilution flow requirement. This makeup flow will be supplied from the makeup reservoir. The makeup water reservoir will have a capacity of 1040-1140 million L (275-300 million gallons) of reclaimed water and is capable of supplying the plant makeup and alternate dilution flow for approximately 5 days of full power with no

replenishment. When using saltwater as cooling water there is sufficient blowdown from cooling towers to supply the 45420 L/min (12,000 gpm) dilution flow requirement. To maintain chemistry of the makeup water reservoir the saltwater makeup to the cooling towers will be supplied directly into the cooling tower basins and not into the makeup water reservoir.

The estimated makeup flow when using reclaimed water for the cooling water system is 145,360 L/min (38,400 gpm). The total flow to all of the deep injection wells is approximately 47,320 L/min (12,500 gpm) and 49,210 L/min (13,000 gpm) for normal and maximum flow rates. A minimum of two deep injection wells will be used, resulting in a normal and maximum flow rate per injection well of 23,660 L/min (6,250 gpm) and 24,610 L/min (6,500 gpm), respectively. When using saltwater as cooling, the estimated flow rate is 327,060 L/min (86,400 gpm). The estimated flow into the deep injection well is 219,550 L/min (58,000 gpm) and 223,340 L/min (59,000 gpm) for normal and maximum flow rates. For this injection, a minimum of nine wells will be used resulting in 24,430 L/min (6,445 gpm) and 24,810 L/min (6,555 gpm) for normal and maximum flow rates per injection well.

FDEP set up a maximum linear injection velocity of 3 m/s (10 fps) into the deep injection well. To meet these requirements, the applicant provided a calculation in its response. The resulting calculation shows that using 3.0 m/s (10 fps) allows for 49,020 L/min (12,950 gpm) of flow into the deep injection well. As discussed before, the applicant calculated 24,610-L/min (6,500-gpm) maximum flow rate per injection well that will be used, which is significantly less than the calculated FDEP requirement. To account for the estimated makeup water flow of 327,060 L (86400 gallons), a back calculation was performed using the 24,810-L/min (6,555-gpm) maximum flow rate. Using 16.62-in. inside diameter piping and the maximum flow of 24,810 L/min (6,555 gpm), it was calculated that the maximum velocity of fluid into a deep injection well would be 3.0 m/s (9.7 fps). The staff finds that this complies with FDEP's requirement of 3.0 m/s (10 fps), and is acceptable.

In the response to item 6, the applicant also addressed the minimum dilution flow required to control liquid radwaste discharges. The applicant incorporated changes to Sections 11.2.1.2.4 and 11.5.3 that include a discussion about maintaining the ECLs found in 10 CFR Part 20, Appendix B, by specifying and maintaining flow rates at the blowdown sump discharge to at least the minimum dilution factor. To ensure compliance with the ECLs, the dilution flow is calculated and applied prior to each batch release of liquid radwaste. The staff reviewed the description of the stated flow rates in its response and finds the response to item 6 of Question 11.02-6 acceptable because the DCD changes to reflect maintaining a minimum flow rate to ensure compliance with the ECLs are clear and adequate and staff can ensure that the applicant will be in compliance with 10 CFR Part 20, Appendix B limits.

In item 7 of RAI 6985, Question 11.02-6, the applicant was asked to describe deep well injection rates under different plant conditions, procedural controls for the disposal of liquid effluents whenever the plant is in an outage mode, sources of dilution flow rates in this operating status, and expected dilution flow rates. The applicant was also requested to address whether it will impose in the ODCM and standard radiological effluent control (SREC) restrictions such that discharges of liquid effluents will not be initiated unless a minimum dilution flow rate is established in demonstrating compliance with effluent concentration limits and unity rule of 10 CFR Part 20, Appendix B, Table 2, Column 2; dose limits of 10 CFR 20.1301, 20.1302, and 20.1301(e); and numerical guides, design objectives, and ALARA provisions of Appendix I to 10 CFR Part 50 for liquid effluents.

In the response to item 7 dated April 22, 2014, the applicant provided information regarding the injection paths. The applicant stated that the injection from the blowdown sump may be used during outage mode. The alternate dilution water, which is only required when reclaimed water is being used as the cooling water, is provided from the makeup water reservoir or radial collector wells. In cases where dilution water is unavailable, the liquid radwaste discharges can be temporarily stored and released when sufficient dilution flow is made available. As with the response to item 6 above, the applicant referenced the changes into Sections 11.2.1.2.4 and 11.5.3 to describe efforts to maintain effluents to the ECLs in 10 CFR Part 20, Appendix B. The staff reviewed and finds the descriptions of the deep well injection rates acceptable and finds the response to item 7 of RAI 6985, Question 11.02-6 acceptable because the applicant adequately describes the provisions in place to maintain a minimum dilution flow to meet the ECLs in 10 CFR Part 20, Appendix B.

In item 8 of RAI 6985, Question 11.02-6, the applicant was asked to assess a postulated event involving the failure of some injection equipment and to consider programs and procedures used to control radiation exposures and doses to plant workers in responding to accidental spills of injectate. In the response to item 8, dated April 22, 2014, the applicant stated that the DIS is designed to have redundant measures to allow for isolation of failed equipment. The DIS also has overpressure protection measures in place to prevent overpressurization from the blowout of seals and operator errors.

The applicant stated that redundant isolation valves will be installed on the injectate main line to allow for isolation of the main line in case of damage or failures of the line. Each feeder line will also have redundant isolation valves that will allow for isolation of each individual injectate line. There are multiple valves on each deep injection well to prevent upward flow of injected fluid and discharge onto the concrete containment pad. The valve arrangement consists of 18-in. gate valve on the wellhead, which is located 3 ft above the injection well exit into the group, and an 18-in. butterfly valve located on the horizontal run of surface pipe on the concrete containment pad. The aboveground piping at the injection wells will be accessible for visual inspection to detect any leakage from pipes and valves.

The applicant stated that vent and drain valves will be installed on multiple locations of each branch line. The vent valves are installed to remove air coming out of the solution or air that is introduced by the air/vacuum release valves. The vents are located on the high points of each DIS, the points where air is most likely to collect. During normal operations, the vent and drain lines will be capped and the valves locked closed to prevent inadvertent operation. The valves will be manually operated as needed for pump startup. Personnel will be present to allow air to escape and then close the vent valves when the line fills with water. Each DIS is designed to minimize inadvertent or unidentified release to the environment. Integrity of each system is monitored for leakage by performing periodic walkdowns.

The applicant stated that each DIS is designed to minimize damage to the injection equipment. These design measures aim to minimize the likelihood of damage by a moving vehicle, overpressurization, blowout of seals, or joint failures. In the event of equipment failure, such as damage caused by a moving vehicle, valves would close to isolate the damaged equipment to minimize the volume of spilled injectate, and the affected injection wells would be removed from service for repairs. Once repairs are complete, the system would be pressure tested to confirm a leakproof repair. In this scenario, one of the redundant injection wells would be placed into service to make up for the temporarily out-of-service injection well. Once the repair and pressure testing is completed, the well affected by damage could be returned to service. In the

case in which the main pipe is damaged, all feeder lines in addition to the main line would isolate to prevent injectate from backflowing into the main piping.

In the case in which injectate is spilled and pooled on the ground, it would be contained and properly managed as potentially contaminated material in accordance with Radiation Protection and ALARA program requirements. Any spillage would be pumped into a tank for transport to a pumping station where it will be pumped down into an injection well, and any soil impacted by an injectate spill would be removed and managed as potential radioactive waste. The staff reviewed the response to item 8 of RAI 6985, Question 11.02-6 and finds the response acceptable because as seen in the preceding text, the applicant describes the redundant isolation valves, the vent and drain valves used to isolate DIS for maintenance or removal. The staff finds that this information adequately addresses features used to minimize the spread of contamination as is required by 10 CFR 20.1406

In Item 9 of RAI 6985, Question 11.02-6, the applicant was asked to describe how facility design and procedures for operation will minimize, to the extent practicable, contamination of the facility and the environment; facilitate eventual decommissioning; and minimize, to the extent practicable, the generation of radioactive waste. In the response to Item 9, dated April 22, 2014, the applicant provided information to support 10 CFR 20.1406 criteria, for minimization of contamination.

As discussed above for Item 8, the applicant described several measures in effect to minimize the sources of contamination by describing the use of isolation valves to isolated damaged lines and to prevent backflow into lines. Description of periodic visual walkdowns of the system and a discussion about the treatment of potential spills if there would be a spillage on the pad are described. Since the pad is made of concrete, water would pool from a leak, any pooled water would be pumped into a tank, and any affected soil would be treated as potentially contaminated material.

The applicant also discussed requirements set in place by the State to conduct mechanic integrity tests to ensure there is no fluid movement into an underground water source. The wells also require periodic sampling that will first be performed on a weekly basis during the first 6 months of operation. After 6 months, the applicant intends to request the State allow a reduced frequency for sampling to perform monthly integrity testing. The staff reviewed the information contained in the response to Item 9 to describe the practices in place to minimize, to the extent practicable, the generation of radioactive waste and finds the response to item 9 of Question 11.02-6 acceptable because the applicant adequately describes additional features used to minimize the spread of contamination as is required by 10 CFR 20.1406.

In Item 10 of RAI 6985, Question 11.02-6, the applicant was asked to describe sampling locations and elevations above the Boulder Zone, sampling frequency, and analytical programs for detecting the presence of long-lived and environmentally mobile radionuclides. In the response to Item 10, dated April 22, 2014, the applicant provided information on the baseline GW monitoring prior to the start of operations, monitoring of GW at the plant during operations, and a determination through the sampling of tritium to confirm whether there is any radioactivity present in GW.

The description of the monitoring program identifies tritium as the largest contributor to the activities released per year per reactor. As such, the applicant stated that tritium will be monitored on a monthly basis at the dual zone monitoring wells. Tritium will serve as an indicator of well failure or confining unit layer breakthrough. The other nuclides described in the

AP1000 DCD will also be considered in the monitoring program based on half-life, mobility, and detectability. After the baseline readings have been obtained, the applicant plans to adjust monitoring to a quarterly frequency. Gamma isotopic and gross beta will also be monitored first monthly, then quarterly once a baseline has been established.

In the event in which operational and radiochemical monitoring of the deep injection wells indicates the presence of plant effluent, through the detection of tritium, the following production wells will be sampled on a monthly basis for tritium and gross alpha/beta radioactivity: PW-1, PW-3, and PW-4. This monitoring is done to check any potential movements of plant effluent to the Upper Floridan aquifer. If these production wells indicate the presence of tritium due to Turkey Point Units 6 and 7 operations, FPL's mitigating actions will include removal of the applicable water supply well from operation and investigation of the DIS for well failure or confining unit failures.

Additional responses to controlling and radioactive material include confirmatory monitoring, removal of affected DIS components from service, and other actions as needed to protect the members of the public and plant workers. The off-normal operations prompt detection and a mitigating strategies program will be a part of the Turkey Point Units 6 and 7 ODCM/REMP. The staff reviewed the response to item 10 to describe sampling locations and elevations above the Boulder Zone, sampling frequency, and analytical programs in detecting the presence of long-lived and environmentally mobile radionuclides and finds the response to item 10 of Question 11.02-6 acceptable because the applicant adequately describes the measures in place to monitor radioactive releases, also describes efforts to control radioactive releases.

In item 11 of Question 11.02-6, the applicant was asked to address the presence of naturally occurring radioactivity in the Upper and Lower Floridan aquifers as part of the REMP. In the response to item 11, the applicant stated that FDEP regulates deep injection wells through its Underground Injection control program. Inside this program, FPL will have radiological monitoring to assess the operation of the injection wells to include gross alpha and combined radium-226 and radium-228, which will be sampled monthly. The frequency will be reduced to quarterly sampling once the operation testing phase is completed.

In addition to the State-regulated program, the applicant will have additional background and operational system monitoring to check for injection well failure and confining unit layer breakthrough, using tritium as an indicator to show leakage or breakthrough at the site. Prior to deep well injection startup, a baseline radiochemical sampling will be performed for gross alpha/beta radioactivity, gamma isotropic, and tritium. FPL proposes to have 6 months' worth of weekly sampling at the available dual zone monitoring wells prior to plant operations. FPL will not have continual background monitoring of naturally occurring radioactivity since tritium monitoring is what will determine injection well failure or confining unit layer breakthrough at the site. The staff reviewed the response to Item 11, in which the applicant described the use of the REMP to address the presence of naturally occurring radioactive material in the Upper and Lower Floridan aquifers, and finds the response to Item 11 of Question 11.02-6 acceptable. The response is acceptable because the applicant adequately describes additional monitoring for naturally occurring radioactive material.

The staff reviewed the entirety of NRC 6985, Question 11.02-6, dated February 20, 2013, and as indicated above, finds the response acceptable. Accordingly, RAI 6985, Question 11.02-6 is resolved.

Compliance with 10 CFR 20.2002

As stated in 10 CFR 20.2002: "A licensee or applicant for a license may apply to the Commission for approval of proposed procedures, not otherwise authorized in the regulations in this chapter, to dispose of licensed material generated in the licensee's activities. Each application shall include:

- (a) A description of the waste containing licensed material to be disposed of, including the physical and chemical properties important to risk evaluation, and the proposed manner and conditions of waste disposal; and*
- (b) An analysis and evaluation of pertinent information on the nature of the environment; and*
- (c) The nature and location of other potentially affected licensed and unlicensed facilities; and*
- (d) Analyses and procedures to ensure that doses are maintained ALARA and within the dose limits in this part.*

The staff's evaluation of the applicant's proposed disposal of liquid waste in compliance with 10 CFR 20.2002 is addressed below.

10 CFR 20.2002(a) A description of the waste containing licensed material to be disposed of, including the physical and chemical properties.

In FSAR Section 11.2, the applicant describes disposal of liquid wastewater effluent via deep well injection into the Boulder Zone. Based on a screening analysis of the DCD Table 11.2-7 inventory, the applicant identifies four radionuclides (tritium, cesium-134, cesium-137 and strontium-90) as the most significant dose contributors to the total body and organs of a child and then proceeds with modelling and evaluation based on those nuclides. Details of the deep well injection system design are presented in FSAR Section 9.2.12.

In FSAR Section 11.5.3, the applicant states that the activity concentration of the radwaste portion of the effluent is controlled to meet 10 CFR Part 20, Appendix B, ECLs, by maintaining sufficient dilution through the blowdown sump discharge pumps, which will provide at least the minimum dilution needed to reduce concentrations to below the ECL values. The required minimum dilution is calculated and applied before the release of liquid radwaste to the sump (batch is the only release mode anticipated) to ensure the activity concentration of the mixture is less than the 10 CFR Part 20, Appendix B, ECLs. The procedural methods and controls are to be in accordance with the Turkey Point Turkey Point Units 6 and 7 ODCM.

Staff review of the liquid radwaste system confirmed a design meeting the guidance of RG1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants." As defined in the Guide, "for the purposes of this guide, the radwaste systems are considered to begin at the interface valves in each line

from other systems provided for collecting wastes that may contain radioactive materials and to include related instrumentation and control systems. The radwaste system terminates at the point of controlled discharge to the environment, at the point of recycle to the primary or secondary water system storage tanks, or at the point of storage of packaged solid wastes.”

Processed liquid radioactive waste from Turkey Point Turkey Point Units 6 and 7 operation is discharged to the plant blowdown sump pump discharge line before release to the Lower Floridan aquifer (Boulder Zone) by the DIS. Piping from the blowdown sump dilution connection point is routed to the deep injection wells, distributed in two branches; one branch is oriented in a north-south direction and located to the east of Unit 6. The second branch is oriented in the east-west direction and located to the south of Turkey Point Units 6 and 7.

The applicant describes that this injectate piping to each deep injection well isolation valve is single-walled, partially buried, and constructed of material suitable for the range of injectate composition, flow rates, and pressures, as well as environmental factors. The injectate piping contains manifolds, valves, and controls necessary to supply any appropriate combination of the deep injection wells. The injectate piping also includes appurtenances, such as vacuum breakers, vent lines, and access ways, as necessary, for proper operation and maintenance of the piping. The piping, manifolds, valves, controls, and appurtenances are designed to minimize inadvertent or unidentified releases to the environment. Integrity of the injectate piping will be monitored for leakage or will be accessible for visual inspection or remote surveillance in conjunction with groundwater monitoring, as necessary, as part of the Turkey Point Units 6 and 7 Groundwater Monitoring Program.

The applicant provided additional information in PTN SUP 11.2-2 stating that the liquid radwaste discharge release point is where the WLS effluent discharge pipe connects to the blowdown sump discharge pipe to deep injection wells.

The applicant defines the DIS as the point of controlled discharge to the environment. Dilution of the liquid radwaste is initiated as the radwaste enters the DIS in the discharge stream from the blowdown sump. The guard pipe-enclosed radwaste discharge piping connects to the blowdown sump discharge piping downstream of the blowdown sump pumps. Dilution of the liquid radwaste is initiated as the radwaste enters the blowdown sump discharge stream. The content of the blowdown sump is a combination of waste streams largely comprised of reclaimed water or seawater from circulating water system blowdown during plant operation or from the alternate dilution flow paths when circulating water system (CWS) blowdown is not sufficient or available for dilution. Failure of the DIS does not affect the ability of safety-related systems to perform their intended function. The DIS is a flow path for liquid radwaste and liquid nonradioactive waste discharge and provides underground disposal of plant wastewater, including CWS blowdown and liquid radwaste, into the Boulder Zone. The applicant has also stated that the WLS effluent discharge piping is double-walled piping up to this point.

Typically, all other nuclear plants operating in the United States that release radioactive waste release it to surface waters – and are not controlled nor

restricted by NRC regulations beyond that point. The DIS injection wells proposed are governed by Florida Department of Environmental Protection (FL-DEP) regulations and also subject to EPA regulations. They are classified and regulated as hazardous Class 1 injection wells. The staff concludes that because the FL-DEP is experienced in regulation injection wells and its associated regulations are comprehensive in this area, issues associated with integrity of the well, protection of the strata of the injection zone and the confining zone are adequately addressed through the FL-DEP regulations and permitting system. Consequently, the applicant has provided adequate information to provide reasonable assurance that requirements of 10 CFR 20.2002(a) are being met.

10 CFR 20.2002(b) An analysis and evaluation of pertinent information on the nature of the environment; and

The applicant analysis and evaluation of the nature of the environment in described in detail in FSAR Chapter 2, and additionally in the FSAR Section 11.2 dose modelling evaluation and the FSAR Section 2.4.13 liquid tank failure analysis. Additional analysis is described in the applicant's ER, section 2.3.2.2. The staff concludes that the information provided in response to staff RAIs on the DIS is sufficient to support the analysis of hazards associated with the proposed deep well injection disposal. Consequently, the applicant has provided adequate information to provide reasonable assurance that the requirements of 10 CFR 20.2002(b) are being met.

10 CFR 20.2002(c) The nature and location of other potentially affected licensed and unlicensed facilities; and

The applicant describes the nature and location of other potentially licensed and unlicensed facilities in detail in FSAR Chapter 2, and additionally in the FSAR Section 11.2 dose modelling evaluation. Additionally, the nature and location of other potentially affected licensed and unlicensed facilities will have to be described in the applicant's construction permit for the deep wells. The staff concludes that the information provided in response to staff RAIs on the DIS is sufficient to support the analysis of hazards associated with the proposed deep well injection disposal. Consequently the applicant has provided adequate information to provide reasonable assurance that the requirements of 10 CFR 20.2002(c) are being met.

10 CFR 20.2002(d) Analyses and procedures to ensure that doses are maintained ALARA and within the dose limits in this part.

In its response to RAI 6985, Question 11.2-06, Items 1-4, dated January 15, 2014 the applicant provided detailed modeling of groundwater migration and potential doses due to both normal offsite water use as well as intruder scenario. The resulting hypothetical dose to a maximum exposed offsite individual was $5.5\text{E-}2$ mSv (5.5 mrem) per year. This dose is consistent with the NRC's acceptance criterion of a few millirem, as stated in SECY-07-0060, Attachment 1, and NUREG-1757, Vol. 1, Rev. 2, Section 15.12.

Additionally, in response to RAI 5695, Question 11.02-2, regarding the need for a cost benefit analysis, the applicant provided a credible argument concluding that no liquid radwaste system augment is justified for installation based on an Appendix I averted dose cost-benefit evaluation of the hypothetical exposed population. Refer to the discussion on “PTN COL 11.2-2, Liquid Radwaste Cost-benefit Analysis Methodology” above for details.

The staff concludes that the information provided by the applicant in response to staff RAIs is considered adequate for demonstration of compliance with 10 CFR 20.2002 given the discussions provided above for meeting the subparts of 10 CFR 20.2002.

11.2.5 Post-Combined License Activities

The applicant proposed a license condition to ensure that radionuclide inventories in the Turkey Point Units 6 and 7 RWBs are properly controlled and that all relevant sources of radioactive material are accounted for and appropriately calculated in accordance with RG 1.143, Revision 2, and the RWB classification of RW-IIc. The license condition language in this section has been modified, per a letter from the applicant dated April 8, 2016 (ADAMS Accession No. ML16103A507), confirming the acceptability of the following license conditions, proposed by the staff. These changes do not affect the staff’s above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

License Condition (11-1) – Before initial fuel load, the licensee shall develop, implement, and maintain procedural controls limiting radionuclide inventory in each of the Radwaste Building Monitor Tanks, and separately in each of up to three (3) Radwaste Building mobile radwaste processing systems to below A_2 quantities for radionuclides specified in Appendix A to 10 CFR Part 71 (Tables A-1 and A-3), as described in FSAR Subsection 13.5.2.2.5. The procedures shall also ensure that any additional equipment located in the RWB is limited to below A_2 quantities and that the total cumulative radioactive inventory contained in unpackaged wastes (including liquid waste, wet waste, solid waste, gaseous waste, activated or contaminated metals and components, and contaminated waste present at any time in the Radwaste Building) is limited so that an unmitigated release, occurring over a two hour time period, would not result in a dose of greater than 500 millirem at the protected area boundary or an unmitigated exposure, occurring over a two hour time period, would not result in a dose of greater than 5 rem to site personnel located 10 feet from the total cumulative radioactive inventory.

11.2.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff’s review confirmed that the applicant has addressed the required information related to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application is documented in NUREG-1793 and its supplements.

In addition, the staff evaluated the additional COL information items (STD COL 11.2-1, PTN COL 11.2-2, PTN COL 11.5-3, PTN COL 2.4-5, PTN COL 15.7-1, STD SUP 11.2-1, and PTN SUP 11.2-2) in the application against the relevant NRC regulations, acceptance criteria defined in NUREG-0800, Section 11.2, and other NRC regulatory guides. The staff reviewed

the applicant's proposed methodology on the deep well injection. The methods and calculations discussed by the applicant have been reviewed and confirmed by independent NRC staff calculations. The staff determines that the applicant has demonstrated the ability to control, track, and evaluate liquid effluent releases from Turkey Point Units 6 and 7. The applicant has satisfactorily addressed all RAIs related to Section 11.2.

The staff confirmed that the applicant provided sufficient information and that the review and calculations support the conclusions that follow. The staff concludes that the LWMS (as a permanently installed system or in combination with mobile systems) includes the equipment necessary to control releases of radioactive materials in liquid effluents in accordance with GDC 60 and 61 of Appendix A to 10 CFR Part 50 and the requirements of 10 CFR 50.34a. Therefore, subject to the resolution of the two confirmatory items discussed above, the staff concludes that the design of the LWMS is acceptable and meets the requirements of 10 CFR 20.1301(e), 10 CFR 20.1302, 10 CFR 20.1406, 10 CFR 50.34a, GDC 60 and 61, and 10 CFR 20.2002.

11.3 Gaseous Waste Management System

11.3.1 Introduction

The GWMS is designed to control, collect, process, handle, store, and dispose of gaseous radioactive waste generated as the result of normal operation, including AOOs.

11.3.2 Summary of Application

Section 11.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 11.3 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 11.3, the applicant provided the following:

AP1000 COL Information Items

- PTN COL 11.3-1

The applicant added additional information in PTN COL 11.3-1 regarding gaseous radwaste cost-benefit analysis methodology (PTN COL FSAR, Section 11.3.3.4.3), as well as additional information to resolve COL Information Item 11.3-1 (COL Action Item 11.3-1), which addresses the estimated doses to the public from the gaseous waste system and the associated cost-benefit analysis in PTN COL FSAR, Section 11.3.3.4.3.4.

- PTN COL 11.5-3

The applicant provided additional information in PTN COL 11.5-3 to resolve COL Information Item 11.5-3 (COL Action Item 11.5-3). The additional information addresses compliance with 10 CFR Part 50, Appendix I, Sections II.B and II.C, related to operation of the gaseous waste system in PTN COL FSAR, Section 11.3.3.4.

Supplemental Information

- STD SUP 11.3-1

The applicant added supplemental information in PTN COL FSAR, Section 11.3.3.6, to address the QA program to be applied to the GWMS.

- PTN SUP 11.3-1

The applicant added supplemental information in Turkey Point Units 6 and 7 COL FSAR, Section 11.3.3.6, to address conformance of the QA program to RG 1.143.

11.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the regulatory basis for acceptance of the supplementary information on the GWMS is established in:

- 10 CFR 20.1301(e) as it relates to compliance with 40 CFR 190
- 10 CFR 20.1302, "Compliance with dose limits for individual members of the public"
- 10 CFR 20.1406, "Minimization of contamination"
- 10 CFR 50.34a, "Design objectives for equipment to control releases of radioactive material in effluents – nuclear power reactors"
- 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," GDC 3, "Fire protection"
- 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," GDC 60, "Control of releases of radioactive materials to the environment"
- 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," GDC 61, "Fuel storage and handling and radioactivity control"
- 10 CFR Part 50, Appendix I, Sections II.B, II.C, and II.D, as they relate to gaseous effluent dose objectives and associated cost-benefit analysis
- 10 CFR 52.80(a) as it relates to those inspections, tests, analysis that the applicant shall perform, and the necessary acceptance criteria that are necessary to show the facility shall be constructed and operated in conformity with the COL

Guidance for meeting these requirements is in:

- Regulatory Position C.2 of RG 1.143
- RG 1.109, Revision 1, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I"
- RG 1.110, "Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors"

- RG 1.111, Revision 1, “Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Nuclear Power Reactors”
- RG 4.21, “Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning”

The acceptance criteria associated with the GWMS are given in Section 11.3 of NUREG-0800, including BTP 11-5.

11.3.4 Technical Evaluation

The staff reviewed Section 11.3 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.¹ The staff’s review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the GWMS. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff’s review of this application included the following COL information and supplementary items:

- PTN COL 11.3-1, Gaseous Radwaste Cost-Benefit Analysis Methodology
- PTN COL 11.3-3, Cost-Benefit Analysis of Population Doses, and 10 CFR Part 50, Appendix I, Sections II.B and II.C
- STD SUP 11.3-1, Supplemental Information on Quality Assurance
- PTN SUP 11.3-1, Supplemental Information on RG 1.143 Conformance

In addition to the above items, the staff reviewed the entire section against Section 11.3 of NUREG-0800 to determine if the information in Turkey Point Units 6 and 7 COL FSAR Section 11.3 met the regulatory requirements in the regulations stated above (SER Section 11.3.3) and NUREG-0800 acceptance criteria. The relevant NUREG-0800 acceptance criteria are as follows:

- The GWMS should have the capability to meet the dose design objectives and should include provisions to treat gaseous radioactive wastes, such that the following is true:
 - A. The calculated annual total quantity of all radioactive materials released from each reactor to the atmosphere will not result in an estimated annual external dose from gaseous effluents to any individual in unrestricted areas in excess of 0.05 mSv (5 mrem) to the total body or 0.15 mSv (15 mrem) to the skin. RGs 1.109 and 1.111 provide acceptable methods for performing this analysis.
 - B. The calculated annual total quantity of radioactive materials released from each reactor to the atmosphere will not result in an

¹ Section 1.2.2 contains a discussion on the staff’s review related to verification of the scope of information to be included within a COL application that references a DC.

estimated annual air dose from gaseous effluents at any location near ground level which could be occupied by individuals in unrestricted areas in excess of 0.01 cGy (10 millirads) for gamma radiation or 0.02 cGy (20 millirads) for beta radiation. RGs 1.109 and 1.111 provide acceptable methods for performing this analysis.

- C. The calculated annual total quantity of radioiodines, carbon-14, tritium, and all radioactive materials in particulate form released from each reactor at the site in effluents to the atmosphere will not result in an estimated annual dose or dose commitment from such releases for any individual in an unrestricted area from all pathways of exposure in excess of 0.15 mSv (15 mrem) to any organ. RGs 1.109 and 1.111 provide acceptable methods for performing this analysis.
 - D. In addition to 1.A, 1.B, and 1.C, above, the GWMS should include all items of reasonably demonstrated technology that, when added to the system sequentially and in order of diminishing cost-benefit return, for a favorable cost-benefit ratio, can effect reductions in dose to the population reasonably expected to be within 80 km (50 mi) of the reactor. RG 1.110 provides an acceptable method for performing this analysis.
 - E. The concentrations of radioactive materials in gaseous effluents released to an unrestricted area should not exceed the limits specified in Table 2, Column 1, of Appendix B to 10 CFR Part 20.
 - F. The regulatory position contained in RG 1.143 is met, as it relates to the definition of the boundary of the GWMS, beginning at the interface from plant systems to the point of controlled discharges to the environment as defined in the ODCM, or at the point of storage in holdup tanks or decay beds for gaseous wastes produced during normal operation and anticipated operational occurrences.
- System designs should describe features that will minimize, to the extent practicable, contamination of the facility and environment; facilitate eventual decommissioning; and minimize, to the extent practicable, the generation of radioactive waste in accordance with RG 1.143, for gaseous wastes produced during normal operation and anticipated operational occurrences, and the requirements of 10 CFR 20.1406 or the DC application, update in the SAR, or the COL application to the extent not addressed in a referenced certified design.
 - BTP 11-5, as it relates to potential releases of radioactive materials (noble gases) as a result of postulated leakage or failure of a waste gas storage tank or off-gas charcoal delay bed.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3

and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding STD content evaluation were endorsed.
- The staff confirmed that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the STD content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This STD content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

AP1000 COL Information Items

- PTN COL 11.3-1, Gaseous Radwaste Cost-Benefit Analysis

The applicant provided additional information in PTN COL 11.3-1 to resolve COL Information Item 11.3-1. COL Information Item 11.3-1 states:

The analysis performed to determine offsite dose due to gaseous effluents is based upon the AP1000 generic site parameters included in Chapter 1 and Tables 11.3-1, 11.3-2 and 11.3-4. The Combined License applicant will provide a site-specific cost-benefit analysis to demonstrate compliance with 10 CFR 50, Appendix I, regarding population doses due to gaseous effluents.

The commitment was also captured in COL Action Item 11.5-3 in Appendix F of the staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will provide a site-specific cost-benefit analysis to demonstrate compliance with 10 CFR 50, Appendix I, regarding population doses due to gaseous effluents.

The applicant performed a site-specific analysis to determine that the offsite dose due to gaseous effluents is bounded by the AP1000 site parameters included in FSAR, Revision 5, Chapter 1, and Tables 11.3-1, 11.3-2, and 11.3-4 from the DCD. The applicant discussed the site-specific cost-benefit analysis in Turkey Point Units 6 and 7 COL FSAR, Section 11.3.3.4.4, to address the requirements of 10 CFR Part 50, Appendix I, Section II.D, regarding population doses due to gaseous effluents. The dose and dose rate to man was calculated using the GASPARI computer code, which is based on the methodology presented in RG 1.109.

The applicant's analysis showed that the lowest-cost option for gaseous radwaste treatment system augments is the Steam Generator Flash Tank Vent to Main Condenser at \$6,320 per year. The population doses, 4.0 person-rem total body per reactor and 7.5 person-rem thyroid

per reactor, are given in the FSAR Table 11.3-207. Assuming that this augment will eliminate all radioactivity from the liquid effluent, the resulting cost per dose reduction was \$1,580 per total body person-rem ($\$6,320/4.0$) and \$843 per thyroid person-rem ($\$6,320/7.5$). While the costs per person-rem reduction exceed the \$1,000 per person-rem criterion considering the total body dose, the costs considering the thyroid dose are below the \$1,000 per person-rem and, therefore, warrant further evaluation.

Since the estimated thyroid dose of 7.5 person-rem exceeds the 6.32 person-rem threshold value (\$6,320 augment at \$1,000 per person-rem), those system augments listed in RG 1.110 with a total annual cost less than \$7,500 were evaluated to determine if they would be cost beneficial. The only such augment is the one already mentioned above. Addition of this augment presumes that the design already includes a steam generator flash tank. The AP1000 design does not include a steam generator flash tank, but instead uses steam generator piping blowdown heat exchangers that provide cooling of the blowdown fluid and prevent flashing prior to blowdown entering the main condenser. Adding the installation of a flash tank to this augment is expected to cause the estimated total annual cost to be \$1,170 and would result in the conclusion that this augment is not cost beneficial.

The applicant went on to state that, although the cost of thyroid dose reduction is just below the threshold, this is assuming the augment completely eliminates the dose. As shown in Table 11.3-1 below (based on Turkey Point Units 6 and 7 COL, Revision 5, FSAR Table 11.3-207), 2.1 of the 7.5 person-rem thyroid dose is due to noble gases, which will not be mitigated by the steam generator flash tank vent to main condenser. With the noble gas contribution unaffected by the augment, the cost of thyroid dose reduction is \$1,170 per person-rem thyroid and is, therefore, not cost beneficial.

The staff reviewed this evaluation and concurs with the applicant's results, as shown in Table 11.3-2, predicated on the applicant's calculated population doses. The staff-derived total annual cost is estimated to be \$6,654, \$1,663 per person-rem total body and \$887 per person-rem thyroid. The thyroid augmented cost, once adjusted for radionuclides contributing doses to the thyroid, is estimated to be \$1,230 per person-rem thyroid. This evaluation confirms the applicant's results, given their relatively close agreements.

Table 11.3-1 Applicant Population Doses Breakdown by Source

Source	Total Body (person-rem)	Thyroid (person-rem)
Noble Gases	2.1	2.1
Iodine	0.013	3.5
Particulates	1.2	1.2
C-14	0.21	0.21
H-3	0.48	0.48
Total	4.0	7.5
Source: Turkey Point Units 6 and 7, Revision 7, FSAR Table 11.3-207		

Table 11.3-2 NRC Staff Population Doses and Breakdown

Source	Total Body (person-rem)	Thyroid (person-rem)
Noble Gases	2.14	2.14
Iodine	0.013	3.50
Particulates	1.23	1.21
C-14	0.12	0.12
H-3	0.45	0.45
Total	3.95	7.42

The augment considered is already the lowest cost augment available. This is above the costs criterion of \$1,000 per person-rem for an augment in 10 CFR Part 50, Appendix I, Section II.D. Thus, when the applicant's calculated population doses are confirmed, the staff will be able to conclude that the GWMS meets ALARA requirements and requires no augments.

- PTN COL 11.5-3

The applicant provided additional information in PTN COL 11.5-3 to resolve COL Information Item 11.5-3. COL Information Item 11.5-3 states:

The Combined License applicant is responsible for addressing the 10 CFR 50, Appendix I guidelines for maximally exposed offsite individual doses and population doses via liquid and gaseous effluents.

The commitment was also captured in COL Action Item 11.5-3 in Appendix F of the staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant is responsible for addressing the guidelines of Appendix I to 10 CFR Part 50, as they relate to maximally exposed offsite individual doses and population doses attributable to liquid and gaseous effluents.

The staff reviewed the resolution to COL Information Item 11.5-3 related to the compliance with Appendix I to 10 CFR Part 50 included under Section 11.3.3.4 of the COL and issued RAI 7112, Question 11.03-1 requesting the applicant to provide more of the details of the individual and population dose analysis, since the information presented in Turkey Point Units 6 and 7 FSAR (Revision 0) is incomplete.

If built, the postulated two new units at the site would release gaseous effluents into the atmosphere. The applicant calculated doses for several airborne pathways, including direct exposure to a radioactive plume, direct exposure to radioactivity deposited on the ground, inhalation of airborne radioactivity and ingestion of contaminated agricultural products, including vegetables and meat. The applicant assumed that the 50-mile population around the plant consumes both cow and goat milk, while the nearest resident who receives the maximum estimate does drinks no milk.

Using radiological exposure models based on RG 1.109 and the GASPAR II computer program (NUREG/CR-4653, "GASPAR II: Technical Reference and User Guide," March 1987), the applicant calculated the estimated doses to a hypothetical MEI of the public and to the population within 50 mi (80 km) from the postulated gaseous effluents discharged.

The applicant maximized the estimated MEI doses by choosing conservative locations and dispersion data for the calculations.

Turkey Point Units 6 and 7 COL, Revision 8, FSAR Tables 11.3-201, -202, and -203 describe assumptions and include gaseous pathway parameters used as input in dose calculations, including population data, and site-specific agricultural usage information. Turkey Point Units 6 and 7 COL, Revision 8, FSAR Tables 11.3-204, -205, and -206 list doses for gaseous releases and exposure pathways for the MEI and surrounding population, respectively.

The applicant calculated the gaseous pathway doses to the MEI. The results (FSAR Revision 8, Tables 11.3-204 and -205) show, for assumed conservative locations, a gamma annual air dose of 0.042 mGy or 4.2 mrad, a beta annual air dose of 0.18 mGy or 18 mrad, a total annual body dose of 0.00038 mSv or 0.038 mrem, and an annual skin dose of 0.00053 mSv or 0.053 mrem. The most limiting age group is the child, with organ doses of 0.0015 mSv or 0.15 mrem to bone and 0.0024 mSv or 0.24 mrem to the thyroid. The calculated annual population doses listed in revised FSAR Revision 5, Table 11.3-207 are 0.04 person-Sv (4.0 person-rem) to the total body and 0.075 person-Sv (7.5 person-rem) to the thyroid. The applicant uses the population doses in the cost-benefit analysis described in this SER.

Table 11.3-3 Comparison of Maximum Annual Individual Doses with NRC Dose Limits

Description	COL Application	10 CFR Part 50, Appendix I, Sections II.B and II.C Criteria
Noble Gases <ul style="list-style-type: none"> Gamma Dose [mGy (mrad)] Beta Dose [mGy (mrad)] Total Body [mSv (mrem)] Skin [mSv (mrem)] 	* 4.2E-2 (4.2) * 1.8E-1 (18) 2.6E-2 (2.6) 1.3E-1 (13)	1.0E-1 (10) 2.0E-1 (20) 5.0E-2 (5) 1.5E-1 (15)
Radioiodines and Particulates <ul style="list-style-type: none"> Maximum Organ [mSv (mrem)] 	** (0.24)	1.5E-1 (15)
* Taken from FSAR Revision 7, Table 11.3-205 ** Dose for the child thyroid, taken from FSAR Revision 7, Table 11.3-204		

The staff performed an independent assessment using the GASPAR II computer code and compared its results to the applicant's and Part 50, Appendix I, criteria and Part 20, Appendix B, ECLs for gaseous effluents. Following a review of COL FSAR, Revision 4, Section 11.3, the staff identified eight issues in demonstrating compliance with gaseous effluent releases and dose limits to members of the public under 10 CFR 20.1301, 20.1302, and 20.1301(e) and Part 50, Appendix I, design objectives and ALARA provisions. Based on this review of the information and conduct of confirmatory analyses, the staff identified inconsistencies and a need to clarify assumptions used in the analyses and results presented by the applicant and include site-specific information and analyses in demonstrating compliance with gaseous effluent releases and dose limits to members of the public under 10 CFR 20.1301, 20.1302, and 20.1301(e) and Part 50, Appendix I, design objectives and ALARA provisions. In RAI 7112, Question 11.03-1, dated August 7, 2013, the applicant was requested to address and resolve the issues identified by the staff. In a response dated September 9, 2013, to RAI 7112, Question 11.03-1, the applicant provided supplemental information for the staff's evaluation.

The staff evaluated and agrees with the approach taken by the applicant to calculate maximum annual individual doses from gaseous effluents. Using this same approach, the staff confirmed the individual doses in the FSAR by independently running the GASPAR II computer code with the applicant's parameter values. SER Table 11.3-4 provides a comparison of the resulting dose estimates between the applicant's analyses and the Part 50, Appendix I criteria. All doses are well below the Appendix I, Sections II.B and II.C, criteria. The staff concludes that the applicant has provided a bounding assessment demonstrating its capability to comply with the regulatory requirements in 10 CFR Part 20 and Appendix I to 10 CFR Part 50.

Table 11.3-4 Comparison of COL MEI Doses with the Staff Results

Pathway	Age Group	Organ	COL Application * mSv/yr (mrem/year)	The Staff's Analysis mSv/yr (mrem/year)
Plume and ground deposition	Teen	Whole body	2.6E-2 (2.6)	2.55E-2 (2.55)
External plume exposure	All	Skin	1.3E-1 (1.3E1)	1.28E-1 (1.28E1)
External ground exposure	All	Skin	1.2E-2 (1.2)	1.23E-2 (1.23)
Inhalation	Child	Thyroid	1.4E-4 (1.4E-2)	1.37E-4 (1.37E-2)
Meat	Child	Bone	1.8E-4 (1.8E-2)	1.79E-4 (1.79E-2)
Vegetables	Child	Thyroid	2.1E-3 (2.1E-1)	2.06E-3 (2.06E-1)
Most limiting	Child	T-Body Bone Thyroid	3.8E-4 (3.8E-2) 1.5E-3 (1.5E-1) 2.4E-3 (2.4E-1)	3.8E-4 (3.8E-2) 1.5E-3 (1.5E-1) 2.4E-3 (2.4E-1)

* Taken from FSAR Section 11.3.3.4 and Table 11.3-206

In confirming that gaseous effluent concentrations are in compliance with Part 20, Appendix B, Table 2, Column 1, limits and the unity rule for radionuclide mixtures, the applicant provided an updated evaluation by comparing the exclusion area boundary (EAB) atmospheric dispersion parameter of AP1000 DCD, FSAR, Revision 19, Section 11.3.3.2 and Table 11.3-4 (sheet 2), with the corresponding FPL site-specific EAB atmospheric dispersion parameter presented in FSAR, Revision 5, Section 2.3.5. The applicant presented a comparison in COL Revision 5, FSAR 11.3.3.2 in demonstrating compliance with Part 20, Appendix B, Table 2, Column 1, limits and the unity rule since the result of this analysis and regulatory compliance are dependent on site-specific meteorological data. Using a site-specific EAB atmospheric dispersion parameter, the applicant adjusted upward the results of the sum-of-the-ratio by a factor of 1.7, as the difference between the EAB atmospheric dispersion parameters. The adjusted sum-of-the-ratio is 0.051 for routine effluent releases and 0.56 for maximum effluent releases. The staff confirmed this adjustment with a sum-of-the-ratio of 0.051 for routine releases and 0.58 for maximum releases. The adjusted sum-of-the-ratio is acceptable since it is less than the calculated value for unity and in conformance with Part 20, Appendix B, Footnote 4. The staff

confirmed that the corresponding revisions were made to COL Revision 7, FSAR Section 11.3.3.2 and, therefore, closes out this item in RAI 7117, Question 11.03-1.

In confirming that gaseous effluent concentrations are in compliance with the guidance of NUREG-0800, SRP Section 11.3, and BTP 11-5 (Postulated Radioactive Releases Due to a Waste Gas System Leak or Failure), the applicant did not compare the results of AP1000 DCD FSAR, Revision 19, Section 11.3.3.4 (2nd paragraph), and the EAB atmospheric dispersion parameter of AP1000 DCD, FSAR, Revision 19, Section 2.1, Table 2-1 (sheet 3), with the corresponding site-specific EAB atmospheric dispersion parameter (0-2 hour X/Q) presented in COL FSAR, Revision 5, Section 2.3.4. As part of RAI 7112, Question 11.03-1, the applicant was requested to address and acknowledge this comparison in COL FSAR 11.3.3 in demonstrating compliance with AP1000 DCD FSAR, Revision 19, Section 11.3.3.4, and SRP Section 11.3 and BTP 11-5 since the dose result of this analysis and regulatory compliance are dependent on site-specific meteorological data. In a response dated March 6, 2014, to RAI 7112, Question 11.03-1, the applicant provided supplemental information for the staff's evaluation. In its evaluation, the staff determined that the applicant's response provided clarifying text in the FSAR Section 11.3.3.4, to state that: "The site-specific atmospheric dispersion factor for the site boundary is bounded by the value given in DCD Table 2-1. Hence the single failure of an active component in the gaseous radwaste system yields a whole body dose less than 0.1 rem." The staff finds this response acceptable because the staff has confirmed that the atmospheric dispersion factor for the site boundary is less than the value described in the AP1000 DCD and also determines that the calculated value would be less than what is currently estimated in the DCD. Therefore, the staff's findings made in NUREG-1793 and its supplements are still valid. The staff has confirmed the changes in Revision 6 of the application. RAI 7117, Question 11.03-1 is resolved.

The following portion of this technical evaluation section is reproduced from Section 11.3.4 of the VEGP SER:

Supplemental Information

The following portion of this technical evaluation section is reproduced from Section 11.3.4 of the BLN SER:

- *STD SUP 11.3-1*

The applicant provided supplemental information in BLN COL FSAR Section 11.3.3.6, "Quality Assurance," addressing the quality assurance program to be applied to the gaseous waste system and stated that the program complies with the guidance presented in RG 1.143.

The NRC staff reviewed this supplemental quality assurance information included in BLN COL FSAR Section 11.3.3.6 and finds that this supplemental statement commits the applicant to the regulatory positions in RG 1.143 related to quality assurance and is acceptable.

- *PTN SUP 11.3-1*

The applicant provided additional information in PTN SUP 11.3-1 stating that the quality assurance program for design, construction, procurement, materials, welding, fabrication,

inspection and testing activities conforms to the quality control provisions of the codes and STDs recommended in Table 1 of RG 1.143.

The following portion of this technical evaluation section is reproduced from Section 11.3.4 of the VEGP SER:

Postulated Radioactive Release Due to a Waste Gas Leak or Failure

NUREG-0800, Section 11.3, acceptance criteria and BTP 11-5 require the staff to evaluate the results of a postulated radioactive release resulting from a leakage or failure of a waste gas storage tank or offgas charcoal delay bed.

*The AP1000 DCD and NUREG-1793 addressed the results of this analysis. In response to RAI SRP11.3-CHPB-02 covering AP1000 DCD, Revision 17, Westinghouse detailed the results of this analysis for inclusion in the next revision of the DCD. As documented in the staff's SER for the AP1000 DCD, the staff found this analysis acceptable and that it encompassed the site-specific parameters for the VEGP site. Once the staff confirms the inclusion of the failure analysis in a future revision of the AP1000 DCD and the incorporation by reference of that DCD revision by the applicant, the staff will consider this item closed for the VEGP COL FSAR. This is considered **Confirmatory Item 11.3-1**.*

Resolution of Standard Content Confirmatory Item 11.3-1

Confirmatory Item 11.3-1 is a commitment by the applicant to incorporate changes, by reference, proposed by Westinghouse to Section 11.3.3.4 of the AP1000 DCD to include the results of the postulated radioactive release resulting from a leakage or failure of a waste gas storage tank or offgas charcoal delay bed. The staff verified that the applicant has incorporated the AP1000 DCD Revision 18 that includes the above changes. As a result, Confirmatory Item 11.3-1 is now closed.

Demonstrating Compliance with 10 CFR 20.1301(e)

The staff discusses compliance with 10 CFR 20.1301(e) in Section 11.2.4 of this SER.

Demonstrating Compliance with 10 CFR 20.1302

The annual average concentration of radioactive material released in gaseous effluents at the boundary of the unrestricted area must not exceed the values specified in Table 2 of Appendix B to 10 CFR Part 20. The applicant demonstrated compliance with this requirement by referencing the AP1000 DCD. Section 11.3.3.5 of the DCD shows that, even at the TS limit for percent failed fuel defects, the site provides sufficient atmospheric dilution to ensure that the expected effluent release concentrations will be less than those specified in Table 2 of Appendix B to 10 CFR Part 20.

In NUREG-1793, the staff evaluated and accepted the conclusions of Section 11.3.3.5 of the DCD. Based on this acceptance, the staff concludes that the applicant complies with 10 CFR 20.1302.

Demonstrating Compliance with 10 CFR 20.1406

The staff discusses compliance with 10 CFR 20.1406 in Section 11.2.4 of this SER.

Demonstrating Compliance with 10 CFR Part 50 Appendix I

Pursuant to 10 CFR Part 50, Appendix I, Sections II.B, II.C, and II.D, the applicant is responsible for addressing the requirements for dose objectives in controlling doses to a hypothetical maximally exposed member of the public and populations living near the proposed nuclear power plant. The requirements define dose objectives for gaseous effluents and require a cost-benefit analysis in justifying installed processing and treatment equipment of the GWMS, including any augmentation to the design in complying with 10 CFR Part 50, Appendix I. The applicant demonstrated compliance with 10 CFR Part 50, Appendix I, Sections II.B, II.C, and II.D requirements, by performing the required cost-benefit analysis through PTN COL 11.3-1, and performed the required dose compliance through PTN COL 11.5-3. The staff independently confirmed the results of the cost-benefit analysis and compliance with the dose objectives and finds that the applicant is in compliance with 10 CFR Part 50, Appendix I, Sections II.B, II.C, and II.D.

11.3.5 Post-Combined License Activities

There are no post-COL activities related to this section.

11.3.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff evaluated the additional COL information (PTN COL 11.3-1, PTN COL 11.5-3, and STD SUP 11.3-1) in the application against the relevant NRC regulations, acceptance criteria defined in NUREG-0800, Section 11.3, and other NRC regulatory guides.

In other areas of the evaluation of the GWMS, the staff confirmed that the applicant provided sufficient information and that the review and calculations support the conclusion that the GWMS includes the equipment necessary to control releases of radioactive materials in gaseous effluents in accordance with GDC 3, 60, and 61 of Appendix A to 10 CFR Part 50 and the requirements of 10 CFR 50.34a. The staff finds that the applicant has met the requirements in GDC 3 by conforming to the guidance in BTP 11-5. The staff also concludes that the design of the GWMS meets the requirements of 10 CFR 20.1301(e), 10 CFR 20.1302, 10 CFR 20.1406, 10 CFR 50.34a, GDC 3, 60, and 61, and Appendix I to 10 CFR Part 50.

11.4 Solid Waste Management System

11.4.1 Introduction

The SWMS is designed to collect and accumulate spent ion exchange resins and deep-bed filtration media, spent filter cartridges, dry active wastes, and mixed wastes generated from normal plant operation, including AOOs. Processing and packaging of wastes are by mobile systems, and the packaged waste is stored in the auxiliary and radwaste buildings until it is shipped off site to a licensed disposal facility.

11.4.2 Summary of Application

Section 11.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 11.4 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point COL FSAR, Section 11.4, the applicant provided the following:

AP1000 COL Information Items

- STD COL 11.4-1

The applicant provided additional information in STD COL 11.4-1 to address COL Information Item 11.4-1 (COL Action Item 11.4-1). The additional information provides a process control program (PCP) for both wet and dry solid wastes.

Supplemental Information

- STD SUP 11.4-1

The applicant provided supplemental information in PTN COL FSAR Section 11.4.5 to address how the solid radwaste system complies with the guidance in RG 1.143. STD SUP 11.4-1 also addresses the processes to be followed to ship waste that complies with 10 CFR 61.55, "Waste classification," and 10 CFR 61.56, "Waste characteristics," in PTN COL FSAR, Section 11.4.6.1.

- PTN SUP 11.4-1

The applicant provided additional information in PTN SUP 11.4-1 to describe its disposition of packaged waste.

- PTN SUP 11.4-2

The applicant added in Turkey Point Units 6 and 7 COL FSAR, Section 11.4.5, supplemental information to address conformance of the QA program to RG 1.143.

License Condition

- Part 10, License Condition 3, Operational Program Implementation

PTN COL FSAR, Section 13.4, Table 13.4-201, "Operational Programs Required by NRC Regulations," identifies item 9, the process control program, as a program required by

regulations that must be implemented by a milestone (prior to initial fuel load) to be identified as a license condition.

- Part 10, License Condition 6, Operational Program Readiness

The applicant proposed a license condition to provide a schedule to support NRC inspection of operational programs, including the PCP.

11.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in the FSER related to the DCD.

In addition, the regulatory basis for acceptance of the supplemental information on the SWMS is established in several codes and STDs. These include:

- 10 CFR Part 20, "Standards for Protection Against Radiation"
- 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities"
- 10 CFR 52.79, "Contents of applications; technical information in final safety analysis report"
- 10 CFR Part 71, "Packaging and Transportation of Radioactive Material"
- 49 CFR Part 173, "Shippers—General Requirements for Shipments and Packagings"
- State regulations and disposal site waste form requirements for burial at a low-level waste disposal site that is licensed in accordance with 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," or equivalent State regulations
- Table 1 and Regulatory Positions C.3.2 and C.3.3 of RG 1.143

The acceptance criteria associated with the SWMS are given in NUREG-0800, Section 11.4, including BTP 11-3.

11.4.4 Technical Evaluation

The staff reviewed Section 11.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.² The staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the SWMS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff's review of this application included the following COL information item and supplemental information:

- STD COL 11.4-1, Solid Waste Management System Process Control Program
- STD SUP 11.4-1, Quality Assurance

² Section 1.2.2 contains a discussion on the staff's review related to verification of the scope of information to be included within a COL application that references a DC.

- PTN SUP 11.4-1, Disposition of Packaged Waste
- PTN SUP 11.4-2, Supplemental Information on RG 1.143 Conformance

In addition to the above items, the staff reviewed the entire section against NUREG-0800, Section 11.4, to determine if the information in BLN COL FSAR Section 11.4 met the regulatory requirements in the regulations stated above (SER Section 11.4.3) and NUREG-0800 acceptance criteria. The relevant NUREG-0800 acceptance criteria are as follows:

- All effluent releases (gaseous and liquid) associated with the operation (normal and anticipated operational occurrences) of the SWMS will comply with 10 CFR Part 20 and RG 1.143, as they relate to the definition of the boundary of the SWMS beginning at the interface from plant systems, including multiunit stations, to the points of controlled liquid and gaseous effluent discharges to the environment or designated onsite storage locations, as defined in the PCP and ODCM.
- Operational Programs. For COL reviews, the description of the operational program and proposed implementation milestone for the PCP aspect of the Process and Effluent Monitoring and Sampling Program are reviewed in accordance with 10 CFR 20.1301, 10 CFR 20.1302, 10 CFR 50.34a, 10 CFR 50.36a, and 10 CFR Part 50, Appendix I, Sections II and IV. Its implementation is required by a license condition.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding STD content evaluation were endorsed.
- The staff confirmed that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the STD content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This STD content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN, Units 3 and 4, COL application.

Although the staff concluded that the evaluation performed for the standard content is directly applicable to the Turkey Point Units 6 and 7 COL application, there is a difference in how the Turkey Point Units 6 and 7 applicant addressed STD COL 11.4-1 and how the VEGP applicant addressed this review item. This difference is evaluated by the staff below, following the STD content material for STD COL 11.4-1.

The following portion of this technical evaluation section is reproduced from Section 11.4.4 of the VEGP SER:

AP1000 COL Information Items

The following portion of this technical evaluation section is reproduced from Section 11.4.4 of the BLN SER:

- **STD COL 11.4-1**

The applicant provided additional information in STD COL 11.4-1 to resolve COL Information Item 11.4-1. COL Information Item 11.4-1 states:

The Combined License applicant will develop a process control program in compliance with 10 CFR Sections 61.55 and 61.56 for wet solid wastes and 10 CFR Part 71 and DOT regulations for both wet and dry solid wastes. Process control programs will also be provided by vendors providing mobile or portable processing or storage systems. It will be the plant operator's responsibility to assure that the vendors have appropriate process control programs for the scope of work being contracted at any particular time. The process control program will identify the operating procedures for storing or processing wet solid wastes. The mobile systems process control program will include a discussion of conformance to Regulatory Guide 1.143, Generic Letter GL-80-009, and Generic Letter GL-81-039 and, information of equipment containing wet solid wastes in the non-seismic Radwaste Building. In the event additional onsite storage facilities are a part of Combined License plans, this program will include a discussion of conformance to Generic Letter GL-81-038.

The commitment was also captured as COL Action Item 11.4-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will develop a process control program for both wet and dry solid wastes.

In BLN COL FSAR Section 11.4.6, the applicant addressed this COL information item. The applicant adopted NEI 07-10[A], "FSAR Template Guidance for Process Control Program (PCP) Description." The PCP describes the administrative and operational controls used for the solidification of liquid or wet solid waste and the dewatering of wet solid waste. It provides the necessary controls such that the final disposal waste product meets applicable federal regulations (10 CFR Parts 20, 50, 61, 71 and 49 CFR Part 173), state regulations, and disposal site waste form requirements for burial at a low level waste disposal site licensed in accordance with 10 CFR Part 61. Waste processing equipment and services may be provided by the plant or by

*third-party vendors. In a letter dated January 8, 2009, (ML082910077), the NRC accepted NEI 07-10[A], Revision 3. Specifically, the NRC staff indicated that for COL applications NEI 07-10[A], Revision 3, provides an acceptable template for assuring that the administrative and operational controls for waste processing, processing parameters, and surveillance requirements within the scope of the PCP will meet the requirements of 10 CFR 52.79. In a letter dated April 23, 2009 (ML091170073), the applicant proposed to revise BLN FSAR Section 11.4 to incorporate the approved NEI 07-10[A] Revision 3. Since the BLN COL FSAR Section 11.4 has not adopted the approved version of the NEI Template, this is **Confirmatory Item 11.4-1**. Each process used meets the applicable requirements of the PCP. BLN COL FSAR Table 13.4-201 provides milestones for PCP implementation and is acceptable.*

*In STD COL 11.4-1, the applicant states that “no additional onsite radwaste storage is required beyond that described in the DCD.” The applicant should explain why this statement is included or should remove it. In section 11.4 of NUREG-1793, the staff stated that if a need for onsite storage of low-level waste has been identified beyond that provided in AP1000 Standard Design because of unavailability of offsite storage, the applicant should submit the details of any proposed onsite storage facility to the NRC. The applicant needs to provide any arrangements for offsite storage for low-level waste or to submit plans for onsite storage. This is identified as **Open Item 11.4-1**.*

The following portion of this technical evaluation section is reproduced from Section 11.4.4 of the VEGP SER:

Resolution of Standard Content Confirmatory Item 11.4-1

To address Confirmatory Item 11.4-1 in the BLN SER with open items, the applicant updated VEGP FSAR Section 11.4.6 to indicate adoption of the NRC-approved version of NEI 07-10A. VEGP adoption of this template effectively resolves Confirmatory Item 11.4-1.

Resolution of Standard Content Open Item 11.4-1

To address Open Item 11.4-1 in the BLN SER with open items, the applicant updated VEGP FSAR Section 11.4 with information supporting the statement that no additional onsite radwaste storage was required beyond that described in the DCD. This additional information is in VEGP COL 11.4-1 and VEGP SUP 11.4-1 and is evaluated below.

Evaluation of Site-Specific Information for STD COL 11.4-1

Regarding the Resolution of STD Content Open Item 11.4-1, the staff does not consider the open item relevant to the Turkey Point Units 6 and 7 COL application because the applicant has available offsite disposal of all types of low-level radioactive waste through its membership in

the Atlantic Compact. Therefore, an update of the Turkey Point Units 6 and 7 COL FSAR is not necessary to resolve this item.

The following portion of this technical evaluation section is reproduced from Section 11.4.4 of the VEGP SER:

Supplemental Information

The following portion of this technical evaluation section is reproduced from Section 11.4.4 of the BLN SER:

- *STD SUP 11.4-1*

The applicant provided supplemental information in Section 11.4.5 of the PTN COL FSAR to describe the QA program applicable to design, construction, installation and testing provisions of the solid radwaste system. This QA program is established by procedures and complies with the guidance presented in RG 1.143.

In BLN FSAR Section 11.4.6, the applicant also added a description of procedures relating to waste shipments, waste stream processing, verifying waste as non-radioactive, periodic system maintenance, personnel training, and document revision, clearing with third party vendors. The staff reviewed the descriptions and found them to be comprehensive and acceptable.

The NRC staff reviewed the supplemental information provided in STD SUP 11.4-1 related to the QA program for the solid radwaste system included under Section 11.4.4 of the BLN COL FSAR and finds that this supplemental statement commits the applicant to the regulatory positions in RG 1.143 related to quality assurance.

In addition to the above, the applicant provided a site-specific response to LNP RAI 11.02-4. The Turkey Point Units 6 and 7 response to LNP RAI 11.02-4 also resolved questions asked in LNP RAI 11.02-5. The response was dated October 23, 2014, and was partially revised by a response received February 3, 2015. In the response, the applicant provided additional information in relation to COL Information Item 11.4-1 in order to ensure that the inventory of radioactive materials contained in all unpackaged waste held in the RWB is controlled in accordance with the RG 1.143, Revision 2, dose acceptance criteria. This response, along with the associated operational commitments and proposed license condition ensure that all unpackaged waste held in the RWB is controlled in accordance with the provisions of RG 1.143, Revision 2. A detailed discussion of these responses, including aspects related to SER Section 11.4, is provided in Section 11.2.4 of this SER. The FSAR changes proposed in the response are being tracked as **Confirmatory Item 11.4-1** pending the applicant's update of the FSAR.

Resolution of Turkey Point Confirmatory Item 11.4-1

Confirmatory Item 11.4-1 is an applicant commitment to revise its FSAR Sections 11.2.1.2.5.2, 11.4.6, and 13.5.2.2.5 regarding the solid waste management system process control program.

The staff verified that the Turkey Point Units 6 and 7 COL FSAR, Revision 8 was appropriately revised. As a result, Confirmatory Item 11.4-1 is now closed.

Additionally, the applicant provided the following supplemental information item:

- PTN SUP 11.4-1

The applicant provided supplemental information in Section 11.4.5 of the Turkey Point Units 6 and 7 COL FSAR to describe its planned contracting arrangement for disposal of low-level radioactive waste. This is related to STD COL 11.4-1 above and Open Item 11.4-1. The staff has issued RAI 7104, Question 11.04-1, requesting the applicant to provide additional information related to its long-term disposition of low-level radioactive waste. This discussion is provided in the section below, titled "Compliance with 10 CFR Part 50, Appendix I, Design Criteria."

- PTN SUP 11.4-2

The applicant provided additional information in PTN SUP 11.3-1, stating that the quality assurance program for design, construction, procurement, materials, welding, fabrication, inspection, and testing activities conforms to the quality control provisions of the codes and STDs recommended in Table 1 of RG 1.143.

The following portion of this technical evaluation section is reproduced from Section 11.4.4 of the VEGP SER:

License Conditions

- *Part 10, License Condition 3, Operational Program Implementation*

VEGP COL FSAR Section 11.4.6 describes the process control program. VEGP COL FSAR Table 13.4-201 provides the milestone (prior to initial fuel load) for implementation of the process control program and is acceptable as described in the staff's SER related to NEI 07-10.

- *Part 10, License Condition 6, Operational Program Readiness*

The applicant proposed a license condition to provide a schedule to support NRC inspection of operational programs including the process control program. The proposed license condition is consistent with the policy established in SECY-05-0197 and is acceptable.

These above license conditions are captured in section 11.4.5 of this SER as License Conditions 11-2 and 11-3.

Compliance with 10 CFR Part 50, Appendix I, Design Criteria

The design of the SWMS described in the AP1000 DCD has no release points directly to the environment. Compliance with Appendix I ALARA criteria is strictly based on the releases from the LWMS and GWMS and not the SWMS.

The following portion of this technical evaluation is based on the staff's review of Turkey Point Units 6 and 7 COL FSAR Section 11.4 of the application:

Following a review of Turkey Point Units 6 and 7 FSAR, Revision 4, Section 11.4, the staff identified three issues. The first issue was with the development of a radioactive waste management program for 10 CFR 61.55 Class C wastes. The second issue involved plant-specific operational considerations associated that there is a commitment to comply with the guidance of RG 1.143 and AP1000 DCD in not exceeding the 10 CFR Part 71, Appendix A, A₂ quantities of radioactive materials contained in skid-mounted solid waste processing equipment when installed in the radwaste building to meet RW-IIc requirements (as discussed in detail in Section 11.2.4 of this SER). In the final issue staff requested a correction of inconsistent listing of references dealing with topics covered in COL FSAR Section 11.3. In RAI 7104, Question 11.04-1 and RAI 6920, Question 11.04.02, the applicant was requested to address and resolve the following technical aspects:

- (1) FPL, Turkey Point Units 6 and 7 FSAR, Revision 4, Section 11.4.2.4.3, and PTN SUP 11.4-2 present supplemental information on plans to develop additional storage capacity if warranted by operational needs. In describing the approach, PTN SUP 11.4-2 refers to AP1000 DCD FSAR, Section 11.4.2.4.2, on generation rates of radioactive wastes by referring to "paragraph ten" in that DCD subsection. However, a review of AP1000 DCD FSAR, Revision 19, Section 11.4.2.4.2, indicates that it only describes an option involving the potential use of a licensed central radwaste processing facility for waste processing and disposal, and does not present any data on waste generation rates. Moreover, this subsection consists of only one brief paragraph, without any subparagraphs. In RAI 7104, Question 11.04-1, dated August 7, 2013, the applicant was requested to review the supplemental information provided in PTN SUP 11.4-2 and change the DCD citation to the correct one. In a response dated September 9, 2013 to RAI 7104, Question 11.04-1, the applicant agreed to make the necessary revisions and provide supplemental information in developing contingency plans for the storage of low-level radioactive wastes in the event that access to offsite storage and disposal are not available. In COL Revision 7, FSAR Section 11.4.2.4.3, the applicant made the necessary corrections and added supplemental information on contingency plans for waste storage and disposal and identified the use of NRC guidance in developing such plans. The staff confirmed that the corresponding revisions were made to COL Revision 7, FSAR Section 11.4.2.4.3 and, therefore, closes out this item in RAI 7104, Question 11.04-1.
- (2) On a separate matter, the staff noted that, in Turkey Point Units 6 and 7 FSAR, Revision 4, Section 11.4.7, the citation of references 202, 203, and 204 are incorrectly located in this FSAR section. A review of Turkey Point Units 6 and 7 FSAR, Revision 4, Section 11.3 and Table 11.3-203, indicates that these three references support the dose assessment analysis used in demonstrating regulatory compliance with releases of gaseous effluents in unrestricted areas. In RAI 7112, Question 11.03-1, the applicant was requested to delete references 202, 203, and 204 in FSAR Section 11.4.7 (or explain why the references are included in that FSAR section), or relocate them to the reference section of FSAR Section 11.3. In a response dated September 9, 2013, the applicant agreed to make the corrections by deleting the extraneous references in COL FSAR Section 11.4.7. The staff confirmed that the corresponding revisions were made to COL Revision 7, FSAR Section 11.4.7, and, therefore, closes out this item in NRC 7112, Question 11.03-1.

11.4.5 Post-Combined License Activities

The staff proposes two license conditions. The first license condition, 11-1 relates to STD COL 11.4-1 in that a PCP will be developed and implemented. The second license condition, 11-2, captures the concepts related to STD COL 13.4-1. The intent is to highlight that the PCP, among other operational programs, is an operational program that will be inspected prior to fuel load. The license condition language in this section has been modified, per a letter from the applicant dated April 8, 2016 (ADAMS Accession No. ML16103A507), confirming the acceptability of the following license conditions, proposed by the staff. These changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

License Condition (11-2) – Before initial fuel load, the licensee shall implement an operational program for process and effluent monitoring and sampling. The program shall include the subprogram and documents for a Process Control Program.

License Condition (11-3) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors (NRO) a schedule that supports planning for and conduct of NRC inspections of the operational program for process and effluent monitoring and sampling (including process control program). The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the operational program for process and effluent monitoring and sampling (including process control program) has been fully implemented.

11.4.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff evaluated the additional COL information (STD COL 11.4-1, STD SUP 11.4-1, and PTN SUP 11.4-1) in the application against the relevant NRC regulations, acceptance criteria in NUREG-0800, Section 11.4, and other NRC regulatory guides. The staff also confirmed that the PCP will be developed and implemented in accordance with the recommendations and guidance of NEI 07-10A.

The staff confirmed that the applicant has provided sufficient information and that the review supports the conclusion that follows. The staff concludes that the design and operation of the SWMS, which discharges radioactive releases through the LWMS and GWMS, is acceptable and meets the requirements of GDC 3, 60, and 61 of Appendix A of 10 CFR Part 50, 10 CFR 50.34a, 20.1301(e), 20.1406, and Appendix I to 10 CFR Part 50, and 10 CFR Parts 61 and 71.

11.5 Radiation Monitoring

11.5.1 Introduction

The radiation monitoring systems are used to monitor liquid and gaseous process streams and effluents from the LWMS, GWMS, and SWMS. The radiation monitoring system includes subsystems used to collect process and effluent samples during normal operation and AOOs and under post-accident conditions.

11.5.2 Summary of Application

Section 11.5 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 11.5 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 11.5, the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided information in Section 11.5 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this report.

AP1000 COL Information Items

- STD COL 11.5-1

The applicant provided additional information in STD COL 11.5-1 to resolve COL Information Item 11.5-1 (COL Action Item 11.5-1). The information addresses the ODCM.

- STD COL 11.5-2

The applicant provided additional information in STD COL 11.5-2 to resolve COL Information Item 11.5-2 (COL Action Item 11.5-2). The information provides programmatic aspects of the effluent monitoring and sampling program.

- PTN COL 11.5-2

The applicant provided additional information in PTN COL 11.5-2 to add language to Turkey Point Units 6 and 7 COL FSAR Section 11.5.3 addressing extension of the existing Unit 1 program for QA of radioactive effluent and environmental monitoring to apply to Turkey Point Units 6 and 7.

- PTN COL 11.5-3

The applicant provided additional information in PTN COL 11.5-3 to resolve COL Information Item 11.5-3 (COL Action Item 11.5-3). The information relates to the 10 CFR Part 50, Appendix I guidelines.

License Condition

- Part 10, License Condition 3, Operational Program Implementation, Item G.3

Turkey Point Units 6 and 7 COL FSAR Section 13.4, Table 13.4-201, "Operational Programs Required by NRC Regulations," identifies three entries under item 9, "Process and Effluent Monitoring and Sampling Program," as follows: (1) Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls; (2) Offsite Dose Calculation Manual; and (3) Radiological Environmental Monitoring program, as programs identified in FSAR Section 11.5 required to be implemented by a milestone. In accordance with License Condition 3, item G.3, these programs are to be implemented prior to initial fuel load.

- Part 10, License Condition 6, Operational Program Readiness

The applicant proposed a license condition to provide a schedule to support the staff's inspection of operational programs including the Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls, the ODCM, and the REMP.

11.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in the FSER related to the DCD.

In addition, the regulatory basis for acceptance of the supplementary information on radiation monitoring addressed in COL Information Items 11.5-1, 11.5-2, and 11.5-3 is established in the requirements and guidelines of:

- 10 CFR Part 50, Appendix A, GDC 64, "Monitoring radioactivity releases"
- 10 CFR Part 20, "Standards for Protection against Radiation"
- 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities"
- 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants"
- 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste"
- 10 CFR Part 71, "Packaging and Transportation of Radioactive Material"
- American National Standards Institute/Health Physics Society (ANSI/HPS) N13.1, "Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities"
- ANSI N42.18, "Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents"
- RG 1.21, Revision 2, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste"

- RG 4.15, Revision 2, “Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination) – Effluent Streams and the Environment”

The applicable acceptance criteria associated with the radiation monitoring system are given in NUREG-0800, Section 11.5.

11.5.4 Technical Evaluation

The staff reviewed Section 11.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.³ The staff’s review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the radiation monitoring system. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information contained in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Items

- STD COL 11.5-1, ODCM
- STD COL 11.5-2, Programmatic Aspects of the Effluent Monitoring and Sampling Program
- PTN COL 11.5-2 adds language to Turkey Point Units 6 and 7 COL FSAR Section 11.5.3 addressing extension of the existing Unit 1 program for quality assurance of radioactive effluent and environmental monitoring to apply to Turkey Point Units 6 and 7.
- PTN COL 11.5-3, 10 CFR Part 50, Appendix I Guidelines

In addition to the above items, the staff reviewed the entire section against NUREG-0800, Section 11.5, to determine if the information in Turkey Point Units 6 and 7 COL FSAR Section 11.5 met the regulatory requirements in the regulations stated above (SER Section 11.5.3) and NUREG-0800 acceptance criteria. The relevant NUREG-0800 acceptance criteria are as follows:

- Provisions should be made to ensure representative sampling from radioactive process streams and tank contents. Recirculation pumps for liquid waste tanks (collection or sample test tanks) should be capable of recirculating at a rate of not less than two tank volumes in 8 hours. For gaseous and liquid process stream samples, provisions should be made for purging sampling lines and for reducing the plate-out of radioactive materials in sample lines. Provisions for gaseous sampling from ducts and stacks should be consistent with ANSI/HPS N13.1-1999.
- For COL reviews, the description of the operational program and proposed implementation milestone for the radiological effluent technical specification (RETS)/SREC, ODCM, and Radiological Environmental Monitoring Program aspects of

³ Section 1.2.2 contains a discussion on the staff’s review related to verification of the scope of information to be included within a COL application that references a DC.

the Process and Effluent Monitoring and Sampling Program are reviewed in accordance with 10 CFR 20.1301, 10 CFR 20.1302, 10 CFR 50.34a, 10 CFR 50.36a, and 10 CFR Part 50, Appendix I, Sections II and IV. Its implementation is required by a license condition.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAls.
- The staff confirmed that all responses to RAls identified in the corresponding STD content evaluation were endorsed.
- The staff confirmed that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the STD content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This STD content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN, Units 3 and 4, COL application.

The following portion of this technical evaluation section is reproduced from Section 11.5.4 of the VEGP SER:

AP1000 COL Information Items

The following portion of this technical evaluation section is reproduced from Section 11.5.4 of the BLN SER:

- *STD COL 11.5-1*

The applicant provided additional information in STD COL 11.5-1 to resolve COL Information Item 11.5-1. COL Information Item 11.5-1 states:

The Combined License applicant will develop an offsite dose calculation manual that contains the methodology and parameters used for calculation of offsite doses resulting from gaseous and liquid effluents. The Combined License applicant will address operational setpoints for the radiation monitors and address programs for monitoring and controlling the release of radioactive material to the environment, which eliminates the potential for

unmonitored and uncontrolled release. The offsite dose calculation manual will include planned discharge flow rates.

This commitment was also captured as COL Action Item 11.5-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will develop an offsite dose calculation manual that contains the methodology and parameters used to calculate offsite doses resulting from gaseous and liquid effluents.

*In BLN COL FSAR Section 11.5.7, the applicant adopts NEI 07-09[A], "FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description." The ODCM program description contains: (1) the methodology and parameters used for calculating doses resulting from liquid and gaseous effluents; (2) operational setpoints, including planned discharge rates, for radiation monitors and monitoring programs; and (3) the limitations on operation of the radwaste systems, including functional capability of monitoring instruments, concentrations of effluents, sampling, analysis, 10 CFR Part 50, Appendix I dose and dose commitments and reporting. In a letter dated January 27, 2009 (ML083530745), the NRC accepted NEI 07-09[A], Revision 4. Specifically, the NRC indicated that for COL applications, NEI 07-09[A], Revision 4 provides an acceptable template assuring that the ODCM program meets applicable NRC regulations and guidance. In a letter dated April 23, 2009 (ML091170073), the applicant proposed to revise BLN COL FSAR Section 11.5 to incorporate the approved NEI 07-09[A], Revision 4. Since the BLN COL FSAR Section 11.5 has not adopted the approved version of the NEI Template, this is **Confirmatory Item 11.5-1**. BLN COL FSAR Table 13.4-201 provides milestones for ODCM implementation. This section also addresses Plant Interface Item 11.4, "requirements for offsite sampling and monitoring of effluent concentrations." The staff finds the applicant's consideration of Plant Interface Item 11.4 to be acceptable based on a review of the ODCM program (NEI 07-09[A]). The NRC staff reviewed the resolution of STD COL 11.5-1 related to the ODCM included under Section 11.5.7 of the BLN COL FSAR and considers it adequately addressed in NEI 07-09[A].*

The following portion of this technical evaluation section is reproduced from Section 11.5.4 of the VEGP SER:

Resolution of Standard Content Confirmatory Item 11.5-1

To address Confirmatory Item 11.5-1, the applicant updated the VEGP FSAR Section 11.5.7 to indicate adoption of the NRC-approved version of NEI 07-09A. VEGP adoption of this template effectively resolves Confirmatory Item 11.5-1.

The following portion of this technical evaluation section is reproduced from Section 11.5.4 of the BLN SER:

- **STD COL 11.5-2**

The applicant provided additional information in STD COL 11.5-2 to resolve COL Information Item 11.5-2 (COL Action Item 11.5-2). COL Information Item 11.5-2 states:

The Combined License applicant is responsible for the site-specific and program aspects of the process and effluent monitoring and sampling in accordance with ANSI N13.1 and RGs 1.21 and 4.15.

The commitment was also captured as COL Action Item 11.5-2 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant is responsible for ensuring that the process and effluent monitoring and sampling program at its site conforms to the guidelines of ANSI N13.1-1969, RG 1.21, and RG 4.15.

In BLN COL FSAR Sections 11.5.1.2, 11.5.2.4, 11.5.4, 11.5.4.1, 11.5.4.2 and 11.5.6.5, the applicant described the programmatic aspects of the effluent monitoring and sampling program. In addition, the applicant provided in BLN COL 11.5-2 specific language regarding the applicant's extension of the existing TVA program for quality assurance of radiological effluent and environmental monitoring which is based on RG 4.15, Revision 1, instead of the most current Revision 2. To maintain consistency, the applicant proposes to apply the same program to BLN Units 3 and 4.

The NRC staff reviewed the resolution of BLN COL 11.5-2 related to the effluent monitoring and sampling program included under Sections 11.5.1.2, 11.5.2.4, 11.5.3, 11.5.4, 11.5.4.1, 11.5.4.2 and 11.5.6.5 of the BLN COL FSAR and considers it adequately addressed in NEI 07-09.

In STD COL 11.5-2, the applicant adopted RG 4.15, Revision 2, instead of the Revision 1, which was adopted by BLN. The staff concludes that Revision 2 is acceptable because it is the more current version.

- **PTN COL 11.5-2**

In PTN COL 11.5-2, the applicant extended the existing NRC-approved Progress Energy QA program, including RG 4.15, Revision 1, for effluent and environmental monitoring to Turkey Point Units 6 and 7. The staff finds this acceptable because the current program is a proven methodology. By using the current program, the applicant will also avoid confusion and the potential for error because the program for the existing and planned units will share the same equipment and personnel.

- PTN COL 11.5-3

The applicant provided additional information in PTN COL 11.5-3 to resolve COL Information Item 11.5-3. COL Information Item 11.5-3 states:

The Combined License applicant is responsible for addressing the 10 CFR 50, Appendix I guidelines for maximally exposed offsite individual doses and population doses via liquid and gaseous effluents.

The commitment was also captured as COL Action Item 11.5-3 in Appendix F of the staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant is responsible for addressing the guidelines of Appendix I to 10 CFR Part 50, as they relate to maximally exposed offsite individual doses and population doses attributable to liquid and gaseous effluents.

The applicant addressed this COL item by adding information to Turkey Point Units 6 and 7 COL FSAR Sections 11.2.3.5 and 11.3.3.4 for liquid and gaseous effluents, respectively.

The staff reviewed the resolution of PTN COL 11.5-3 related to compliance with 10 CFR Part 50, Appendix I, as discussed in SER Sections 11.2.4 and 11.3.4, and considers that the applicant adequately addressed applicable regulatory requirements based on the evaluations provided in SER sections 11.2.4 and 11.3.4 to calculate and verify estimated annual releases.

The following portion of this technical evaluation section is reproduced from Section 11.5.4 of the VEGP SER:

The following portion of this technical evaluation section is reproduced from Section 11.5.4 of the BLN SER:

Section 11.5.4.2, Representative Sampling

In this section, the applicant describes how it will take representative samples for analysis. Based on the staff's review, the staff issued RAIs 11.5-1 and 11.5-2. RAI 11.5-1 requested clarification about the use of ANSI/HPS N13.1-1999. RAI 11.5-2 requested more information concerning how the applicant ensures representative liquid effluent and environmental sampling.

In response to RAI 11.5-1, the applicant revised its commitment to use the 1999 standard. Because the applicant made no changes to the certified design, it removed the commitment to use ANSI/HPS N13.1-1999, and committed to ANSI N13.1-1969 to be consistent with the AP1000 certified design. ANSI withdrew the 1969 standard and replaced it with ANSI/HPS N13.1-1999 because the approach taken in the 1969 standard did not provide assurance that the sample in the effluent vent would be representative. The 1999 standard differs significantly from the earlier version in that it is now performance based. NUREG-0800 Section 11.5 (2007) uses the 1999 standard as acceptance criteria. The staff is pursuing this issue through the DC

because it deals with the design of the sampling systems for radioactive gas streams.

The applicant provided a response to RAI 11.5-2 and the staff finds the response acceptable. The response provided a more detailed description of how the applicant will assure that liquid samples will be representative. The applicant committed to follow the recommendations in ANSI N42.18 and RG 1.21. In addition, the applicant provided more operational descriptions for composite sampling. The NRC staff verified that Revision 1 of the BLN COL FSAR adequately addressed the above. As a result, RAI 11.5-2 is closed.

The following portion of this technical evaluation section is reproduced from Section 11.5.4 of the VEGP SER:

License Condition

- *Part 10, License Condition 3, Operational Program Implementation, Item G.3*

VEGP FSAR Section 11.5.3 describes effluent monitoring and sampling and Section 11.5.7 describes the offsite dose calculation manual. License Condition 3, Item G.3 requires the licensee to implement the "Process and Effluent Monitoring and Sampling" program prior to initial fuel load. VEGP COL FSAR Section 13.4, Table 13.4-201, "Operational Programs Required by NRC Regulations," identifies three entries under Item 9, "Process and Effluent Monitoring and Sampling Program," as follows: (1) Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls, (2) Offsite Dose Calculation Manual; and (3) Radiological Environmental Monitoring program, as programs identified in FSAR Section 11.5 required to be implemented by a milestone. The ODCM includes the Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls and the Radiological Environmental Monitoring program. In accordance with License Condition 3, Item G.3, these programs are to be implemented prior to initial fuel load. VEGP COL FSAR Table 13.4-201 provides the milestones (prior to initial fuel load) for implementation of these elements of the Process and Effluent Monitoring and Sampling Program and is acceptable as described in the staff's SER related to NEI 07-09[A].

- *Part 10, License Condition 6, Operational Program Readiness*

The applicant proposed a license condition to provide a schedule to support NRC inspection of operational programs, including the ODCM, effluent technical specifications, and the radiological environmental monitoring program. The proposed license condition is consistent with the policy established in SECY-05-0197 and is acceptable.

The following portion of this technical evaluation is based on the staff's review of FPL COL FSAR Section 11.5 of the Turkey Point Units 6 and 7 application:

Following a review of FPL, Turkey Point Units 6 and 7 FSAR, Revision 4, Section 11.5, the staff identified four issues with the development of a plant- and site-specific ODCM and associated regulatory compliance using NRC and industry technical guidance. In RAIs 6919, Question 11.05-1 and 7103, Question 11.05-2, the applicant was requested to address and resolve the following technical aspects:

- (1) FSAR, Revision 3, Section 11.5.8, endorses the use of Nuclear Energy Institute (NEI) ODCM Template 07-09A (Revision 0, March 2009) to meet COL Information Item 11.5-1 until a plant- and site-specific ODCM is prepared, before fuel load, under the requirements of a license condition described in FSAR Section 13.4, Table 13.4-201, item 9. The development of the site-specific ODCM and implementing procedures should meet the provisions of GL 89-01 (Supplement No. 1), Radiological Assessment Branch Technical Position (Revision 1, November 1979) included as Appendix A in NUREG-1301, as ODCM guidance for pressurized-water reactors (PWRs), and the guidance of NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," October 1978, and NUREG-0543, "Methods for Demonstrating LWR Compliance with the EPA Uranium Fuel Cycle Standard (40 CFR Part 190)." However, FSAR, Revision 3, Section 11.5.8, does not address unique site-specific conditions that are not covered in the NEI ODCM Template 07-09A. The FSAR does not consider how the ODCM will control gaseous effluent releases and doses to members of the public given that Units 3 and 4 and Turkey Point Units 6 and 7 will be contributing to and sharing a single dose allocation to members of the public under 10 CFR 20.1301 and 20.1302, 10 CFR 20.1301(e) in complying with 40 CFR Part 190, and the unity rule in meeting liquid and gaseous effluent concentration limits of 10 CFR Part 20 (Appendix B, Table 2, Columns 1 and 2). NUREG-0543 addresses compliance issues for sites with multiple reactor units when considering all sources of radiation exposures, including doses due to liquid and gaseous effluent releases and contributions from external radiation from buildings and staging areas containing radioactive materials and wastes. Accordingly, the applicant is requested to describe in FSAR, Section 11.5.8, the administrative program and procedures that will be used to coordinate all liquid and gaseous effluent releases and dose allocations to members of the public between Units 3 and 4 and Turkey Point Units 6 and 7 in complying with NRC regulations, as noted above.
- (2) FPL, Turkey Point Units 6 and 7 FSAR, Revision 4, Sections 11.5.3 and 11.5.4, present supplemental information on effluent and process monitoring and sampling. Based on a review of the corresponding information presented in the AP1000 DCD Section 11.5.2 and Table 11.5-1 and parallel discussions presented in the Turkey Point Units 6 and 7 ER, Revision 4, Section 3.6.3.2, the staff notes that the ER commits to the use of a radiation monitor installed on the common discharge line of the turbine building sumps. This monitor performs an automatic control function by tripping the discharge pump upon detecting elevated levels of radioactivity in the common discharge line. The description also states that, if necessary, contaminated wastewater from the turbine building sumps will be diverted to the WLS for processing and disposal. The applicant is requested to introduce this information in FSAR, Sections 11.2 and 11.5, since the radiation monitor and its operating features are not described there. The applicant should describe the design features of the turbine building sumps and connections to a common discharge line, provide the basis for the placement and type of radiation monitor installed on the common discharge line of the sumps, describe the associated automatic control features and alarm functions, and describe how discharges will be diverted (manual or automatic

method) to the liquid radwaste processing system upon tripping an alarm setpoint. In addressing associated regulatory requirements and guidance, the applicant is requested to integrate this potential radioactive discharge path in the Turkey Point Units 6 and 7 Offsite Dose Calculation Manual in demonstrating compliance with 10 CFR Part 20 liquid effluent concentration and dose limits for members of the public, 10 CFR 20.1406 in minimizing the contamination of plant facilities and the environment, Part 50, Appendix I, on design objectives and ALARA provisions; and describe equipment features and operational commitments that are consistent with the guidance of NUREG-0800, SRP Sections 11.2 and 11.5, RGs 1.206, 1.143, and 4.21, IE Bulletin 80-10, and NEI 08-08A in avoiding unmonitored and uncontrolled releases of radioactive materials in unrestricted areas.

- (3) FPL, Turkey Point Units 6 and 7, FSAR, Revision 4, Section 11.5.8, endorses the use of NEI ODCM Template 07-09A (Revision 0, March 2009) to meet COL Information Item 11.5-1 until a plant- and site-specific ODCM is prepared, before fuel load, under the requirements of a license condition described in FSAR Section 13.4, Table 13.4-201, item 9. However, a comparison of FSAR, Revision 4, Section 11.5.8, and Turkey Point Units 6 and 7 ER, Revision 4, Sections 3.3, 6.2.2, and 6.7.4, indicates that a simple endorsement of NEI ODCM Template 07-09A and Units 3 and 4 ODCM does not address the unique site-specific conditions associated with deep well injection for the disposal of radioactive effluents and associated radiological environmental monitoring. The applicant is requested to introduce this information in FSAR, Sections 11.2 and 11.5, since it is not contained there. The applicant should identify which portions of NEI ODCM Template 07-09A will need to be modified, describe the new information addressing deep well injection, describe methods that will be used in controlling and monitoring discharges of liquid effluents via deep well injection, and describe how water samples will be collected and sampled from each dual zone monitoring well, including well development and purging, containment and processing of purged well water, and sample processing including sample collection, sample preservation, and quality control.
- (4) FPL, Turkey Point Units 6 and 7 ER, Revision 4, Section 3.3.1 and Figure 3.3-1 (sheet 1), describe how Miami-Dade Water and Sewer Department (MDWASD) reclaimed water will be further treated on site by the FPL reclaimed water treatment facility prior to being pumped into the circulating water system. The treatment process is described as including trickling filters, clarifiers, deep bed filters, and equipment to handle solid wastes generated by the onsite treatment system. A review of Turkey Point Units 6 and 7 ER, Revision 4, Figure 3.3-1 (sheet 1), indicates that some end products of the processing may be bypassed to the plant blowdown sump as warranted by operational conditions. Solid waste would be disposed using current operating practices, such as recycling and landfill disposal, as described in Turkey Point Units 6 and 7 ER, Revision 4, Section 3.6.3.3. The staff notes that the corresponding information presented in the Turkey Point Units 6 and 7 ER, Revision 4, Section 3.6.3, and FSAR, Section 11.5, does not acknowledge that the use of an onsite treatment for MDWASD reclaimed water might result in the reconcentration of naturally occurring radioactivity and other forms of radioactivity, which should not be attributed to plant operations. In addition, the potential presence of such radioactive materials in sludge and solids generated by the FPL reclaimed water treatment facility might pose operational and disposal challenges, given an estimated daily generation rate of over 400 t of solids per day under normal operations (ER, Revision 4, Section 3.6.3.3). Moreover, the bypass of liquid wastes from the onsite treatment facility to the plant blowdown sump may introduce radioactivity (if present in MDWASD reclaimed water) which would then need to be accounted for in demonstrating compliance with Part 20

and Part 50, Appendix I, requirements once discharged via deep well injections. As a result, the applicant is requested to expand its radiological monitoring program, at least initially, to routinely collect and analyze samples from reclaimed waste water obtained from the MDWASD, reclaimed waste water treated by the FPL reclaimed water treatment facility, and solid wastes and sludge generated by the FPL reclaimed water treatment facility. The applicant is requested to expand the scope of its site waste management program to include provisions and procedures to handle, store, contain, and ship for disposal solid wastes and sludge should radioactive materials be detected with radiological characteristics not associated with the operations of Turkey Point Units 6 and 7. The procedure should describe steps that, if radioactive materials of other origins are detected in MDWASD reclaimed water, will cause the bypass from the onsite reclaimed water treatment system to be locked out (manually or automatically) to prevent the inadvertent introduction of radioactive materials in the plant blowdown sump. If such measures cannot be readily implemented, the applicant is requested to augment the scope of the radiological monitoring and sampling program to include waste treatment products and treated water from the onsite reclaimed water treatment facility and commit to revise the site- and plant-specific ODCM accordingly.

In letters dated January 16, 2013, and July 31, 2013, the applicant provided responses to RAI 6918, Question 11.05-1 and RAI 7103, Question 11.05-2. In the responses, the applicant proposed the following changes and corrections to the information presented in the noted FSAR sections. The staff's evaluation and determination of acceptability of the responses are presented below.

In response to RAI 6918, Question 11.05-1, the applicant described the administrative controls to be implemented by the licenses of Turkey Point Units 6 and 7 and Turkey Point Units 3 and 4 by coordinating the direct radiation contributions and liquid and gaseous effluent releases so that the site dose limits for 10 CFR Part 20 and 40 CFR Part 190 are not exceeded. The administrative controls and coordination process will be described in the ODCM. To support this description, the applicant provided text to be inserted in Section 11.5.8 describing administrative controls that will coordinate direct doses, liquid effluent, and gaseous effluent that will be released from the site. The staff has reviewed the response to RAI 6918, Question 11.05-1 and the staff finds that the applicant provided sufficient information because the licensee commits to controlling effluent releases in accordance with acceptable methods. The staff has confirmed the additional text has been incorporated in Revision 6 of Turkey Point Units 6 and 7 COL Application and the staff considers RAI 6918, Question 11.05-1 resolved.

In response to RAI 7103, Question 11.05-2, the applicant provided clarification on the above-stated RAI. To address the concern of the stated radiation monitor being referenced in ER Section 3.6.3.2 and not in FSAR Section 11, the applicant stated that the stated monitor in the ER is the same monitor as the waste water discharge radiation monitor mentioned in Section 11.5.2.3.3 of the AP1000 DCD. The DCD information has been incorporated by reference in the Turkey Point Units 6 and 7 FSAR Section 11.5 as a result. The applicant also stated that DCD Section 9.2.9.2, supplemented by FSAR Section 9.2.9.2.2, describes the oil-water separator for discharge flowpaths. This information is again supplemented in Section 9.2.12 for the DIS.

In response to the concern that the NEI ODCM template was not developed to specifically accommodate radioactive discharges to the subsurface environment, the applicant provided a discussion to explain the use of maintaining effluent controls that can be adopted directly into Turkey Point Units 6 and 7 ODCM. The ODCM, which will be made available for the staff's

review prior to fuel load, will reflect the operations of the DIS operations fate-transport-dosimetry model for normal operations and AOOs. The analysis for dose modeling is assessed in RAI 6985, Question 11.02-6 in Section 11.2 of this SER.

In response to the question by the staff to address the presence of and reconcentration of radioactive materials from the MDWASD, the staff also requested that the applicant address the potential presence of such radioactive materials in sludge and solids generated by the FPL reclaimed water treatment facility. The applicant stated that, if present, a fraction of this radioactive material will be adsorbed in the radioactive waste treatment facility (RWTF) treatment sludge and another fraction will remain in the treated RWTF effluent provided as circulation water supply to Turkey Point Units 6 and 7. The RWTF effluent fraction will ultimately be comingled with Turkey Point Units 6 and 7 blowdown and be disposed during DIS operations. The RWTF sludge fraction will be characterized as required to demonstrate compliance with the waste acceptance criteria established by commercial disposal facilities. The applicant also stated that effluent end products that may be bypassed to the plant blowdown sump will be characterized to enable their differentiation from radioactive materials that are attributed from Turkey Point Units 6 and 7 operations.

The staff reviewed the response to RAI 7103, Question, 11.05-2, and finds the response acceptable because the applicant has provided a sufficient description of the aspects that differ from NEI ODCM template, and the applicant highlights that the ODCM will be available for staff review prior to fuel load. License condition (11-5) also captures the fact that staff will have the opportunity to inspect the ODCM, among other documents, prior to fuel load. The staff has confirmed that the applicant has incorporated these revisions in Revision 6, and the staff considers RAI 7103, Question 11.5-02 resolved.

11.5.5 Post-Combined License Activities

The license condition language in this section has been modified, per a letter from the applicant dated April 8, 2016 (ADAMS Accession No. ML16103A507), confirming the acceptability of the following license conditions, proposed by the staff. These changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

License Condition (11-4) – Prior to initial fuel load, the licensee shall implement an operational program for process and effluent monitoring and sampling. The program shall include the following subprograms and documents:

- a. Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls
- b. Offsite Dose Calculation Manual
- c. Radiological Environmental Monitoring Program

License Condition (11-5) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO a schedule that supports planning for and conduct of NRC inspections of the operational program for process and effluent monitoring and sampling (including Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls, Offsite Dose Calculation Manual, and Radiological Environmental Monitoring Program). The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the above operational program has been fully implemented.

11.5.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the required information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff evaluated the additional COL information (STD COL 11.5-1, STD COL 11.5-2, PTN COL 11.5-2, and PTN COL 11.5-3) in the application against the relevant NRC regulations, acceptance criteria defined in NUREG-0800, Section 11.5, and other NRC regulatory guides. The staff concludes that the applicant has satisfactorily addressed all RAIs related to Section 11.5.

PTN DEP 6.4-1, related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this report.

The staff confirmed that the applicant has provided sufficient information and that the review supports the conclusion that follows: The staff concludes that the Process and Effluent Radiological Monitoring and Sampling Systems is sufficient to comply with applicable portions of GDC 64 of Appendix A of 10 CFR Part 50; applicable requirements of 10 CFR Parts 20, 50, and 52; ANSI/HPS N13.1, ANSI N42.18, RGs 1.21 and 4.15, NEI ODCM Template 07-09A, and applicable acceptance criteria in NUREG-0800, Section 11.5.

12 RADIATION PROTECTION

This chapter provides information on radiation protection methods and estimated occupational radiation exposures (OREs) of operating and construction personnel during normal operations including refueling; purging; fuel handling and storage; radioactive material handling, processing, use, storage, and disposal; maintenance; routine operational surveillance; inservice inspection (ISI); and calibration, and anticipated operational occurrences (AOOs). Specifically, this chapter provides information on facility and equipment design, planning and procedures programs, and techniques and practices employed by the applicant to meet the radiation protection standards set forth in Title 10 of the Code of *Federal Regulations* (10 CFR) Part 20, and to be consistent with the guidance given in the appropriate regulatory guides (RGs), where the practices set forth in such guides are used to and in the implementation the U.S. Nuclear Regulatory Commission (NRC)'s regulations.

12.1 Assuring That Occupational Radiation Exposures are As-Low-As-Reasonably Achievable (Related to RG 1.206, Section C.III.1, Chapter 12, C.I.12.1, "Ensuring that Occupational Radiation Exposures are As Low As Is Reasonably Achievable")

12.1.1 Introduction

Section 12.1 addresses policy and design considerations to ensure that the ORE to personnel will be kept As Low As Is Reasonably Achievable (ALARA). The ALARA program is addressed in this section and in Appendix 12AA of the Turkey Point Units 6 and 7 combined license (COL) Final Safety Analysis Report (FSAR).

12.1.2 Summary of Application

Section 12.1 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 12.1 of the AP1000 Design Control Document (DCD), Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 12.1, the applicant provided the following:

AP1000 COL Information Items

- STD COL 12.1-1

The applicant provided additional information in Standard (STD) COL 12.1-1 to resolve COL Information Item 12.1-1 (COL Action Item 12.2.1-1), which addresses ALARA and operational policies and compliance with RGs. The applicant provided additional information to incorporate Nuclear Energy Institute (NEI) NEI 07-08A, "Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA)," into Turkey Point Units 6 and 7 COL FSAR Section 12.1 and NEI 07-03A, "Generic FSAR Template Guidance for Radiation Protection Program Description," in Appendix 12AA.

The applicant also provided site specific information in their FSAR that was not included in NEI 07-08A, Section 12.1.2, to specify that the applicant's quality assurance criteria are described in Part III of the Quality Assurance Program Description which is discussed in Turkey Point Units 6 and 7 COL FSAR Section 17.5.

Supplemental Information

- STD SUP 12.1-1

The applicant provided supplemental (SUP) information by addressing equipment layout at the end of AP1000 DCD Section 12.1.2.4.2.

12.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report [FSER] Related to Certification of the AP1000 Standard Design," and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the ALARA program are given in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)," Section 12.1.

The applicable regulatory requirements and guidance for STD COL 12.1-1 and STD SUP 12.1-1 are as follows:

- 10 CFR Part 20, "Standards for Protection against Radiation"
- 10 CFR 19.12, "Instructions to workers"
- RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," Revision 3
- RG 1.33, "Quality Assurance Program Requirements (Operation)," Revision 2
- RG 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," Revision 4
- RG 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable," Revision 3
- RG 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably A achievable," Revision 1-R
- NUREG-1736, "Consolidated Guidance: 10 CFR Part 20 – Standards for Protection Against Radiation"

12.1.4 Technical Evaluation

The NRC staff (the staff) reviewed Section 12.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL

application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to ensuring that the ORE to personnel will be kept ALARA. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the design certification (DC) and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application Vogtle Electric Generating Plant (VEGP) Units 3 and 4 were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.1.4:

¹ See Section 1.2.2 of this SER for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a design certification (DC). This footnote will be referenced in several places throughout the chapter of this Safety Evaluation.

The following portion of this technical evaluation section is reproduced from Section 12.1.4 of the BLN SER

AP1000 COL Information Items

- *STD COL 12.1-1*

The applicant provided additional information in STD COL 12.1-1, related to ALARA and Operational Policies, to resolve COL Information Item 12.1-1. COL Information Item 12.1-1 states:

Operational considerations of ALARA, as well as operational policies and continued compliance with 10 CFR 20 and RGs 1.8, 8.8, and 8.10, will be addressed by the Combined Operating License applicant. In addition, the Combined Operating License applicant will address operational considerations of the Standard Review Plan to the level of detail provided in RG 1.70. RGs that will be addressed include: 8.2, 8.7, 8.9, 8.13, 8.15, 8.20, 8.25, 8.26, 8.27, 8.28, 8.29, 8.34, 8.35, 8.36, and 8.38.

The commitment was also captured as COL Action Item 12.2.1-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will review all plant procedures and modification plans that involve personnel radiation exposure to ensure that the ALARA policy is applied. In addition, a COL applicant referencing the AP1000 certified design will address operational ALARA concerns and will submit an operational ALARA policy which conforms to the requirements of 10 CFR Part 20 and the recommendations of Revision 2 to RG 1.8, RG 8.8, and Revision 1-R to RG 8.10

In response to COL Action Item 12.2.1-1 the following is stated in the BLN COL FSAR (Revision 1) as STD COL 12.1-1:

This section incorporates by reference [Nuclear Energy Institute] NEI 07-08, "Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA)," Revision 2, which is currently under review by the NRC staff. See Table 1.6-201. ALARA practices are developed in a phased milestone approach as part of the procedures necessary to support the Radiation Protection Program. Table 13.4-201 describes the major milestones for ALARA procedures development and implementation

STD COL 12.1-1 includes a commitment to the use of a "Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are as Low as Is Reasonably Achievable (ALARA)," as an operational program document, based on draft NEI Template 07-08, Revision 2. The NEI template

*presents the functional elements of an ALARA program, which, if met, would demonstrate compliance with 10 CFR 20.1101 and 10 CFR 19.12. Accordingly, BLN FSAR Section 12.1, STD COL 12.1-1 needs to be updated as to its commitment to the final NEI ALARA template if it is accepted by the NRC staff. Therefore, the staff cannot find the applicant's reference to the NEI 07-08 template to be acceptable until the staff completes its review of this template as a method to meet the regulatory requirements of an ALARA program, and the BLN FSAR is updated to reference the final version of this template. This is identified as **Open Item 12.1-1***

The NRC staff review finds that BLN FSAR Section 12.1 and Appendix 12AA describe programs and procedures that ensure ORE will be ALARA in accordance with the training requirements in 10 CFR 19.12 and the ALARA provisions of 10 CFR 20.1101(b). The ALARA policy will be described, displayed, and implemented in accordance with the provisions of RG 8.8 (Regulatory Position C.1) and RG 8.10 (Regulatory Position C.1) and NUREG-1736, as it relates to maintaining doses ALARA.

According to BLN FSAR Appendix 12AA, NEI 07-03, NEI 07-08, and Chapter 13, "Conduct of Operations," specific individual(s) will be designated and assigned responsibility and authority for implementing ALARA policy at the BLN site. The Functional Manager in charge of Radiation Protection and the Radiation Protection staff periodically will review, update, and modify as appropriate, plant design features and changes, as well as all operating and maintenance features, using exposure data and experience gained from operating nuclear power plants to ensure that occupational exposures will be kept ALARA in accordance with RG 8.8 guidance.

Using the guidance of Section 12.1 of NUREG-0800, the staff finds BLN FSAR Section 12.1 and Appendix 12AA are in accordance with the ALARA provisions of 10 CFR 20.1101(b) and RG 8.8 (Regulatory Position C.2) and will include incorporation of measures for reducing the need for time spent in radiological areas; measures to control access to radiological areas; measures to reduce the production, distribution, and retention of activated corrosion products throughout the primary system; measures for assuring that ORE during decommissioning will be ALARA; reviews of design modifications by competent radiation protection personnel; instructions to engineers regarding ALARA design; experience from operating plants and past designs; and continuing facility design reviews.

Using the guidance of Section 12.1 of NUREG-0800, the staff finds that BLN COL FSAR Section 12.1 and Appendix 12AA describe an acceptable program to develop plans and procedures in accordance with RGs 1.33, 1.8, 8.8, and 8.10 that can incorporate the experiences obtained from facility operation into facility and equipment design and operations planning and that will implement specific exposure control techniques.

Initially, it was not clear to the NRC staff when the appropriate ALARA program and planning procedures would be implemented as described in the proposed License Conditions (Part 10 of the BLN, Units 3 and 4 COL application).

Therefore, the staff issued request for additional information (RAI) 12.1-1. In a letter dated September 22, 2008, the applicant stated that ALARA focused procedures are developed in conjunction with the Radiation Protection Program (RPP) and thus will follow the RPP milestones for implementation found in FSAR Table 13.4-201. The applicant stated that FSAR Section 12.1, STD COL 12.1-1 text will be updated as to its commitment to the final ALARA program implementation. The NRC staff finds the RAI response acceptable because it clearly identified that ALARA practices will be in place at the same time as the RPP. The NRC staff verified that Revision 1 of the BLN COL FSAR adequately incorporates the above. As a result, RAI 12.1-1 is closed. For a discussion related to the proposed license condition related to the RPP, which includes ALARA practices, refer to SER Section 12.5.5.

In accordance with 10 CFR 20.1101(b), the staff finds that overall facility operations, as well as the RPP as described in BLN COL FSAR Section 12.5, Appendix 12AA, and NEI 07-03 will integrate the procedures necessary to ensure that radiation doses are ALARA, including work scheduling, work planning, design modifications, and radiological considerations. Operating and maintenance personnel will follow specific plans and procedures to ensure that goals related to keeping exposures ALARA are achieved in the operation of the plant. Engineering controls for the protection of personnel will be optimized. Operations involving high person-sievert (person-rem) exposures will be carefully preplanned and carried out by personnel who are well trained in radiation protection and using proper equipment. During maintenance activities, in radiological areas, personnel will be monitored for exposure to radiation and contamination. Their radiation exposures will be reviewed and used to make changes in future job procedures and techniques.

The BLN FSAR states that COL information item, STD COL 12.1-1 is addressed in NEI 07-08, and Appendix 12AA of the BLN COL FSAR, which references NEI 07-03. The staff has reviewed the current version of NEI 07-03 and NEI 07-08 with respect to compliance with RG 1.8. The NEI 07-03 template states that the Radiation Protection Manager, Radiation Protection Technicians, and Radiation Protection Supervisory and Technical Staff will be trained and qualified in accordance with the guidance of RG 1.8. In a letter dated March 18, 2009 (ML090510379), the NRC accepted NEI 07-03, Revision 7. Specifically, the NRC staff indicated that for COL applications, NEI 07-03, Revision 7 provides an acceptable template for assuring that the RPP meets the applicable NRC regulations and guidance. Since the BLN COL FSAR has not yet adopted the approved version of the NEI template, this is identified as Confirmatory Item 12.1-1. At present, the NRC has not accepted NEI-07-08 as an acceptable template to be used by the COL applicants. As a result, this is identified as Open Item 12.1-1.

Supplemental Information

- STD SUP 12.1-1

The applicant added the following text to the end of Section 12.1.2.3, "Facility Layout General Design Considerations for ALARA," of the DCD included in the DC amendment:

A video record of the equipment layout in areas where radiation fields are expected to be high following operations may be used to assist in ALARA planning and to facilitate decommissioning.

The NRC staff acknowledges STD SUP 12.1-1 as a statement of fact not requiring NRC review.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.1.4:

Resolution of Standard Content Open Item 12.1-1 and Confirmatory Item 12.1-1

The NRC staff compared the VEGP and BLN COL applications and found them to be essentially identical, with two exceptions: first, the application material under STD COL 12.1-1 in Section 12.1 of the VEGP application references NEI 07-08A and the application material under STD COL 12.1-1 in Section 12.1 of the BLN application references NEI 07-08, Revision 2; and second, the VEGP FSAR Appendix 12AA references NEI 07-03A and the BLN FSAR Appendix 12AA references Revision 3 of NEI 07-03. Regarding these exceptions, the differing material associated with STD COL 12.1-1 in the VEGP FSAR is associated with adopting NEI 07-08A and NEI 07-03A, which are evaluated below as part of resolving Open Item 12.1-1 and Confirmatory Item 12.1-1.

In a letter from NEI to NRC dated October 29, 2009, NEI submitted NEI 07-08A to the NRC, which is the version of NEI 07-08 that has been accepted by the NRC. Accordingly, Open Item 12.1-1 is resolved for VEGP.

Confirmatory Item 12.1-1 is resolved for VEGP because the applicant has adopted the approved version of NEI 07-03, i.e., NEI 07-03A, (see paragraph below).

In Revision 2 of the VEGP COL FSAR, the applicant modified parts of FSAR Chapter 12, Appendix 12.AA that relate to STD COL 12.1-1. Specifically, in the FSAR, Revision 2, NEI 07-03A, is referenced. Accordingly, because NEI 07-03A is the approved version of NEI 07-03, the above conclusions regarding Confirmatory Item 12.1-1 are not affected by the changes to Revision 2 of the FSAR. One other change is the modification of a reference at the end of Appendix 12AA where the reference to RG 1.97 is changed from Revision 4 to Revision 3. The staff found the change acceptable, since Revision 3 provides for a more comprehensive version of the RG and also provides for portable radiation

monitoring equipment. Revision 4 of RG 1.97 indicates that partial implementation is not recommended.

12.1.5 Post Combined License Application

The post COL activities related to ALARA practices (part of the RPP) are discussed in Section 12.5.5 of this SER.

12.1.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable based on the relevant acceptance criteria provided in NUREG-0800, Section 12.1. The staff based its conclusion on the following:

- STD COL 12.1-1, relating to ALARA and operational policies and compliance with relevant regulatory guidance, is acceptable because the applicant incorporates approved references NEI 07-03A and NEI 07-08A into the Turkey Point Units 6 and 7 COL FSAR and meets the applicable regulatory requirements and guidance specified in Sections 12.1.3 and 12.1.4 of this SER.
- STD SUP 12.1-1, relating to the use of video recording of equipment layout in areas where radiation fields are expected to be high, is acceptable because it is a statement of fact not requiring NRC approval.

12.2 Radiation Sources

12.2.1 Introduction

This section addresses the issues related to contained radiation sources and airborne radioactive material sources during normal operations, AOOs, and accident conditions affecting in-plant radiation protection.

12.2.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR, Revision 8, Section 12.2 incorporates by reference AP1000 DCD, Revision 19, Section 12.2.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 12.2 (and in letter dated May 16, 2016 (ADAMS Accession No. ML16140A087)), the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Section 12.2 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

AP1000 COL Information Item

- STD COL 12.2-1

The applicant provided additional information in STD COL 12.2-1 to resolve COL Information Item 12.2-1 (COL Action Item 12.3.1-1), which addresses miscellaneous sources.

12.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the radiation sources are given in NUREG-0800, Section 12.2.

The applicable regulatory requirements for STD COL 12.2-1 are as follows:

- 10 CFR 20.1801, "Security of stored material"
- 10 CFR 20.1802, "Control of material not in storage"
- 10 CFR Part 50, "Domestic licensing of production and utilization facilities," Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 61, "Fuel Storage and Handling and Radioactivity Control"

12.2.4 Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 12.2 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to radiation sources. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP

Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAls.
- The staff confirmed that all responses to RAls identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.2.4:

The following portion of this technical evaluation section is reproduced from Section 12.2.4 of the BLN SER:

AP1000 COL Information Item

• *STD COL 12.2-1*

The applicant provided additional information in STD COL 12.2-1, related to miscellaneous sources, to resolve COL Information Item 12.2-1. COL Information Item 12.1-1 states:

The Combined License applicant will address any additional contained radiation sources not identified in subsection 12.2.1, including radiation sources used for instrument calibration or radiography. The same commitment was also captured as COL Action Item 12.3.1-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793).

The applicant provided additional information in the BLN COL FSAR to address the plant STD COL 12.2-1 dealing with miscellaneous sources. The applicant stated that licensed sources containing byproduct, source and special nuclear material that warrant shielding consideration will meet the applicable requirements of 10 CFR Parts 20, 30, 31, 32, 33, 34, 40, 50 and 70. The applicant indicated that there are byproducts and source materials with known isotopes and activity manufactured for the purpose of measuring, checking, calibrating, or controlling processes quantitatively or qualitatively. Accordingly, written procedures will be established and implemented that address procurement, receipt, inventory, labeling, leak testing, surveillance, control,

transfer, disposal, storage, issuance and use of these radioactive sources. Also, the applicant indicated that sources maintained on-site for instrument calibration purposes will be shielded while in storage to keep personnel exposure ALARA.

*The regulatory requirements cited in the above paragraph address the requirements applicable to sources that would likely be used in conjunction with construction, preoperational, and initial testing. The applicant will implement the practices for radioactive material control as described in NEI 07-03, Section 12.5.4.10, "Radioactive Material Control." In a letter dated March 18, 2009 (ML090510379), the NRC accepted NEI 07-03, Revision 7. Specifically, the NRC staff indicated that for COL applications, NEI 07-03, Revision 7 provides an acceptable template for assuring that the RPP meets the applicable NRC regulations and guidance. Since the BLN FSAR has not adopted the approved version of the NEI template, this is identified as **Confirmatory Item 12.1-1.***

The staff concludes that the information provided by the applicant with respect to radiation sources is acceptable and meets the requirements of 10 CFR Sections 20.1801 and 20.1802 and GDC 61. This conclusion is based on the applicant's commitment to the NEI 07-03 administrative controls to meet the regulatory requirements. These controls apply to the additional contained radiation sources discussed in the COL item. The staff notes that its review did not encompass the entire set of regulatory requirements cited by the applicant (10 CFR Parts 20, 30, 31, 32, 33, 34, 40, 50 and 70), since the staff's review is focused on radiation protection requirements on sources used in conjunction with the RPP.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.2.4:

Resolution of Standard Content Confirmatory Item 12.1-1

The NRC staff compared the VEGP and BLN COL applications regarding STD COL 12.2-1, and found them to be essentially identical, with the exception that VEGP FSAR Appendix 12AA references NEI 07-03A, whereas, the BLN FSAR references NEI 07-03, Revision 3. As indicated in Section 12.1.4 above, Confirmatory Item 12.1-1, is resolved for VEGP because the applicant has adopted the approved version of NEI 07-03, which is now designated as NEI 07-03A.

12.2.5 Post Combined License Activities

There are no post-COL activities related to this section.

12.2.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point

Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable based on the relevant acceptance criteria provided in NUREG-0800, Section 12.2. The staff based its conclusion on the following:

- PTN DEP 6.4-1, related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.
- STD COL 12.2-1, which addresses miscellaneous radiation sources, is acceptable because the applicant has incorporated the approved reference NEI 07-03A into the Turkey Point Units 6 and 7 COL FSAR and meets the requirements of 10 CFR 20.1801, 10 CFR 20.1802, and GDC 61.

12.3 Radiation Protection Design Features

Section 12.3, "Radiation Protection Design Features" and the following Section 12.4, "Dose Assessment," are treated as separate sections in this SER (as well as in the AP1000 DCD). However, these two sections are listed as a single section, Section 12.3-12.4, "Radiation Protection Design Features," in both RG 1.206 and NUREG-0800, with the material discussed under the section "Dose Assessment" included in a section at the end of Section 12.3-12.4.

12.3.1 Introduction

This section addresses the issues related to radiation protection equipment and design features used to ensure that OREs are ALARA. It takes into account design dose rates, AOOs, and accident conditions. These issues include the facility design features, shielding, ventilation, area radiation and airborne radioactivity monitoring instrumentation, and dose assessment.

12.3.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR, Revision 7, Section 12.3 incorporates by reference AP1000 DCD, Revision 19, Section 12.3.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 12.3 (and in letter dated May 16, 2016 (ADAMS Accession No. ML16140A087)), the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Section 12.3 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

- PTN DEP 18.8-1

The applicant described the following portion of the Tier 2 departure (DEP) from the AP1000 DCD related to the radiation design protection features. The applicant proposed revising several AP1000 DCD figures in Section 12.3 to reflect the relocation of the Operations Support Center (OSC). Other aspects of this Tier 2 departure are evaluated in Sections 12.5, 13.3, and 18.8 of this SER.

AP1000 COL Information Items

- STD COL 12.3-1

The applicant provided additional information in STD COL 12.3-1 to resolve COL Information Item 12.3-1 (COL Action Item 12.4.2-1), which addresses the administrative controls for use of the design features provided to control access to radiologically restricted areas.

- STD COL 12.3-2

The applicant provided additional information in STD COL 12.3-2 to resolve COL Information Item 12.3-2 (COL Action Item 12.4.4-1), which addresses the criteria and methods for obtaining representative measurement of radiological conditions, including airborne radioactivity concentrations in work areas.

- STD COL 12.3-3

The applicant provided additional information in STD COL 12.3-3 to resolve COL Information Item 12.3-3, which addresses the groundwater monitoring program beyond the normal radioactive effluent monitoring program.

- STD COL 12.3-4

The applicant provided additional information in STD COL 12.3-4 to resolve COL Information Item 12.3-4, which addresses the program to ensure documentation of operational events deemed to be of interest for decommissioning.

Supplemental Information

- PTN SUP 11.2-1

In a May 22, 2012, letter, the applicant provided supplemental information to be added to Turkey Point Units 6 and 7 COL FSAR Section 11.2.1.2.4. This supplemental information, which was added to Turkey Point Units 6 and 7 COL FSAR Section 11.2.1.2.4, describes some of the features of the liquid radwaste discharge pipeline incorporated to minimize leakage to the environment. This section also states that the diluted liquid radwaste effluent will be routed to the deep injection wells.

12.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the radiation protection design features are given in NUREG-0800, Section 12.3-12.4.

The applicable regulatory requirements and guidance for STD COL 12.3-1 are as follows:

- 10 CFR Part 20
- RG 1.8, Revision 3
- RG 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program," Revision 1
- RG 8.38 "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants," Revision 1
- NUREG-1736, "Consolidated Guidance: 10 CFR Part 20-Standards for Protection Against Radiation"

The applicable regulatory requirements and guidance for STD COL 12.3-2 are as follows:

- 10 CFR Parts 19, "Notices, instructions and reports to workers: inspection and investigations"
- 10 CFR Part 20
- 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities"
- NUREG-0737, "Clarification of TMI Action Plan Requirements," Item III.D.3.3
- RG 1.8, Revision 3
- RG 8.2, "Guide for Administrative Practices in Radiation Monitoring," Revision 0
- RG 8.8, Revision 3
- RG 8.10, Revision 1-R
- RG 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, Appendix A, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste"
- RG 1.97, , "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," Revision 4

The applicable regulatory requirements and guidance for STD COL 12.3-3 and STD COL 12.3-4 are as follows:

- 10 CFR 20.1406, “Minimization of contamination”
- 10 CFR 50.75, “Reporting and recordkeeping for decommissioning planning”
- RG 4.21, “Minimization of Contamination and Radioactive Waste Generation: Life Cycle Planning,” Revision 0

12.3.4 Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 12.3 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff’s review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to radiation protection design features. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER. Confirmatory items that are first identified in this SER section have a Turkey Point Units 6 and 7 designation (e.g., **Turkey Point Units 6 and 7 Confirmatory Item 12.3-1**).

Tier 2 Departure

- PTN DEP 18.8-1

PTN DEP 18.8-1 pertains to the relocation of the OSC from the location specified in the AP1000 DCD. In the AP1000 DCD description, the OSC is located in the same room as the ALARA Briefing Room in the Annex Building. For Turkey Point Units 6 and 7, the OSC was relocated to the Maintenance Shop/Office Building, which is inside the Protected Area but separate from the Units 6 and 7 Nuclear Islands. This departure to relocate the OSC for Turkey Point Units 6 and 7 is acceptable insofar as the health physics (HP) facility design is concerned because the location of the OSC does not have an impact on the radiation protection facilities design. The ALARA briefing room remains as stated in the AP1000 DCD, so there is no impact on radiation protection facilities, programs or functions.

The evaluation of the effect of the OSC relocation is addressed in SER Section 12.5 for the HP facilities, in Section 13.3 of this SER for emergency preparedness, and in Section 18.8 of this SER for the human system interface design.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.3.4:

The following portion of this technical evaluation section is reproduced from Section 12.3.4 of the BLN SER:

AP1000 COL Information Items

- STD COL 12.3-1

The applicant provided additional information in STD COL 12.3-1, related to the administrative controls for radiological protection, to resolve COL Information Item 12.3-1. COL Information Item 12.3-1 states:

The Combined License applicant will address the administrative controls for use of the design features provided to control access to radiologically restricted areas, including potentially very high radiation areas, such as the fuel transfer tube during refueling operations and to the reactor cavity.

The commitment was also captured as COL Action Item 12.4.2-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will address the administrative controls for use of the design features provided to control access to radiologically restricted areas, including potentially very high radiation areas, such as the reactor cavity and the fuel transfer canal during refueling operations. The hatch to the spent fuel transfer canal will be treated as an entrance to a very high radiation area under 10 CFR Part 20 and will be locked during spent fuel transfer operations.

The applicant addressed this STD COL item in BLN COL FSAR, Appendix 12AA. This appendix incorporates by reference NEI 07-03, Revision 7. The NEI template directs COL applicants to describe the site-specific plant information for

areas requiring administrative controls for very high radiation areas. To supplement NEI 07-03, Section 12.5.4.4, "Access Control," the applicant provided additional measures in Appendix 12AA for access controls such as signs, locks, plant manager (or designee) approval for entry, and radiation protection personnel accompaniment and exposure control for entry into very high radiation areas. The applicant also stated that a closed circuit television system may be installed in high radiation areas to allow remote monitoring of individuals entering high radiation areas by personnel qualified in radiation protection procedures.

The COL applicant will apply the administrative controls for the use of the design features to control access to very high radiation areas, such as the fuel transfer tube during refueling and to the reactor cavity during operations, and other radiologically restricted areas to comply with 10 CFR Sections 20.1601 and 20.1602. The opening of the fuel transfer hatch is administratively controlled, treated as an entrance to a very high radiation area, and is in place during spent fuel transfer operation.

The staff finds the applicant's approach meets the requirements of 10 CFR Sections 20.1601 and 20.1602, and is consistent with RG 8.38, Regulatory Position C1 and C3, which will ensure that an individual is unable to gain unauthorized or inadvertent access to such areas.

In a letter dated March 18, 2009 (ML090510379), the NRC accepted NEI 07-03, Revision 7. Specifically, the NRC staff indicated that for COL applications, NEI 07-03, Revision 7 provides an acceptable template for assuring that the RPP meets the applicable NRC regulations and guidance. Since the BLN FSAR has not adopted the approved version of the NEI template, this is identified as **Confirmatory Item 12.1-1**.

The NRC staff reviewed STD COL 12.3-1 dealing with administrative controls for radiological protection, using the text added in Appendix 12AA. The BLN COL FSAR Appendix 12AA, incorporates by reference NEI 07-03.

In Appendix 12AA, the applicant has taken exception to NEI 07-03, Section 12.5 to not conform to the guidance of the following regulatory guides:

RG 8.20, "Applications for Bioassay for I-125 and I-131"

RG 8.26 [sic], "Bioassay at Uranium Mills"

RG 8.32, "Criteria for Establishing a Tritium Bioassay Program"

The guidance documents were identified as outdated regulatory guidance in NUREG-1736, Consolidated Guidance: 10 CFR Part 20, "Standards for Protection Against Radiation," October 2001. NUREG-1736 describes that in conjunction with 10 CFR 20.1502(b), which requires licensees to monitor for likely intakes; 10 CFR 20.1204(a) and (b) prescribe how information obtained through monitoring is to be used when assessing exposures to workers from

intakes. The NUREG recommends that licensees (and therefore applicants) consider the methods described in RG 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program," for estimating intakes of radionuclides and determining the frequency of bioassay measurements. RG 8.9 provides updated methods and guidance that was previously contained in positions of the three RGs above. The applicant's commitment to RG 8.9 is sufficient to assure proper monitoring for intake of radionuclides.

In BLN COL FSAR, Appendix 12AA, the applicant took exception to the first paragraph of NEI 07-03, Section 12.5.2 to describe the equivalent key radiological protection positions for the BLN site. The description of organizational positions with specific radiation protection responsibilities is in BLN COL FSAR Section 13.1. BLN COL FSAR Section 13.1, "Organizational Structure of the Applicant," provides specific radiation protection responsibilities for key positions within the plant organization and the plant organization overall. Managers and supervisors within the plant operating organization are responsible for establishing goals and expectations for their organization and to reinforce behaviors that promote radiation protection. BLN COL FSAR Section 13.1.1, "Management and Technical Support Organization," and Section 13.1.2, "Operating Organization," provide the responsibilities of the organizations and positions to assure that radiological safety goals and expectations are adhered to.

The staff finds that the applicant's exception to NEI 07-03, Section 12.5.2 is acceptable because BLN COL FSAR Section 13.1 provides the key radiological safety responsibilities and organization consistent with RG 1.8.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.3.4:

Correction of Errors in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from the BLN SER, Section 12.3.4, that requires correction. The BLN SER states that Appendix 12AA of the BLN COL FSAR incorporates by reference NEI 07-03, Revision 7. The appendix actually incorporates by reference NEI 07-03, Revision 3. The NRC staff also identified an error in the text reproduced above from the BLN SER, Section 12.3.4 regarding the reference to RG 8.22, which was incorrectly referred to as RG 8.26.

Resolution of Standard Content Confirmatory Item 12.1-1

The NRC staff compared the VEGP and BLN COL applications regarding STD COL 12.3-1, and found them to be essentially identical, with the exception that VEGP FSAR Appendix 12AA references NEI 07-03A and BLN FSAR Appendix 12AA references Revision 3 of NEI 07-03. Additional clarifying information has been added to the VEGP FSAR regarding STD COL 12.3-1, which is discussed below. As indicated in Section 12.1.4 above, Confirmatory

Item 12.1-1, is resolved for VEGP because the applicant has adopted the approved version of NEI 07-03, which is now designated as NEI 07-03A.

In addition, changes have been made in Revision 2 of the VEGP FSAR Chapter 12 that relate to STD COL 12.3-1. The changes are as follows:

- 1. A new Table 12AA-201 has been added to Appendix 12AA that provides information concerning access to very high radiation areas (VHRA). The table provides VHRA locations, DCD cross references, radiation sources in the locations and other conditions and restrictions.*
- 2. In FSAR Appendix 12AA, new text was added to Section 12.5.4.4 of NEI 07-03A. The text references new Table 12AA-201 and describes the information in it, discusses removal of the primary sources of radiation from the VHRA areas, and discusses verification walk downs of VHRA to ensure consistency with RG 8.38. In addition to the changes to Appendix 12AA discussed above, the applicant has also added text to Section 12.5.4 regarding the possible use of closed circuit television system to allow remote monitoring of individuals entering high radiation areas.*

These items (i.e., the addition of the table, reference to it and discussion of walk downs, and the closed circuit television system) are acceptable because they provide additional clarity and site-specific information regarding controls to VHRAs and more completely describe features that address STD COL 12.3-1.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.3.4:

The following portion of this technical evaluation section is reproduced from Section 12.3.4 of the BLN SER

- *STD COL 12.3-2*

The applicant provided additional information in STD COL 12.3-2, related to the criteria and methods for radiological protection, to resolve COL Information Item 12.3-2. COL Information Item 12.3-2 states:

The Combined License applicant will address the criteria and methods for obtaining representative measurement of radiological conditions, including airborne radioactivity concentrations in work areas. The Combined License applicant will also address the use of portable instruments, and the associated training and procedures, to accurately determine the airborne iodine concentration in areas within the facility where plant personnel may be present during an accident.

The same commitment was also captured as COL Action Item 12.4.4-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793).

The staff reviewed STD COL 12.3-2, dealing with criteria and methods for radiological protection. In BLN COL FSAR Section 12.3.4, the applicant presented the procedure detailing the criteria and methods for obtaining representative measurement of radiological conditions, including in-plant airborne radioactivity concentrations in accordance with applicable portions of 10 CFR Part 20 and consistent with the guidance in RGs 1.21, Appendix A, 8.2, 8.8, and 8.10.

The applicant also discussed the surveillance requirements and the frequency of scheduled surveillance that are consistent with the operational philosophy in RG 8.10. In Section 12.3.4, "Area Radiation and Airborne Radioactivity Monitoring Instrumentation," the applicant described the typical survey frequencies and varieties of surveys. The surveys described in general terms include radiation, contamination, airborne radioactivity, and job coverage surveys for occupational radiation workers during normal and off-normal conditions.

Appendix 12AA also describes qualification and training criteria for site personnel consistent with the guidance in RG 1.8 and as described in FSAR Chapter 13. Section 13.2, "Training," incorporates NEI 06-13A, "Template for an Industry Training Program Description." NEI 06-13A, Section 1.2.7, provides training for the use of survey instruments, use of analytical equipment, radiation protection procedures and emergency plan procedures.

The applicant discussed a portable iodine monitoring system used to determine the airborne iodine concentration in areas where plant personnel may be present routinely and during an accident which meets the guidance of NUREG-0737, Item III.D.3.3 and complies with 10 CFR Part 50, Appendix A. The applicant will incorporate the use of this sampling system into the emergency plan implementing procedures.

The NRC staff reviewed BLN COL FSAR Section 12.3.4 and Appendix 12AA, dealing with standards applied to the calibration and maintenance of portable radiation survey instruments. The applicant describes Area and Airborne Radioactivity Monitoring Instrumentation in BLN COL FSAR Section 12.3.4 and also in Section 14.2.9.4.27, "Portable Personnel Monitors and Radiation Survey Instruments."

The portable personnel monitor and radiation survey instrument testing verifies that the devices operate in accordance with their intended function in support of the RPP as described in Chapter 12. The applicant stated as a prerequisite that the monitors, instruments and certified test sources are on site. The applicant also stated that the general test method and acceptance criteria for the monitors and instruments would be source checked and tested in accordance with the manufactures' recommendations. The NRC staff determined that additional information should be provided in addition to the use of manufacturers' recommendations. Additional standards such as American National Standards Institute (ANSI) N42.17A-1989, as it relates to the accuracy and overall performance of portable survey instruments, and ANSI N323A-1997, as it relates to the calibration and maintenance of portable radiation survey instruments

should be provided. In response to RAI 12.3-12.4-5, in a letter from the applicant, dated September 22, 2008; the applicant stated that it intends to revise the BLN COL FSAR to include maintenance and calibration of survey instruments and to update the version of the ANSI standard in a future revision of the COL application. The NRC staff finds that Revision 1 of the BLN COL FSAR adequately addresses the above. As a result, RAI 12.3-12.4-5 is closed.

- **STD COL 12.3-3**

The applicant provided additional information in STD COL 12.3-3, related to the groundwater monitoring program, to resolve COL Information Item 12.3-3. COL Information Item 12.3-3 states:

The Combined License applicant will establish a groundwater monitoring program beyond the normal radioactive effluent monitoring program. If and as necessary to support this groundwater monitoring program, the Combined License applicant will install groundwater monitoring wells during the plant construction process. Areas of the site to be specifically considered in this groundwater monitoring program are as follows:

- *West of the auxiliary building in the area of the fuel transfer canal*
- *West and south of the radwaste building*
- *East of the auxiliary building rail bay and the radwaste building truck doors*

The applicant added text in BLN COL FSAR Appendix 12AA, Section 12AA.5.4.14 to the information incorporated from NEI 07-03 regarding the groundwater monitoring program.

The applicant stated that a groundwater monitoring program beyond the normal radioactive effluent monitoring program will be developed, if, and as necessary to support this groundwater monitoring program, design features will be installed during the plant construction process. The applicant discussed areas of the site to be specifically considered in this groundwater monitoring program.

The NRC staff evaluated the applicant's groundwater monitoring program to the criteria in 10 CFR 20.1406. 10 CFR 20.1406 requires the applicant to provide a description of how facility design and procedures for operation will minimize, to the extent practicable, contamination of the facility and the environment; facilitate eventual decommissioning; and minimize, to the extent practicable, the generation of radioactive waste. The regulatory guidance which describes an acceptable method for meeting the regulation was published in June 2008, RG 4.21, Revision 0, "Minimization of Contamination and Radioactive Waste Generation: Life Cycle Planning."

The groundwater monitoring program as described in BLN COL FSAR Appendix 12AA included some implementation considerations, but the program lacked a description of the key components of the program such as, types and periodicity of routine samples, threshold activity to be detected, actions to be taken upon detection, and quality assurance practices to be used to ensure reasonable assurance of prompt identification of leakage into the groundwater (RAI 12.3-12.4-1 and RAI 12.3-12.4-2).

*The applicant stated in a letter dated September 22, 2008, that it will adopt the NEI 08-08, "Generic FSAR Template Guidance for Life Cycle Minimization of Contamination," Revision 0 template. If approved by the NRC, the applicant will provide additional description of site specific design features and procedures for operation that minimize contamination of the facility, site, and environment. NEI 08-08 is currently under staff review. This is identified as **Open Item 12.3-1**.*

*As described in Section 11.2.1 2.4 of the AP1000 DCD, Revision 17, the exterior monitored liquid effluent discharge pipe is engineered to preclude leakage by either enclosure within a guard pipe and leakage monitoring, or is accessible for visual inspection in total from the Radwaste Building to the licensed release point for dilution and discharge. No valves, vacuum breakers, or other fittings are incorporated outside of buildings. In a supplemental response dated December 16, 2008, to RAI 12.3-12.4-1, the applicant provided a proposed revision to the BLN COL FSAR to describe the site-specific design of the external radioactive waste discharge line. The staff agrees with the applicant that the site-specific design will minimize the potential for undetected leakage from this discharge to the environment at a non-licensed release point, and complies with 10 CFR 20.1406. The proposed change to the BLN COL FSAR is acceptable subject to a formal revision to the BLN COL FSAR. Accordingly, this is identified as **Confirmatory Item 12.3-1**.*

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.3.4:

Resolution of Standard Content Open Item 12.3-1

Revision 2 of the FSAR references NEI 08-08A, which is the version of NEI 08-08 that has been accepted by NRC. Accordingly, Open Item 12.3-1 is resolved for VEGP.

Resolution of Standard Content Confirmatory Item 12.3-1

The NRC staff verified that Section 11.2.1.2.4 of the VEGP FSAR was updated to include the information identified in BLN Confirmatory Item 12.3-1; therefore, Confirmatory Item 12.3-1 is resolved for VEGP.

Supplemental Information

- PTN SUP 11.2-1

The exterior radwaste discharge piping, described above, runs from the Auxiliary Building to the Radwaste Building and then out of the Radwaste Buildings for both units to the licensed release point for dilution and discharge into the deep injection wells. The last paragraph of the standard content evaluation of STD COL 12.3-3, reproduced from Section 12.3.4 of the BLN SER above, provides the staff's evaluation of the exterior radwaste discharge piping for BLN. In an October 12, 2009, letter to NRC (Agencywide Documents and Management System (ADAMS) ML092870439), the Turkey Point Units 6 and 7 applicant endorsed BNL's response to BLN RAI 109, Question 12.3-12.4-1.

The applicant described the above-mentioned portions of the radwaste discharge piping in Turkey Point Units 6 and 7 COL FSAR Section 11.2. However, the Turkey Point Units 6 and 7 COL FSAR did not initially describe the site-specific design portions of the external radioactive waste discharge line. Following discussions with the staff, in a May 22, 2012, letter, (ML12144A360), the applicant proposed to modify Turkey Point Units 6 and 7 COL FSAR Section 11.2.1.2.4 by providing supplemental information (PTN SUP 11.2-1) regarding site-specific design features of the external radioactive waste discharge line. The staff verified that the applicant has incorporated these changes into Turkey Point Units 6 and 7 COL FSAR, Revision 4. In PTN SUP 11.2-1, the applicant stated that the exterior radwaste discharge piping is enclosed within a guard pipe and is monitored for leakage. The use of a guard pipe enclosure and leakage monitoring for the external radioactive waste discharge line complies with 10 CFR 20.1406. The exterior radwaste discharge piping runs from each of the Radwaste Buildings to where it connects to the blowdown sump discharge piping downstream of the blowdown sump pumps. At this connection point, the liquid radwaste in the discharge piping is mixed with the high volume circulating water system blowdown stream and is diluted so that the resulting mixture meets the release limits of 10 CFR Part 20, Appendix B Table II, Column 2. Downstream of this blowdown sump dilution connection point, the diluted radwaste solution flow is distributed through two separate piping branches. One of the piping branches is orientated in a North-South direction and is located to the East of Unit 6, and the second branch is orientated in the East-West direction and is located to the south of Turkey Point Units 6 and 7. Each of these piping branches contains six deep injection wells and three monitoring wells.

To obtain additional information about the layout and design features of the discharge piping and deep injection wells and how these components are designed to minimize leakage and contamination of the environment, the staff issued RAI 72, Questions 11.02-6-6 through 11.02-6-9. On August 9, 2013, the applicant provided an initial response to RAI 72, Questions 11.02-6-6 through 11.02-6-9. On April 22, 2014, the applicant provided a supplemental response to RAI 72, Question 11.02-6-6. The applicant submitted an additional supplemental response to RAI 72, Question 11.02-6-6 on September 23, 2014. As part of the applicant's response to these RAIs, the applicant amended the Turkey Point Units 6 and 7 COL FSAR to add Section 9.2.12.2.2, "Component Design," which provides a description of the deep injection wells and lists some of the design features of the associated piping, valves, and other components which make up the deep well injection system. The injectate piping connecting the pump station to the deep injection wells is a single-walled steel pipe. The diameter of the injectate piping varies from 152.4 cm (60 inches (in.)) closest to the pump station near the blowdown sump to 61 cm (24 in.) at the last well in each piping branch. This section of injectate piping between the pump station and the edge of the curbed concrete containment pad that will surround each injection well is buried. The above ground 15.2 meters (m) (50 feet (ft)) portion of the injectate piping from where the piping exits the underground to the injection tubing is accessible for visual inspection to detect for any potential leakage from pipe and valve fittings.

During discharge operations, the diluted radwaste flow will be routed to a number of deep injection wells for discharge. The number of wells used will be dependent on the volume of the radwaste discharge flow.

To direct the discharge flow to the appropriate combination of discharge wells for discharge, the injectate piping contains manifolds, valves, and controls. In addition, the injectate piping also includes appurtenances, such as air/vacuum release valves, vent lines, and access ways, as necessary, for proper operation and maintenance of the discharge piping. The air/vacuum release valves are used to prevent potential water column separation in the branch pipelines when pumps may be started and stopped or valves cycled. These air/vacuum release valves provide assurance of continued integrity of the blowdown lines. To ensure that leakage is contained and controlled, these valves are included in the preventive maintenance program. As part of this program, the valves are checked periodically and maintained within acceptable parameters. The air/vacuum release valves are also included in the site routine maintenance program. Vent and drain lines, installed at system high points or where air would be most likely to collect on each branch line, are included to remove any air that may be introduced into the lines by the air/vacuum release valves or that is not swept out of the blowdown line during system startup. As required during pump startup, personnel will be present at the vent valve locations to allow air to escape from the blowdown lines and then to close the vent valves when the vent lines fill with water. To prevent leakage from these valves during system operation, the vent lines and drain lines will be capped and the valves will be locked to prevent inadvertent operation. The applicant will contain any spillage that could occur from the vent valves during pump startup or during normal operations and properly manage this spillage as being potentially contaminated, in accordance with Radiation Protection and ALARA Program requirements. The applicant will remove any soil impacted by an injectate spill and manage this as potential radioactive waste.

10 CFR 20.1406 specifies that applicants for licenses shall describe how the facility will minimize contamination of the facility and the environment. To comply with these requirements of 10 CFR 20.1406, the discharge piping, manifolds, valves, controls, and appurtenances are designed to minimize inadvertent or unidentified releases to the environment. The integrity of the injectate piping and the valve fittings will be monitored for leakage by performing periodic visual inspections, where accessible, as part of routine operation and maintenance activities. For those portions of the injectate piping that are not accessible, leakage monitoring will be performed through remote surveillance in conjunction with groundwater monitoring, as necessary, as part of the Units 6 and 7 Groundwater Monitoring Program. Monitoring points are provided to facilitate sampling for leakage consistent with contamination minimization requirements. Leakage monitoring of the liquid radwaste system discharge pipeline and the underground pit where the liquid radwaste pipe ties into the blowdown sump discharge pipe is implemented as part of the Radiation Protection Program. The staff notes that the monitoring and leakage detection program complies with the requirements of 10 CFR 20.1406 and utilizes the applicable guidance contained in RG 4.21 and NEI 08-08A.

To ensure that the appurtenances are maintained in good condition to minimize the potential for leakage and to minimize, to the extent practicable, contamination of the facility and the environment, the piping and fittings are included in the site's routine preventive maintenance program. The deep well injection system equipment will be designed to minimize the possibility of damage to the injection equipment. Each deep injection well will be located on a curbed concrete containment pad to contain any leakage in the event of a spill. To eliminate

unauthorized personnel access or vehicle damage to the injection well and associated piping, the above ground portion of the piping at each well will be surrounded by locked protective fencing and/or closely spaced bollards of steel or concrete. In the event of a failure of some injection equipment, valves would be closed to isolate the damaged equipment and minimize the volume of spilled injectate. Each injectate feeder line is equipped with redundant isolation valves. These valves are used to isolate each individual injectate feeder line in the event of equipment failure and to prevent the upward flow of injected fluid from the well onto the containment pad due to a damaged injectate feeder line. As stated earlier, each injection well will be located on a curbed concrete containment pad to contain any injectate spilled from the injection well or from the surface piping. Any spills would be contained and managed in accordance with Radiation Protection and ALARA Program requirements. Any injectate that spills and pools on the ground would be pumped into a tank and ultimately pumped down one of the injection wells. Any soil impacted by an injectate spill would be removed and treated as radioactive waste. On the basis that the applicant has adequately described features of the discharge piping and deep injection wells to minimize leakage and contamination of the environment in accordance with 10 CFR 20.1406, the staff finds the applicant's response to the applicable portions of RAI 72, Questions 11.02-6-6 through 11.02-6-9 addressing these subjects acceptable.

RG 4.21 states that applicant should strive to minimize leaks and spills, provide containment in areas where such events might occur, and provide for detection that supports timely assessment and appropriate response. For the reasons stated above, the staff finds that the design features of the site-specific design portion of the external radioactive waste discharge line, which are described in PTN SUP 11.2-1 and in Turkey Point Units 6 and 7 COL FSAR Section 9.2.12.2.2, will minimize the potential for undetected leakage from this discharge to the environment in accordance with the guidance of RG 4.21. In addition, as stated above, the monitoring and leakage detection program complies with the requirements of 10 CFR 20.1406.

NEI 08-08A, "Generic FSAR Template Guidance for Life Cycle Minimization of Contamination," provides a description of the operational and programmatic elements and controls that minimize contamination of the facility, site, and the environment, in order to meet the requirements of 10 CFR 20.1406. NEI 08-08A also states that the COL applicant should establish an on-site groundwater monitoring program to ensure timely detection of inadvertent radiological releases to the groundwater. In accordance with NEI 08-08A, the applicant has modified its radiation protection program described in Turkey Point Units 6 and 7 COL FSAR Section 12AA to include the development of a Groundwater Monitoring Program that is beyond the normal radioactive effluent monitoring program. This groundwater monitoring program will include a network of wells to ensure timely detection of inadvertent radiological releases to the ground water.

On the basis of the staff's review of the information provided in Turkey Point Units 6 and 7 COL FSAR PTN SUP 11.2-1, the responses to RAI 72, Questions 11.02.06-6 through 11.02.06-9, and the pertinent sections of Turkey Point Units 6 and 7 COL FSAR Section 9.2.12.2., the staff concludes that the discharge piping design features and implementation of the groundwater monitoring program meet the requirements of 10 CFR 20.1406 for minimizing the potential for the contamination of the environment. Thus, the staff finds this information acceptable.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.3.4.

The following portion of this technical evaluation section is reproduced from Section 12.3.4 of the BLN SER.

- **STD COL 12.3-4**

The applicant provided additional information in STD COL 12.3-4, related to the record of operational events of interest for decommissioning, to resolve COL Information Item 12.3-4. COL Information Item 12.3-4 states:

The Combined License applicant will establish a program to ensure documentation of operational events deemed to be of interest for decommissioning, beyond that required by 10 CFR 50.75. This or another program will include remediation of any leaks that have the potential to contaminate groundwater. The applicant added text in Appendix 12AA, Section 12AA.5.4.15 to the information incorporated from NEI 07-03 dealing with a record of operational events of interest for decommissioning. The applicant discussed procedures established to document the operational events that are deemed of interest for decommissioning, beyond that required by 10 CFR 50.75. These documented operational events assist in developing a historical assessment of the nuclear facilities, thereby reducing time, effort, and hazards to personnel during decommissioning planning. This documentation will include identification of the remediation of any leaks, which have the potential to contaminate groundwater. The procedures that govern retention of these records, and the records themselves, should specify the retention period required to assure availability when they may be required (e.g., life of facility plus 30 years). The NRC staff requested in RAI 12.3-12.4-3 that the applicant include the operational and design COL information items that fully meet the objectives of RG 4.21, Revision 0 and hence the requirements of 10 CFR 20.1406, 'Minimization of Contamination.'

*In response to the RAI, in a letter dated September 22, 2008, the applicant stated that it intended to adopt NEI 08-08. This document is intended to provide the description of additional site procedures for decommissioning records which will demonstrate compliance with 10 CFR 20.1406. This is identified as **Open Item 12.3-1**.*

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.3.4:

Resolution of Standard Content Open Item 12.3-1

Revision 2 of the FSAR references NEI 08-08A, which is the version of NEI 08-08 that has been accepted by NRC. Accordingly, Open Item 12.3-1 is resolved for VEGP.

12.3.5 Post Combined license Activities

The post COL activities related to the RPP are discussed in Section 12.5.5 of this report.

12.3.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements. In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable. The staff based its conclusion on the relevant acceptance criteria provided in Section 12.3-12.4 of NUREG-0800 and on the following:

- PTN DEP 6.4-1, related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.
- PTN DEP 18.8-1, in which the applicant proposed to relocate the OSC from the location described in the AP 1000 DCD Section 12.5.2.2, is acceptable from a radiation design features perspective. The location of the OSC does not have an impact on the radiation protection facilities design. The ALARA briefing room remains as stated in the AP1000 DCD, so there is no impact on radiation protection facilities, programs or functions.
- STD COL 12.3-1, which addresses the administrative controls for use of the design features provided to control access to radiological restricted areas, is acceptable because the applicant has incorporated the approved reference NEI 07-03A into the Turkey Point Units 6 and 7 COL FSAR and meets the applicable regulatory requirements and guidance specified in Sections 12.3.3 and 12.3.4 of this SER.
- STD COL 12.3-2, which addresses the criteria and methods for obtaining representative measurement of radiological conditions, including airborne radioactivity concentrations in work areas, is acceptable because the applicant has demonstrated compliance with the applicable regulatory requirements and guidance specified in Sections 12.3.3 and 12.3.4 of this SER.
- STD COL 12.3-3 and PTN SUP 11.2-1, which address the groundwater monitoring program beyond the normal radioactive effluent monitoring program, are acceptable because the applicant has incorporated the approved reference NEI 08-08A into the Turkey Point Units 6 and 7 COL FSAR in order to

demonstrate conformance with the applicable regulatory requirements and guidance specified in Sections 12.3.3 and 12.3.4 of this SER.

- STD COL 12.3-4, which addresses the program to ensure documentation of operational events deemed to be of interest for decommissioning, is acceptable because the applicant has incorporated the approved reference NEI 08-08A into the Turkey Point Units 6 and 7 COL FSAR in order to demonstrate conformance with the applicable regulatory requirements and guidance specified in Sections 12.3.3 and 12.3.4 of this report.

12.4 Dose Assessment

12.4.1 Introduction

This section addresses the issues related to estimating the annual personnel doses associated with operation, normal maintenance, radwaste handling, refueling, in-service inspection and special maintenance (e.g., maintenance that goes beyond routine scheduled maintenance, modification of equipment to upgrade the plant, and repairs to failed components), and construction.

12.4.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR, Revision 8, Section 12.4, incorporates by reference Section 12.4 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 12.4, the applicant provided the following:

Supplemental Information

- STD SUP 12.4-1

The applicant provided supplemental information to address dose to construction workers by adding new sections after AP1000 DCD Section 12.4.1.8.

- STD SUP 12.4-1

The applicant provided supplemental information regarding conduct of radiological surveys in unrestricted and controlled areas and for radioactive materials in effluents discharged to unrestricted and controlled areas.

12.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the dose assessment are given in NUREG-0800, Section 12.4.

The applicable regulatory requirements for PTN SUP 12.4-1 and STD SUP 12.4-1 are as follows:

- 10 CFR 20.1101, "Radiation Protection Programs"
- 10 CFR 20.1301, "Dose limits for individual members of the public"
- 10 CFR 20.1302, "Compliance with dose limits for individual members of the public"

12.4.4 Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 12.4 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to dose assessment. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

The staff reviewed the information contained in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- PTN SUP 12.4-1

The applicant provided supplemental information regarding dose to construction workers in Turkey Point Units 6 and 7 COL FSAR Section 12.4.1.9 (Sections 12.4.1.9.1 through 12.4.1.9.6), "Dose to Construction Workers." Turkey Point Units 6 and 7, Section 12.4.1.9.1,

"Site Layout," describes the site layout as depicted in Turkey Point Units 6 and 7 COL FSAR, Figure 2.1203.

Turkey Point Units 6 and 7 COL FSAR Section 12.4.1.9.2, "Radiation Sources," describes the sources of radiation that will be encountered by construction workers. Turkey Point Units 6 and 7 construction workers will be exposed to direct radiation and gaseous effluents from the operation of existing Turkey Point Units 3 and Unit 4. Turkey Point Unit 7 construction workers could also be exposed to direct radiation and gaseous effluent from Unit 6 once Unit 6 becomes operational. The applicant stated that, on the basis of operational environmental thermoluminescent detector (TLD) measurements, direct radiation from the existing operating units (Turkey Point Units 3 and 4) to Turkey Point Units 6 and 7 is negligible. The applicant also stated that the exposure to Units 6 and 7 construction workers from a proposed Independent Spent Fuel Storage Installation (ISFSI) will be negligible. Based on analysis described in AP1000 DCD Section 12.4.2, the applicant stated that direct exposure to Turkey Point Unit 7 construction workers from the Turkey Point Unit 6 containment and other plant buildings is considered negligible.

To evaluate the applicant's statement that direct radiation from Turkey Point Units 3 and 4 is negligible, the staff issued RAI 31, Question 12.4.1.9.2-1 to request additional information, such as TLD data, measurement locations and dates. In an August 19, 2011, response to RAI 31, Question 12.4.1.9.2-1, the applicant provided the requested TLD data. This RAI response showed that the Turkey Point site pre-operational (1970 – 1971) direct radiation exposures (as measured by TLD) were similar to the exposures received after Turkey Point Units 3 and 4 became operational. Based on this information, the staff agrees that the potential direct radiation component of Units 6 and 7 construction worker exposures from the existing units will be negligible.

The applicant stated that construction workers will be exposed to routine gaseous effluents from Turkey Point Units 3 and 4. The applicant used the annual effluent reports from Units 3 and 4 to estimate the gaseous effluent doses from these units. Additionally, Turkey Point Unit 7 construction workers will be exposed to gaseous effluents released from Unit 6. The source term from these effluents is listed in the AP1000 DCD, Table 11.3-3.

The applicant stated that construction workers receive no exposure from the liquid effluent pathway since potable water is provided from an external source that is unaffected by the liquid discharge from Turkey Point Unit 6 or operating Units 3 and 4. The staff issued RAI 31, Question 12.4.1.9.2-2 to request that the applicant provide additional information concerning potential worker exposures to liquid effluents, specifically during activities related to the installation of liquid effluent discharge lines for Turkey Point Units 6 and 7. In an August 19, 2011, response to RAI 31, Question 12.4.1.9.2-2, the applicant stated that, during Turkey Point Unit 7 construction, any work involving contaminated Unit 6 liquid waste effluent discharge piping connections would be performed by trained and qualified radiation workers from Turkey Point Unit 6. The applicant revised Turkey Point Units 6 and 7 COL FSAR Section 12.4.1.9.2 to address this issue. The staff reviewed the RAI response and agrees that there is no exposure to Turkey Point Unit 7 construction workers from the liquid effluent pathway.

In Turkey Point Units 6 and 7 COL FSAR Section 12.4.1.9.3, "Construction Worker Dose Estimates," the applicant stated that although there has been no measurable direct radiation component from Turkey Point Units 3 and 4, and the calculated dose rate from the planned

ISFSI is only 0.009 millirem (mrem) ($9\text{E-}5$ millisievert (mSv)) per year, the applicant assumes a direct radiation dose rate of 1 mrem (0.01 mSv) per year per unit in the Units 6 and 7 construction area.

The staff notes that the applicant's assumption that construction workers would receive a direct radiation exposure of 1 mrem (0.01 mSv) per year per unit from the existing units is a reasonable and conservative assumption, based on the results of direct radiation measurements (TLD data). This exposure, adjusted by the assumed construction worker occupancy time, is used to estimate the annual construction worker direct radiation exposure from the existing units. The Turkey Point Units 6 and 7 COL FSAR, however, did not provide any basis for the calculated exposure of 0.009 mrem ($9\text{E-}5$ mSv) per year from the loaded ISFSI. Therefore, in RAI 31, Question 12.4.1.9.3-1, the staff requested that the applicant provide additional information to validate the calculated construction worker exposure from this potential pathway. In an August 19, 2011, response to RAI 31, Question 12.4.1.9.3-1, the applicant stated that the ISFSI is assumed to be fully loaded with 52 horizontal storage modules, each containing design basis pressurized water reactor (PWR) fuel. Turkey Point Units 6 and 7 are at least 914.4 m (3000 ft) from the ISFSI. Using Monte Carlo N-Particle Transport Code, Version 5 (MCNP5), the applicant calculated that the construction workers at Units 6 and 7 would be exposed to a dose rate of approximately 0.009 mrem ($9\text{E-}5$ mSv) per year from the planned ISFSI. The applicant's August 19, 2011, response to RAI 31, Question 12.4.1.9.3-1, stated that the detailed calculations performed to model the dose rates from the ISFSI are described in the applicant's electronic reading room. The staff performed an audit (ADAMS Accession No. ML15124A949, April 30, 2015) of these calculations and determined that the results are reasonable and acceptable. Compared to the direct radiation exposure to the Turkey Point Units 6 and 7 construction workers of 1 mrem (0.01 mSv) per year per unit from Turkey Point Units 3 and 4, the calculated annual dose of 0.009 mrem ($9\text{E-}5$ mSv) from the ISFSI is considered negligible. Adjusting for construction worker residence time, the applicant calculated (see Turkey Point Units 6 and 7 COL FSAR Table 12.4-201) a total direct radiation dose to the construction workers from Turkey Point Units 3 and 4 of 0.47 mrem ($4.7\text{E-}3$ mSv) per year. An independent evaluation by the staff produced comparable results.

In an October 22, 2014, supplemental response to RAI 31, Question 12.4.1.9.3-1, the applicant increased the storage capacity of the ISFSI from 52 spent fuel storage modules to 66 storage modules. This increase in the number of spent fuel storage modules in the ISFSI results in an increase in the dose rate to Units 6 and 7 construction workers from approximately 0.009 mrem ($9\text{E-}5$ mSv) per year to approximately 0.013 mrem ($1.3\text{E-}4$ mSv) per year. Although this revised dose rate is based on a fully loaded ISFSI containing 66 storage modules, the applicant stated that the ISFSI will be loaded with a maximum of only 38 storage modules during the construction of Turkey Point Unit 7. This revised dose of 0.013 mrem ($1.3\text{E-}4$ mSv) per year is still considered negligible compared to the combined direct radiation exposure from Units 3 and 4 to Units 6 and 7 construction workers of 2 mrem (0.02 mSv) per year. Therefore, the total direct radiation dose to construction workers from Turkey Point Units 3 and 4, adjusted for construction worker residence time, remains unchanged at 0.47 mrem ($4.7\text{E-}3$ mSv) per year.

The Turkey Point Units 6 and 7 COL FSAR states that construction worker doses from gaseous effluents from Turkey Point Units 3 and 4 were estimated from annual release reports, but did not identify the details of this estimation, such as which annual reports were used, what source term was used, the location of the calculated exposure or the dispersion and deposition parameters. To ascertain how the applicant determined the potential construction worker

exposure from gaseous effluents from Turkey Point Units 3 and 4, in RAI 31, Question 12.4.1.9.3-3, the staff requested that the applicant provide additional details on the assumptions used to calculate this exposure, including the applicable annual reports, assumed source terms, locations and assumed dispersion and deposition factors. In August 19, 2011, and October 22, 2014, responses to RAI 31, Question 12.4.1.9.3-3, the applicant stated that the gaseous effluent doses from Turkey Point Units 3 and 4 are the maximum values from the annual effluent reports for 2004 to 2008, adjusted for the annual construction worker occupancy of 2080 hours per year. The resulting annual estimated dose from gaseous effluent releases from Turkey Point Units 3 and 4 is 0.0023 mrem ($2.3\text{E-}5$ mSv). The RAI response stated that the data and the detailed calculations to determine the construction worker dose for the gaseous effluents for Turkey Point Units 3 and 4 are described in the applicant's electronic reading room. The staff performed an audit (ADAMS Accession No. ML15124A949) of this information and found that the calculation assumptions and methodology were appropriate and acceptable. Additionally, the staff performed an independent evaluation of the assumed construction worker exposure as a result of Turkey Point Units 3 and 4 gaseous effluents and determined that the applicant's assessment (0.0023 mrem ($2.3\text{E-}5$ mSv) per year, as indicated in Turkey Point Units 6 and 7 COL FSAR Table 12.4-201) is reasonable.

The Turkey Point Units 6 and 7 COL FSAR identifies the pathways and basic assumptions used to calculate the construction worker exposure from Turkey Point Unit 6 gaseous effluents. However, Turkey Point Units 6 and 7 COL FSAR did not provide the calculational details or the estimated Turkey Point Unit 7 construction worker exposure due to gaseous effluents from Unit 6 operation. Therefore, in RAI 34, Question 12.4.1.9.3-2, the staff requested that the applicant provide additional information on the subject. In an August 19, 2011, response to RAI 31, Question 12.4.1.9.3-2, the applicant referenced the Turkey Point Units 6 and 7 COL FSAR tables that contained the requested input information used for the dose calculation. In addition, the applicant amended the Turkey Point Units 6 and 7 COL FSAR to add Table 12.4-201, which summarizes the source, pathway and calculated dose to construction workers. The applicant estimated that the Turkey Point Unit 7 construction workers would receive an annual dose of 5.5 mrem (0.055 mSv), corrected for worker occupancy, from gaseous effluents from Turkey Point Unit 6. The staff verified that the calculation assumptions and methodology were appropriate. Additionally, the staff performed an independent evaluation of the assumed Turkey Point Unit 7 construction worker exposure as a result of Unit 6 gaseous effluents and concluded that the applicant's assessment of 5.5 mrem (0.055 mSv) per year to Turkey Point Unit 7 construction workers, per Turkey Point Units 6 and 7 COL FSAR Table 12.4-201, is reasonable.

In Turkey Point Units 6 and 7 COL FSAR Section 12.4.1.9.4, "Compliance with Dose Regulations," the applicant stated that the construction workers are considered to be members of the public and, therefore, are limited by 10 CFR 20.1301, to an annual dose of 100 mrem (1 mSv) and 2 mrem (0.02 mSv) in any one hour. The applicant also committed to comply with the requirements of 10 CFR 20.1302 and 10 CFR Part 50, Appendix I, which govern dose rates to members of the general public.

In Turkey Point Units 6 and 7 COL FSAR Section 12.4.1.9.5, "Collective Doses to Unit 7 Workers," the applicant stated assumptions for the estimated maximum number of construction workers onsite per year and their annual exposure time, which result in a calculated total worker collective dose of 17 person-rem (0.17 person-Sv) per year. As a result of a discrepancy noticed between information provided in Turkey Point Units 6 and 7 COL FSAR Section 12.4.1.9.5 and the estimated construction worker dose shown in Turkey Point Units 6

and 7 FSAR Table 12.4-201, the staff issued RAI 31, Question 12.4.1.9.5-2. In an August 19, 2011, response to RAI 31, Question 12.4.1.9.5-2, the applicant changed the estimated annual construction worker peak loading from 2600 to 2800 workers to make the information in Turkey Point Units 6 and 7 COL FSAR Section 12.4.1.9.5 consistent with the information in Turkey Point Units 6 and 7 COL FSAR Table 12.4-201. The staff finds the applicant's response to this RAI acceptable and, therefore, considers this RAI resolved.

Turkey Point Units 6 and 7 COL FSAR Section 12.4.1.9.5 also refers to Turkey Point Units 6 and 7 COL FSAR Table 12.4-202, where the results of the dose assessments are presented and compared to the applicable regulatory limits. Turkey Point Units 6 and 7 COL FSAR Table 12.4-202 states that the total estimated individual construction worker dose is 6.0 mrem (0.06 mSv) per year with a maximum dose in any one hour of 2.9E-03 mrem (2.9E-5 mSv). Since both of these worker dose estimates are within the public dose limits specified in 10 CFR 20.1301, the staff finds these worker dose estimates acceptable and, therefore, considers this RAI resolved.

The staff finds that the information provided in PTN SUP 12.4-1, regarding dose to construction workers, in Turkey Point Units 6 and 7 COL FSAR Section 12.4.1.9, is acceptable, for the reasons described above. On the basis of the reasons discussed in the above paragraphs, the staff finds the applicant's responses to RAI 31, Questions 12.4.1.9.2-1, 12.4.1.9.2-2, 12.4.1.9.3-1, 12.4.1.9.3-2, 12.4.1.9.3-3, and 12.4.1.9.5-2 acceptable and, therefore, considers this RAI resolved.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.4.4

- *STD SUP 12.4-1*

The applicant provided supplemental information regarding conduct of radiological surveys in unrestricted and controlled areas and for radioactive materials in effluents discharged to unrestricted and controlled areas. The supplemental text states that these surveys are conducted by the operating unit for the purposes of implementing 10 CFR 20.1302 and to demonstrate compliance with the standards of 10 CFR 20.1301 for construction workers. This text is acceptable because it is consistent with applicable regulatory requirements.

12.4.5 Post Combined License Activities

There are no post COL activities related to this section.

12.4.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable based on the relevant acceptance criteria provided in NUREG-0800, Section 12.3-12.4. The staff based its conclusion on the following:

- PTN SUP 12.4-1, which provides supplemental information to address dose to construction workers, is acceptable because the applicant has demonstrated compliance with the applicable requirements of 10 CFR 20.1101; 10 CFR 20.1301; 10 CFR 20.1302; and the applicable acceptance criteria provided in NUREG-0800, Section 12.3-12.4.
- STD SUP 12.4-1, which provides supplemental information regarding conduct of radiological surveys in unrestricted and controlled areas and for radioactive materials in effluents discharged to unrestricted and controlled areas is acceptable because the applicant has demonstrated compliance with the applicable requirements of 10 CFR 20.1301 and 10 CFR 20.1302.

12.5 Health Physics Facilities Design (Related to RG 1.206, Section C.III.1, Chapter 12, C.I.12.5, “Operational Radiation Protection Program”)

12.5.1 Introduction

This section addresses the objectives and design of the health physics (HP) facilities. The HP facilities are designed with the objectives of the following:

- Providing capability for administrative control of the activities of plant personnel to limit personnel exposure to radiation and radioactive materials ALARA and within the requirements of 10 CFR Part 20.
- Providing capability for administrative control of effluent releases from the plant to maintain the releases ALARA and within the limits of 10 CFR Part 20 and the plant Technical Specifications.

12.5.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR, Revision 8, Section 12.5, incorporates by reference AP1000 DCD, Revision 19, Section 12.5.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 12.5, the applicant provided the following:

Tier 2 Departure

- PTN DEP 18.8-1

The applicant described the following Tier 2 departure from the AP1000 DCD. The AP1000 DCD states that the ALARA briefing room and OSC share the same location in the Annex Building. The applicant proposed to move the OSC from the location identified in the AP1000

DCD to a location described in the Emergency Plan and revise the AP1000 DCD Section 12.5.2.2 to exclude the reference to the OSC.

AP1000 COL Information Item

- STD COL 12.3-1

The applicant added additional information in STD COL 12.3-1 to resolve COL information item 12.3-1, which addresses the administrative controls for use of the design features provided to control access to radiologically restricted areas. This information pertains to the possible installation of a closed circuit television system in high radiation areas to allow remote monitoring of individuals entering high radiation areas by personnel qualified in radiation protection procedures

Although a sentence describing the possible use of such a system appears in Section 12.5.4 of the Turkey Point Units 6 and 7 COL FSAR, it is also addressed in Turkey Point Units 6 and 7 COL FSAR Section 12.3.5.1. The staff's evaluation of this STD COL item is addressed in Section 12.3.4 of this SER.

- STD COL 12.5-1

The applicant provided additional information in STD COL 12.5-1 to resolve COL Information Item 12.5-1 (COL Action Item 12.6-1), which addresses the RPP description.

License Conditions

- Part 10, License Condition 3, Items C.1, D.2, G.4, and K.1

The actual milestones for the RPP are listed in Turkey Point Units 6 and 7 COL FSAR Table 13.4-201.

- Part 10, License Condition 6, Operational Program Readiness

The applicant proposed a license condition to provide a schedule to support NRC inspection of operational programs including the RPP.

12.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the HP facilities design are given in NUREG-0800, Section 12.5.

The applicable regulatory requirements and guidance for STD COL 12.5-1 are as follows:

- 10 CFR Part 20
- RG 8.2, Revision 0

- RG 8.4, "Direct Reading and Indirect Reading Pocket Dosimeters," Revision 0
- RG 8.6, "Standard Test Procedures for Gieger-Muller Counters," Revision 0
- RG 8.8, Revision 3
- RG 8.9, Revision 1
- RG 8.10, Revision 1
- RG 8.28, "Audible-Alarm Dosimeters," Revision 0
- NUREG-1736, "Consolidated Guidance: 10 CFR Part 20-Standards for Protection Against Radiation"

The applicable regulatory requirement for License Condition 3, Items C.1, D.2, G.4, and K.1 is as follows:

- 10 CFR 20.1101

12.5.4 Technical Evaluation

The staff reviewed Turkey Point Units 6 and 7 COL FSAR Section 12.5 and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the HP facilities design. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content

material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The staff reviewed the information contained in the Turkey Point Units 6 and 7 COL FSAR:

Tier 2 Departure

- PTN DEP 18.8-1

The location of the OSC for Turkey Point Units 6 and 7 differs from the OSC location described in the AP1000 DCD. Therefore, the applicant proposed to eliminate the reference to the OSC that appears in the first sentence of AP1000 DCD Section 12.5.2.2. The applicant proposed to revise the text in the first sentence of AP1000 DCD Section 12.5.2.2 to read: "The ALARA briefing room is located off the main corridor immediately beyond the main entry to the annex building."

This departure is acceptable to the staff insofar as the HP facility design is concerned because the location of the OSC does not have an impact on the radiation protection facilities design. The location of the ALARA briefing room remains as stated in the AP1000 DCD, so there is no impact on radiation protection facilities, programs or functions. The staff's evaluation of the OSC relocation on emergency preparedness is addressed in Section 13.3 of this SER and the evaluation on human system interface design is addressed in Section 18.8 of this SER.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.5.4

The following portion of this technical evaluation section is reproduced from Section 12.5.4 of the BLN SER:

AP1000 COL Information Item

- STD COL 12.5-1

The applicant provided additional information in STD COL 12.5-1, addressing the RPP description, to resolve COL Information Item 12.5-1. COL Information Item 12.5-1 states:

The Combined License applicant will address the organization and procedures used for adequate radiological protection and to provide methods so that personnel radiation exposures will be maintained ALARA.

The same commitment was also captured as COL Action Item 12.6-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793). The applicant stated that STD COL 12.5-1 is addressed in Appendix 12AA of the BLN COL FSAR. This appendix incorporates by reference NEI 07-03, Revision 3. The applicant described revisions to NEI 07-03 and supplemental information in Appendix 12AA of the BLN COL FSAR. The staff evaluated the revised text and

supplemental information provided in conjunction with the referenced NEI 07-03, Revision 3 template. These revisions and supplements address STD COL Items 12.1-1, 12.3-1, 12.3-3, 12.3-4, and 12.5-1. The applicant's proposed revisions and supplements are:

- 1. Specific organizational positions were described in Chapter 13 of BLN COL FSAR; and Sections 12.5.2.1 through 12.5.2.5 are not incorporated in Appendix 12AA.*
- 2. Facilities, as described in general terms in NEI 07-03, Revision 3 are not incorporated in BLN COL FSAR Appendix 12AA; facilities, instrumentation, and equipment are described in DCD Section 12.5.2.*
- 3. Supplemental information was provided for NEI 07-03, Section 12.5.3.3 to describe compliance with 10 CFR 20.1703(b) and 10 CFR 20.1705 when National Institute for Occupational Safety and Health (U.S. Public Health Service) tested and certified respiratory protection equipment is not used.*
- 4. The following headings and associated material that are described in general terms in NEI 07-03, Revision 3 are not incorporated in Appendix 12AA. Radwaste Handling, Spent Fuel Handling, Normal Operation, and Sampling are described in DCD Section 12.5.3.*
- 5. Supplemental information was provided for NEI 07-03, Section 12.5.4.4 [12.5.4.2 is the correct section number] to describe the use of a closed circuit television system to allow remote monitoring for high radiation areas access.*
- 6. Supplemental information was provided for NEI 07-03, Section 12.5.4.4 to describe access control measures for very high radiation areas. Locations and radiological controls of the radiation zones are described on plant diagrams in DCD Section 12.5.3.*
- 7. Appendix 12AA revised NEI 07-03, Section 12.5.4.7 to clarify the location of the COL applicant's management policy, organizational responsibility authorities for implementing an effective ALARA program, and the establishment and implementation of radiation protection.*
- 8. The applicant revised the second bullet of NEI 07-03, Section 12.5.4.7 II to require that the functional manager in charge of radiation protection be responsible for defining the value for "Significant exposures" and the associated activities within written procedures. The example value described in NEI 07-03 includes activities that are estimated to involve greater than 1 person-rem of collective dose.*
- 9. The COL applicant added text after the last bullet of NEI 07-03, Section 12.5.4.8 to adopt NEI 08-08 that is currently under review by the NRC staff.*

10. The COL applicant added information to NEI 07-03, Section 12AA.5.4.14 and Section 12AA.5.4.15 [sic] to adopt NEI 08-08 that is currently under review by the NRC staff.

The applicant describes the exceptions and supplemental information to NEI 07-03 that reference additional design and site-specific information necessary to clearly identify the source of the information addressed in the RPP as described in Appendix 12AA. The applicant's description provides sufficient detailed information supporting the exceptions or revisions such that the information described provides clear direction as to organizational structure, facilities, management policy for ALARA, and where the threshold for significant with exposures will be described. The NRC staff agrees that the applicant's exceptions to NEI 07-03, noted above are acceptable because these exceptions and the supplemental information satisfy the regulatory requirements of 10 CFR 20.1106 (b), the acceptance criteria of Sections 12.1 and 12.5 of NUREG-0800 and the regulatory guidance in RG 8.8, Position C.1.b, RG 8.9, and RG 8.10, Positions C.1.a, and C.2.

The applicant added Appendix 12AA, "Appendix 12AA, Radiation Protection Program Description," after Section 12.5 of the DCD. In this appendix the applicant incorporates by reference NEI 07-03, Revision 3. The applicant indicated that Table 13.4-201 provides milestones for radiation protection operational program implementation.

The NRC staff reviewed STD COL 12.5-1 dealing with the RPP description in BLN COL FSAR Appendix 12AA. The additional controls described in STD COL 12.5-1 are consistent with the discussion in NUREG-1736 regarding Bioassay programs for personnel monitoring and are consistent with the applicant's commitment to RG 8.9. The staff reviewed the threshold for determining significant exposures. The applicant stated that the functional manager in charge of radiation protection determines the threshold within procedures. Initially, the staff did not consider that the applicant exercised sufficient control related to maintaining ALARA (RAI 12.5-1).

*In response to RAI 12.5-1, in a letter dated September 22, 2008, the applicant provided additional information that the final NEI 07-03 template (Revision 7) would be incorporated without departure concerning significant exposures. In a letter dated March 18, 2009 (ML090510379), the NRC accepted NEI 07-03, Revision 7. Specifically, the NRC staff indicated that for COL applications, NEI 07-03, Revision 7 provides an acceptable template for assuring that the RPP meets the applicable regulations and guidance. Since the BLN COL FSAR has not yet adopted the approved version of the NEI template, this is identified as **Confirmatory Item 12.1-1**.*

The NRC staff reviewed Revision 0 of the BLN COL FSAR Appendix 1AA, which listed the applicant's conformance with radiation protection related RGs. The applicant stated that it will conform in general to RG 8.28, "Audible Alarm Dosimeters," Revision 0, dated August 1981, and specifically stated that it conforms to ANSI N13.7-1981, which was reaffirmed in 1992. ANSI N13.7-1983

is the "American National Standard for Radiation Protection-Photographic Film Dosimeters Criteria for Performance." RG 8.28, Revision 0, endorsed ANSI N13.27-1981, "Performance Specifications for Pocket-Sized Alarming Dosimeters/Ratemeters." This discrepancy was identified in RAI 1-10. In response to RAI 1-10, the applicant stated that BLN COL FSAR Appendix 1AA would be revised to the correct reference of the ANSI standard in a future revision of the BLN COL FSAR. The NRC staff verified that Revision 1 of the BLN COL FSAR adequately addresses the proposed change. As a result, RAI 1-10 is closed.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.5.4:

*The staff notes that the VEGP FSAR has not been updated to correct the discrepancy identified in RAI 1-10 regarding the reference to ANSI N13.27-1981. Revision 2 of the VEGP FSAR currently references the incorrect standard, ANSI N13.7-1981, under RG 8.28 in Appendix 1AA. Since the VEGP applicant has endorsed RAI 1-10, the staff expects this discrepancy to be corrected in a future revision of the VEGP FSAR. This is **VEGP Confirmatory Item 12.5-2**.*

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified two errors in the text reproduced above from the BLN SER, Section 12.5.4 that require correction. In the change numbered 5 above, the reference to "NEI 07-03, Section 12.5.4.4," is incorrect. The correct reference is to "NEI 07-03, Section 12.5.4.2." In the change numbered 10, above, the reference to "Section 12AA.5.4.14 and Section 12AA.5.4.15" is incorrect. The correct reference is to "Section 12.5.4.14 and Section 12.5.4.15."

Resolution of Standard Content Confirmatory Item 12.1-1

The NRC staff compared the VEGP and BLN COL applications regarding STD COL 12.5-1, and found them to be essentially identical, with the exception that VEGP FSAR Appendix 12AA references NEI 07-03A and BLN FSAR Appendix 12AA references Revision 3 of NEI 07-03. Additional clarifying information has been added to the VEGP FSAR regarding STD COL 12.5-1, which is discussed below. As indicated in Section 12.1.4 above, Confirmatory Item 12.1-1, is resolved for VEGP because the applicant has adopted the approved version of NEI 07-03, which is now designated as NEI 07-03A.

In Revision 2 of the FSAR, the applicant modified parts of FSAR Chapter 12, Appendix 12AA, that relate to STD COL 12.5-1. The changes are as follows:

1. *Text describing a closed circuit television system associated with high radiation areas has been moved from Appendix 12AA to Section 12.5.2.2 (this text is associated with STD COL 12.3-1, and is evaluated in Section 12.3.4 of this SER).*

2. *References in NEI 07-03A have been revised to reflect the appropriate sections of the FSAR.*
3. *Proposed modifications to the second bullet of NEI 07-03, Section 12.5.4.7 have been withdrawn.*
4. *Bullet number 3 of NEI 07-03A, Section 12.5, has been revised to address aspects of the radiation program functional areas that must be in place at various milestones.*
5. *A cross reference to NEI 08-08A has been added in NEI 07-03A.*
6. *The first paragraph of Section 12.5.4.12 of NEI 07-03A has been revised to address 10 CFR 20.1101 and the Quality Assurance Program.*

Items 1, 2, and 5 are acceptable because they are editorial and do not affect content. The change described in Item 3 is acceptable because NEI 07-03A is acceptable without modification. The changes described in Item 4 are acceptable because they are consistent with the milestones described in FSAR Table 13.4-201 and with applicable regulatory requirements. The changes described in Item 6 are acceptable because they are consistent with 10 CFR 20.1101 and the Quality Assurance Program described in FSAR Section 17.5.

Resolution of VEGP Confirmatory Item 12.5-2

Turkey Point Units 6 and 7 COL FSAR, Appendix 1AA correctly references ANSI N13.27-1981 under the conformance discussion of RG 8.28. Therefore, the staff considers VEGP Confirmatory Item 12.5-2 resolved for the Turkey Point Units 6 and 7 COL application.

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.5.4:

Exceptions to RGs 8.2, 8.4, 8.6, and Section C.3.b of RG 8.8

The following portion of this technical evaluation section is reproduced from Section 12.5.4 of the BLN SER.

The applicant took exception to RG 8.2, "Guide for Administrative Practices in Radiation Monitoring," regarding a reference to a previous version of 10 CFR Part 20 (10 CFR 20.401), because it is no longer valid. The staff agrees with the applicant's exception.

The applicant took exception to RG 8.4, "Direct Reading and Indirect Reading Pocket Dosimeters," regarding references to previous versions of 10 CFR Part 20 (10 CFR 20.202(a), and 10 CFR 20.401) because they are no longer valid. The staff agrees with the applicant's exception. The applicant also took exception to ANSI N13.5-1972 (R-1989), in that two performance criteria, accuracy and leakage, specified in the guidance, are to be met by acceptance standards in ANSI N322-1997, "ANSI Test, Construction, and Performance

requirements for Direct Reading Electrostatic/Electroscope Type Dosimeters." The staff finds that by using ANSI N322-1997 for performance criteria, 10 CFR 20 requirements are still met, as the major change is the allowance of an additional one percent leakage over a comparable time period. Test and calibration intervals recommended by RG 8.4 are not affected.

The applicant took exception to RG 8.6, "Standard Test Procedures for Geiger Mueller Counters," to reference an instrument calibration program based upon ANSI Criteria N323A-1997 (with 2004 Correction Sheet), "Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments." This methodology is acceptable over the previous program referenced in RG 8.6 because the ANSI standard reflects current industry practices. The staff agrees with the applicant's position.

The applicant took exception to part of Position C.3.b in RG 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposure at Nuclear Power Stations will be ALARA." This exception was to the reporting requirements associated with operating exposure. The applicant's basis for justifying the exception to RG 8.8, Position C.3.b, is that reporting of operating exposure information is no longer required. The staff agrees with the applicant's exception to RG 8.8, Position C3.b, because this specific reporting requirement has been superseded. All licensees are now required to report records of ionizing exposure to the NRC annually in accordance with 10 CFR 20.2206.

License Condition

- License Condition 3, Items C.1, D.2, G.4, and K.1

Implementation milestones were provided by the applicant to address the RPP required by 10 CFR 20.1101. A phased-in implementation should include appropriate milestones in the construction of the facility. Staffing levels, equipment, facilities, and procedures necessary to ensure radiation safety of the workers and public for each phase of implementation should be identified. In RAI 12.5-2, the staff requested that the applicant provide the specific programs to be implemented at each milestone identified in Table 13.4-201 of the BLN COL FSAR. In its response to the RAI, the applicant provided clarifying information regarding Table 13.4-201.

*In a supplemental response to RAI 12.5-2, dated December 16, 2008, the applicant provided a proposed revision to BLN COL FSAR Table 13.4-201 to show the specific program(s) for each milestone and assignment of a Radiation Protection Manager and Supervisor. The proposed change to BLN COL FSAR Table 13.4-201 is acceptable subject to a formal revision to the BLN COL FSAR, based on the specific commitment to establish an individual responsible for each milestone. Accordingly, this is identified as **Confirmatory Item 12.5-1**.*

The following portion of this technical evaluation section is reproduced from VEGP SER Section 12.5.4:

Resolution of Standard Content Confirmatory Item 12.5-1

The NRC staff verified that the VEGP FSAR was updated to include the information identified in the initial and supplemental BLN response to RAI 12.5-2. Accordingly, Standard Content Confirmatory Item 12.5-1 is resolved for the VEGP COL FSAR.

- *Part 10, License Condition 6, Operational Program Readiness*

The applicant proposed a license condition to provide a schedule to support NRC inspection of operational programs, including the RPP. The proposed license condition is consistent with the policy established in SECY-05-0197, "Review of Operational Programs in a Combined License Application and General Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," and is acceptable.

12.5.5 Post Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

- License Condition (12-1) – The licensee shall implement the Radiation Protection Program (RPP) (including the ALARA principle) or applicable portions thereof (as identified in FSAR Section 12.5) as described in the milestones below:
 1. RPP features (including the ALARA principle) applicable to receipt of by-product, source, or special nuclear materials (excluding exempt quantities as described in 10 CFR 30.18) implemented before initial receipt of such materials;
 2. RPP features (including the ALARA principle) applicable to new fuel implemented before receipt of initial fuel on site;
 3. All other RPP features (including the ALARA principle) except for those applicable to control radioactive waste shipment implemented before initial fuel load;
 4. RPP features (including the ALARA principle) applicable to radioactive waste shipment implemented before first shipment of radioactive waste;
- License Condition (12-2) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors a schedule that supports planning for and conduct of NRC inspections of the operational program (RPP). The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until this operational program has been fully implemented.

12.5.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable based on the relevant acceptance criteria provided in NUREG-0800, Section 12.5. The staff based its conclusion on the following:

- STD COL 12.5-1, which addresses the RPP description, is acceptable because the applicant incorporates NEI 07-03A into the Turkey Point Units 6 and 7 COL FSAR in order to meet the applicable regulatory requirements and guidance specified in Sections 12.5.3 and 12.5.4 of this SER.
- PTN DEP 18.1-1, in which the applicant proposes to relocate the OSC from the location described in the AP1000 DCD Section 12.5.2.2, is acceptable insofar as the HP facility is concerned because the location of the OSC does not have an impact on the radiation protection facilities design. The ALARA briefing room remains as stated in the AP1000 DCD, so there is no impact on radiation protection facilities, programs or functions.

13.0 CONDUCT OF OPERATIONS

13.1 Organizational Structure of Applicant

13.1.1 Introduction

The organizational structure includes the design, construction, and preoperational responsibilities of the applicant organizations described in the applicant's final safety analysis report (FSAR). The management and technical support organization includes a description of the corporate or home office organization, its functions and responsibilities, and the number and the qualifications of personnel. Its activities include facility design, design review, design approval, construction management, testing, and operation of the plant. The descriptions of the design, and construction and preoperational responsibilities include the following:

- how these responsibilities are assigned by the headquarters staff and implemented within the organizational units
- the responsible working- or performance-level organizational unit
- the estimated number of persons to be assigned to each unit with responsibility for the project
- the general educational and experience requirements for identified positions or classes of positions
- early plans for providing technical support for the operation of the facility

This section also describes the structure, functions, and responsibilities of the onsite organization established to operate and maintain the plant.

13.1.2 Summary of Application

Section 13.1 of the Turkey Point Units 6 and 7 combined license (COL) FSAR, Revision 8, incorporates by reference Section 13.1 of the AP1000 design control document (DCD), Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 13.1, the applicant provided to the U.S. Nuclear Regulatory Commission (NRC) the following:

AP1000 COL Information Items

- PTN COL 13.1-1

The applicant provided additional information in PTN COL 13.1-1 to resolve COL Information Item 13.1-1 (COL Action Item 13.1-1). COL Information Item 13.1-1 states the COL applicant will address the adequacy of its organizational structure. 10 CFR 50.33 requires this information. PTN COL 13.1-1 describes organizational positions of the nuclear power station and owner/applicant corporations and associated functions and responsibilities. Table 1.8-202, "COL Item Tabulation," provides PTN COL 13.1-1 cross-references.

- PTN COL 9.5-1

The applicant provided additional information in PTN COL 9.5-1, describing the fire protection program in Section 9.5.1.8. PTN COL 9.5-1 is addressed under Section 13.1.1.2.10, "Fire Protection" and Section 13.1.2.1.3.9, "Fire Protection Supervisor and Fire Protection Engineer." Table 1.8-202, "COL Item Tabulation," provides PTN COL 9.5-1 cross-references.

- PTN COL 18.6-1

The applicant provided additional information in PTN COL 18.6-1, describing the qualifications of the nuclear plant technical support personnel. PTN COL 18.6-1 is addressed under Section 13.1.1.4, "Qualifications of Technical Support Personnel"; Section 13.1.3.1, "Minimum Qualification Requirements"; Section 13.1.3.2, "Qualification Documentation"; Table 13.1-201, "Generic Position/Site-Specific Position Cross-Reference"; and Table 13.1-202, "Minimum On-Duty Operations Shift Organization for Two-Unit Plant." Table 1.8-202, "COL Item Tabulation," provides PTN COL 18.6-1 cross-references.

- PTN COL 18.10-1

The applicant provided additional information in PTN COL 18.10-1 to address the responsibilities of the manager in charge of nuclear training. PTN COL 18.10-1 is addressed in Section 13.1.1.3.2.5, "Training Manager." Table 1.8-202, "COL Item Tabulation," provides PTN COL 18.10-1 cross-references.

13.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for PTN COL 13.1-1, PTN COL 9.5-1, PTN COL 18.6-1, and PTN COL 18.10-1 are given in Sections 13.1.1, "Management and Technical Support Organization," and 13.1.2-13.1.3, "Operating Organization," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (SRP).

The applicable regulatory guidance for the organizational structure of the applicant is as follows:

- American National Standards Institute (ANSI)/American Nuclear Society (ANS)-3.1-1993, "American National Standard for Selection, Qualification, and Training of Personnel for Nuclear Power Plants," as endorsed and amended by Regulatory Guide (RG) 1.8, Revision 3, "Qualification and Training of Personnel for Nuclear Power Plants."

The applicable regulations for the management, technical support, and operating organizations of the applicant are as follows:

- 10 CFR 52.79, "Contents of applications; technical information in final safety analysis report"
- 10 CFR 50.40, "Common standards"

- 10 CFR 50.48, “Fire Protection”
- 10 CFR 50.71, “Maintenance of records, making of reports”
- 10 CFR Part 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants”
- 10 CFR 50.54, “Conditions of licenses”
- 10 CFR Part 55, “Operator’s Licenses”

The applicable regulatory guidance for the management, technical support, and operating organizations of the applicant is as follows:

- RG 1.8, “Qualification and Training of Personnel for Nuclear Power Plants”
- RG 1.28, “Quality Assurance Program Criteria (Design and Construction)”
- RG 1.33, “Quality Assurance Program Requirements (Operation)”
- RG 1.68, “Initial Test Programs for Water-cooled Nuclear Power Plants”
- RG 1.114, “Guidance to Operators at the Controls and to Senior Operators in the Control Room of a Nuclear Power Unit”
- RG 1.160, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants”
- RG 1.174, “An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis”
- RG 1.175, “An Approach for Plant-Specific, Risk-Informed Decisionmaking: Inservice Testing”
- RG 1.177, “An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications”
- RG 1.178, “An Approach for Plant-Specific Risk-Informed Decisionmaking for Inservice Inspection of Piping”
- RG 1.182, “Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants”
- RG 1.206 “Combined License Applications for Nuclear Power Plants (LWR Edition)”
- NUREG-0660, “NRC Action Plan Developed as a Result of the Three Mile Island Accident”
- NUREG-0694, “TMI-Related Requirements for New Operating Licenses”
- NUREG-0711, “Human Factors Engineering Program Review Model”
- NUREG-0718, “Licensing Requirements for Pending Applications for Construction Permits and Manufacturing License”
- NUREG-0737 and Supplement 1, “Clarification of TMI Action Plan Requirements”

13.1.4 Technical Evaluation

The NRC staff reviewed Section 13.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COLA represents the

complete scope of information relating to this review topic.¹ The staff confirmed that the information in the application and incorporated by reference addresses the required information relating to the organizational structure of the applicant. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Items

- PTN COL 13.1-1

The staff reviewed Turkey Point Units 6 and 7 site-specific information to resolve PTN COL 13.1-1. PTN COL 13.1-1 is related to the organizational structure of the COL applicant included under Section 13.1 of the Turkey Point Units 6 and 7 COL FSAR. Section 13.1 of the Turkey Point Units 6 and 7 COL FSAR describes the organizational positions of a nuclear power plant and owner/applicant corporations and associated functions and responsibilities.

The applicant provided the following additional Turkey Point Units 6 and 7 site-specific COL information to resolve COL Information Item 13.1-1, which addresses the organizational structure of the COL applicant. COL Information Item 13.1-1 states:

Combined License applicants referencing the AP1000 certified design will address adequacy of the organizational structure.

The commitment was also captured as COL Action Item 13.1-1 in Appendix F of NUREG-1793, which states:

The COL applicant will describe its organizational structure.

The applicant provided additional information as part of the Turkey Point Units 6 and 7 COL FSAR to describe the organizational positions of a nuclear power station and owner/applicant corporations and associated functions and responsibilities. The applicant included a table in the FSAR (Turkey Point Units 6 and 7 COL FSAR Table 13.1-201, "Generic Position/Site-Specific Position Cross-Reference") to provide a cross-reference to identify site-specific position titles.

The applicant added new sections and information related to the site-specific organizational structure to Turkey Point Units 6 and 7 COL FSAR Section 13.1 beyond the structure given in RG 1.206, "Combined License Applications for Nuclear Power Plants: LWR Edition." The new section titles are:

- 13.1.1, "Management and Technical Support Organization"
- 13.1.2, "Operating Organization"
- 13.1.3, "Qualifications Requirements of Nuclear Plant Personnel"
- 13.1.4, "Combined License Information Item"
- 13.1.5, "References"
- Table 13.1-201, "Generic Position/Site-Specific Position Cross-Reference"
- Table 13.1-202, "Minimum On-Duty Operations Shift Organization for Two-Unit Plant"

¹ See Section 1.2.2 for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a design certification (DC).

Figure 13.1-201, "Plant Management Organization"
Figure 13.1-202, "Shift Operations Organization"
Figure 13.1-203, "Corporate and Engineering Organization"
Figure 13AA-201, "Construction Management Organization"
Figure 13AA-202, "Hiring Schedule for Plant Staff"

In addition, the applicant added a new appendix to Chapter 13 titled "Appendix 13AA Construction-Related Organization." This appendix describes the applicant's construction organization. The applicant states "The information in this appendix is included for future designation as historical information".

Turkey Point Units 6 and 7 FSAR Sections 11.4 and 11.5 describe the implementation of a site specific Process Control Program (PCP) (The PCP describes the administrative and operational controls used for the solidification of liquid or wet solid waste and the dewatering of wet solid waste.), and a site-specific Offsite Dose Calculation Manual (ODCM) (the ODCM contains the methodology and parameters used for calculating doses resulting from liquid and gaseous effluents.). These were not discussed in FSAR Section 13.1.2.1.2.6. In request for additional information (RAI) 6917, Question 13.01.01-5, the staff requested the applicant to demonstrate compliance with 10 CFR 20.1301 and 20.1302, and Appendix I to 10 CFR Part 50. The applicant was also requested to revise FSAR Tier 2, Section 13.1.2.1.2.6 to include programs for implementing the PCP and the ODCM. In a response dated April 2, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13093A410), the applicant agreed to update the FSAR text. The staff has confirmed this change in Revision 7 of the FSAR and the staff finds this response acceptable since the FSAR was revised to include a statement to develop, implement, direct and coordinate the radioactive waste materials management program for the assigned units, Turkey Point Units 6 and 7. The staff considers RAI 6917, Question 13.01.01-5, resolved and closed.

The staff has reviewed PTN COL 13.1-1 and, for the reasons set forth below, concludes that the management, technical support, and operating organizations, as described, are acceptable and meet the requirements of 10 CFR 50.34, 10 CFR 50.40, 10 CFR 50.48, Appendix B to 10 CFR Part 50, 10 CFR 52.79, and 10 CFR 50.80, as applicable. This conclusion is based on the following:

The applicant has described clear responsibilities and definite resources for the design and construction of the facility and has described its plans for managing the project and utilizing the nuclear steam supply system (NSSS) vendor and architect-engineer (AE). The staff reviewed these plans and determined these plans provide reasonable assurance that the applicant will establish an acceptable organization and that sufficient resources are available to provide offsite technical support and to satisfy the applicant's commitments for the design, construction, and operation of the facility. These findings contribute to the staff's judgment that the applicant complies with the requirements of 10 CFR 50.34, 10 CFR 50.40, 10 CFR 50.48, 10 CFR Part 50 Appendix B, 10 CFR 52.79, and 10 CFR 50.80, as applicable; that is, the applicant is technically qualified to engage in design and construction activities.

The applicant has described the assignment of plant operating responsibilities; the reporting chain up through the chief executive officer; the proposed size of the regular plant staff; the functions and responsibilities of each major plant staff group; the proposed shift crew complement for single-unit or multiple-unit operation; the qualification requirements for members of its plant staff; and staff qualifications of plant managerial and supervisory positions (through personnel resumes for plant managerial and principle supervisory and technical positions as

submitted during the later stages of plant design, construction, and licensing). In Table 1.9-202, "Conformance with SRP Acceptance Criteria," of the Turkey Point Units 6 and 7 COL FSAR, the applicant noted an exception to the criteria of NUREG-0800, Section 13.1.2–13.1.3 that suggests resumes of personnel holding plant managerial and supervisory positions be included in the FSAR. The staff finds this exception to the criteria of NUREG-0800, Section 13.1.2–13.1.3 acceptable because personnel filling the management and principal supervisory and technical positions will meet the education and experience requirements of the ANSI/American Nuclear Society (ANS)-3.1-1993, as endorsed and amended by RG 1.8, Revision 3. Resumes for the personnel filling the plant managerial and principle supervisory and technical positions will be verified during the Construction Inspection Program.

NUREG-0800, Section 13.1.2–13.1.3, "Operating Organization," provides the following acceptable characteristics for an applicant's operating organization:

1. An adequate number of licensed operators will be available at all required times to satisfy the minimum staffing requirements of 10 CFR 50.54(j)–(m).
2. On-shift personnel are able to provide initial facility response in the event of an emergency.
3. Organizational requirements for the plant manager and radiation protection manager have been satisfied.
4. Qualification requirements and qualifications of plant personnel conform to the guidance of RG 1.8.
5. Organizational requirements conform to the guidance of RG 1.33.
6. The applicant has complied with TMI Action Plan items I.A.1.1 and I.A.1.3.

The staff reviewed the application in regard to the characteristics identified in items 1-6 above, and finds that the operating organization proposed by the applicant will comply with these characteristics. That is, the applicant is technically qualified to engage in design and construction activities, and to operate a nuclear power plant; that the applicant will have the necessary managerial and technical resources, and financial resources as Florida Power and Light (FPL) is a regulated utility, to support the plant staff in the event of an emergency; and that the applicant has identified the organizational positions responsible for fire protection matters and delegated the authorities to these positions to implement fire protection requirements. These findings contribute to the judgment that the applicant complies with the requirements of 10 CFR 50.40(b).

- PTN COL 9.5-1

The staff reviewed Turkey Point Units 6 and 7 site-specific information to resolve PTN COL Item 9.5-1. PTN COL Item 9.5-1 addresses the fire protection program responsibilities as shown on Figure 13.1-201 of the COL. This item is cross-referenced to Turkey Point Units 6 and 7 COL FSAR Section 9.5.1 in Table 1.8-202, "COL Item Tabulation."

The applicant added text to Turkey Point Units 6 and 7 COL FSAR Section 13.1.1.2.10, "Fire Protection," indicating that the nuclear power station is committed to maintaining a fire protection program as described in Turkey Point Units 6 and 7 COL FSAR Section 9.5. The

applicant also added text to Turkey Point Units 6 and 7 COL FSAR Section 13.1.2.1.3.9, "Fire Protection Supervisor and Fire Protection Engineer," describing the responsibilities for the fire protection supervisor and the fire protection engineer. From Figure 13.1-201 of the COL FSAR, the staff determined that the fire protection supervisor reports through the program engineering manager to the site vice president, who has ultimate responsibility for the fire protection program. Fire Protection Program implementation and maintenance are the responsibilities of the fire protection engineer. The fire protection supervisor is qualified in accordance with ANSI/ANS-3.1-1993 and the fire protection engineer is qualified in accordance with RG 1.189, "Fire Protection for Nuclear Power Plants."

The staff reviewed Section 13.1.1.2.10 and Section 13.1.2.1.3.9 of the COLA. Based on these section's descriptions of management, responsibilities, and qualification requirements, as described above, the staff finds the applicant's fire protection organization meets the organizational criteria of 10 CFR 50.48. The technical review for PTN COL 9.5-1 as it relates to the fire protection program programmatic requirements is addressed in Section 9.5 of this safety evaluation report (SER).

- PTN COL 18.6-1

The staff reviewed Turkey Point Units 6 and 7 site-specific information to resolve PTN COL 18.6-1. PTN COL 18.6-1 requires the COL applicant to address the staffing levels and qualifications of plant personnel. This item is cross-referenced to Turkey Point Units 6 and 7 COL FSAR Section 18.6 in Table 1.8-202, "COL Item Tabulation."

In Table 1.9-202, "Conformance with SRP Acceptance Criteria," of the Turkey Point Units 6 and 7 COL FSAR, the applicant noted an exception to the criteria of NUREG-0800 Section 13.1.1 that suggest the experience necessary for managers and supervisors of the technical support organization be included in the FSAR. The staff finds this exception to the criteria of NUREG-0800 Section 13.1.1 acceptable because the applicant added text to Turkey Point Units 6 and 7 COL FSAR Section 13.1.1.4, "Qualifications of Technical Support Personnel," stating the qualifications of managers and supervisors of the technical support organization will meet the education and experience standards described in ANSI/ANS-3.1-1993 and RG 1.8, which specifies qualifications for these positions that are acceptable to the staff.

The applicant added text to Turkey Point Units 6 and 7 COL FSAR Section 13.1.3.1, "Qualification Requirements," stating the qualifications of managers, supervisors, operators, and technicians of the operating organization "will meet the education and experience requirements described in ANSI/ANS-3.1-1993 (Reference 201) as endorsed and amended by and RG 1.8." In addition, Section 13.1.3.2 states that resumes and other documentation of the qualifications and experience of initial appointees to appropriate management and supervisory positions will be available for NRC inspection after position vacancies are filled. The staff finds this acceptable because personnel filling the management and principal supervisory and technical positions will meet the education and experience standards of the ANSI/ANS-3.1-1993, as endorsed and amended by RG 1.8, Revision 3 and their resumes will be available for NRC review after position vacancies are filled.

The applicant added Turkey Point Units 6 and 7 COL FSAR Table 13.1-201, "Generic Position/Site-Specific Position Cross Reference" and Turkey Point Units 6 and 7 COL FSAR Table 13.1-202, "Minimum On-Duty Operations Shift Organization for Two-Unit Plant." Table 13.1-201 describes the plant management, technical support, and plant operating

organizations, expected staffing, and a cross-reference to identify the corresponding generic and site-specific position titles. Table 13.1-202 describes the minimum composition of the operating shift crew for all modes of operation and meets the staffing levels of 10 CFR 50.54 (m). Position titles, license requirements, and minimum shift manning for the various modes of operation are in the Technical Specifications, administrative procedures, Table 13.1-201, Table 13.1-202, and illustrated in Figure 13.1-202.

The staff reviewed the text added to Turkey Point Units 6 and 7 COL FSAR Sections 13.1.1.4 and 13.1.3.1 relative to PTN COL 18.6-1 and concludes that the provisions for qualification of managers and supervisors are acceptable and meet 10 CFR 50.40(b) based on the following:

The applicant has described its organization for the management of, and its means of providing, technical support for the plant staff for the design, construction, and operation of the facility and has described its plans for managing the project and utilizing the NSSS vendor and AE. These plans give reasonable assurance that the applicant will establish an acceptable organization and that sufficient resources are available to provide offsite technical support and to satisfy the applicant's commitments for the design, construction, and operation of the facility.

- PTN COL 18.10-1

The staff reviewed Turkey Point Units 6 and 7 site-specific information to resolve PTN COL 18.10-1. PTN COL 18.10-1 requires the COL applicant to address training program development. This item is cross-referenced to Turkey Point Units 6 and 7 COL FSAR Section 13.2 and Section 18.10 in Table 1.8-202, "COL Item Tabulation."

PTN COL 18.10-1 is discussed in Section 13.1.1.3.2.5, "Training Manager." PTN COL 18.10-1 describes the responsibilities of the manager responsible for training programs upon which the applicant relies for the safe and proper operation and maintenance of the plant. The staff concludes that the training manager responsibilities described in Section 13.1.1.3.2.5 are acceptable and meet the regulatory guidelines identified in NUREG-0800 Sections 13.1.1, 13.1.2-13.1.3, and 13.2, as the applicant has described how the training manager will carry out his or her position responsibilities for designing, developing, implementing, and maintaining training programs for the safe and proper operation and maintenance of the plant. Accordingly, the application meets the requirements of 10 CFR 50.40(b) in regard to the qualifications of the training manager. The technical review for PTN COL 18.10-1 is addressed in Section 18.10 of this SER.

13.1.5 Post Combined License Activities

There are no post-COL activities related to this section.

13.1.6 Conclusion

The staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA related to information incorporated by reference is in NUREG-1793 and its supplements. NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. Pursuant to 10 CFR 52.63(a)(5) and 10 CFR Part 52, Appendix D, Section VI.B.1, all nuclear safety issues relating to this section that were incorporated by reference have been resolved.

The applicant has described clear responsibilities and definite resources for the design and construction of the facility, and has described its plans for managing the project and utilizing the NSSS vendor and AE. The staff reviewed these plans, and for the reasons set forth above, finds that they give adequate assurance that an acceptable organization has been established and that sufficient resources are available such that the applicant will satisfy its commitments in the application for the design and construction of the facility. These findings contribute to the judgment that the applicant complies with the requirements of 10 CFR 50.34, 10 CFR 50.40, 10 CFR 50.48, 10 CFR Part 50 Appendix B, 10 CFR 52.79, and 10 CFR 50.80, as applicable; that is, the applicant is technically qualified to engage in design and construction activities.

The applicant has described its organization for the management of, and its means of providing, technical support for the plant staff during operation of the facility. The NRC staff has reviewed these measures, and, for the reasons set forth above, concludes that the applicant has an acceptable organization and adequate resources to provide offsite technical support for the operation of the facility under both normal and off-normal conditions.

The applicant has described the assignment of plant operating responsibilities; the reporting chain up to the chief executive office of the applicant; the proposed size of the regular plant staff; the functions and responsibilities of each major plant staff group; the proposed shift crew complement for single-unit or multiple-unit operation; the qualification of its plant staff; and staff qualifications.

For the reasons described above, the staff finds that the operating organization proposed by the applicant will conform to these characteristics, and will comply with the requirements of 10 CFR 50.40(b) and 10 CFR 50.80, as applicable. That is, the applicant is technically qualified to operate a nuclear power plant; the applicant will have the necessary managerial and technical resources to support the plant staff in the event of an emergency; and the applicant has identified the organizational positions responsible for fire protection matters and delegated the authorities to these positions to implement fire protection requirements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the acceptance criteria identified in RGs 1.8, 1.28, 1.33 and 1.114. For the reasons set forth above the staff concludes that the organizational structure of the COL applicant is acceptable because it meets the requirements of 10 CFR 50.40(b) and 10 CFR 50.80, as applicable.

13.2 Training

13.2.1 Introduction

This section addresses the description and schedule of the training program for reactor operators (ROs) and senior reactor operators (SROs) (i.e., licensed operators). It addresses the scope of licensing examinations as well as training requirements of 10 CFR 55. The licensed operator training program also includes the requalification programs as required in 10 CFR 50.54(i)(i-1) and 10 CFR 55.59, "Requalification." In addition, this section of the Turkey Point Units 6 and 7 COL FSAR includes the description and schedule of the training program for nonlicensed plant staff, including the programs required by 10 CFR Parts 50.120.

13.2.2 Summary of Application

Section 13.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 13.2 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 13.2, the applicant provides the following:

AP1000 COL Information Items

- STD COL 13.2-1

The applicant provided additional information in Standard (STD) COL 13.2-1 to resolve COL Information Item 13.2-1 (COL Action Item 13.2-1), which incorporates the provisions of Nuclear Energy Institute (NEI) 06-13A, "Template for an Industry Training Program Description," providing the description and scheduling of the training program for plant personnel, including the requalification program for licensed operators.

- STD COL 18.10-1

The applicant provided additional information in STD COL 18.10-1 to address training for those operators involved in the Human Factors Engineering (HFE) Verification and Validation (V&V) Program, using a systematic approach to training and Westinghouse Commercial Atomic Power (WCAP)-14655, "Designer's Input to the Training of the Human Factors Engineering Verification and Validation Personnel."

License Conditions

- Part 10, License Condition 3, Items B.1, C.3

The applicant proposed a license condition in Part 10 of the Turkey Point Units 6 and 7 COL application, which provides the milestones for implementing the Reactor Operator Training (B.1) and the applicable portions of the Non-Licensed Plant Staff Training Program (C.3) (required in accordance with 10 CFR 50.120, "Training and qualification of nuclear power plant personnel"). The license condition related to the portions of the Non-Licensed Plant Staff Training Program applicable to radioactive material is addressed in Chapter 1 of this SER.

- Part 10, License Condition 6

The applicant proposed a license condition to provide a schedule to support the NRC's inspection of operational programs included in Turkey Point Units 6 and 7 COL FSAR Table 13.4-201, including the Non-Licensed Plant Staff Training Program (required in accordance with 10 CFR 50.120), Reactor Operator Training Program, and the Reactor Operator Requalification Program.

13.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the description and schedule of the training program for licensed operators are given in Sections 13.2.1 and 13.2.2, and Chapter 18 of NUREG-0800.

The applicable regulations for STD COL 13.2-1 are as follows:

- 10 CFR 50.54(m)
- 10 CFR Part 55

The applicable regulations for the Non-Licensed Plant Staff Training Program are as follows:

- 10 CFR 50.120
- 10 CFR 52.79(a)(33), "Contents of applications; technical information"

The applicable regulations for the licensed operators training program are as follows:

- 10 CFR 55.13, "General exemptions"
- 10 CFR 55.31, "How to apply"
- 10 CFR 55.41, "Written examinations: Operators"
- 10 CFR 55.43, "Written examinations: Senior operators"
- 10 CFR 55.45, "Operating tests"

The applicable regulations for the licensed operator's requalification program are found in:

- 10 CFR 50.34(b), "Final safety analysis report"
- 10 CFR 50.54(i)
- 10 CFR 55.59

The applicable regulatory guidance documents for STD COL 13.2-1 are as follows:

- RG 1.8
- RG 1.149, "Nuclear Power Plant Simulation Facilities for Use in Operator Training and License Examinations"
- NUREG-1021, "Operator Licensing Examination Standards for Power Reactors"

The applicable regulatory guidance for STD COL 18.10-1 is as follows:

- NUREG-0711, "Human Factors Engineering Program Review Model"

13.2.4 Technical Evaluation

The staff reviewed Section 13.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COLA represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the description and schedule of the training programs for nuclear plant personnel. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COLAs. To ensure that the staff's findings on standard content that were documented in the SER for the reference COLA (Vogtle Electric Generating Plant (VEGP), Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COLA, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COLA, as applicable) resulting from VEGP COL FSAR RAIs.
- The staff confirmed that all responses to VEGP COL FSAR RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and has verified that the Turkey Point Units 6 and 7 application incorporates the standard content information included in the Vogtle application. Accordingly, the staff finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COLA. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COLA (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Plant (BLN) Units 3 and 4 COLA. In addition, the Staff did not pose any RAIs to FPL regarding the standard content described above, and there was no need to evaluate any information in addition to the standard content.

The following portion of this technical evaluation section is reproduced from Section 13.2.4 of the VEGP SER:

AP1000 COL Information Items

- STD COL 13.2-1

The NRC staff reviewed STD COL 13.2-1 related to COL Information Item 13.2-1 (COL Action Item 13.2-1) included under Section 13.2 of the BLN COL FSAR. COL Information Item 13.2-1 states:

The Combined License applicants referencing the AP1000 certified design will develop and implement training programs for plant personnel. This includes the training program for the operations personnel who participate as subjects in the human factors engineering verification and validation. These Combined License applicant training programs will address the scope of licensing examinations as well as new training requirements.

The commitment was also captured as COL Action Item 13.2-1 in Appendix F of the NRC staff FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will develop and implement training programs for plant personnel.

The applicant provided the following text to supplement Section 13.2, "Training," of the AP1000 DCD, dealing with the training program for plant personnel.

This section incorporates by reference NEI 06-13 (sic) [NEI 06-13A], Template for an Industry Training Program Description. See Table 1.6-201.

This technical report provides a complete training program description for use with COL applications. The staff has endorsed NEI 06-13A, Revision 1, as it provides an acceptable template for describing licensed operators and non-licensed plant staff training programs. The applicant has incorporated by reference NEI 06-13A.

The applicant provided the following text to supplement Section 13.2, "Training," of the AP1000 DCD, which is included in the [design certification] DC amendment as part of the BLN COL FSAR to address STD COL 13.2-1, dealing with the training program for plant personnel.

Table 13.4-201 provides milestones for training implementation.

NUREG-0800, Section 13.2.1, establishes milestones for the licensed operators and non-licensed plant staff training programs and for the licensed operator requalification training program. The BLN COL FSAR has identified those milestones in Table 13.4-201. The staff determined that this is acceptable, as the milestone information included in this table meets the criteria found in NUREG-0800.

- *STD COL 18.10-1*

The NRC staff reviewed STD COL 18.10-1, related to COL Information Item 18.10-1 (COL Action Item 18.10.3-1). COL Information Item 18.10-1 states:

Combined License applicants referencing the AP1000 certified design will develop and implement training programs for plant personnel. This includes the training program for the operations personnel who participate as subjects in the human factors engineering verification and validation. These Combined License applicant training programs will address the scope of licensing examinations as well as new training requirements.

The commitment was also captured as COL Action Item 18.10.3-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

With regard to the training program development, the COL applicant will: (1) address the training program development

considerations in NUREG-0711, (2) address relevant concerns identified in this report [NUREG-1793], and (3) identify the minimum documentation that the COL applicant will provide to enable the staff to complete its review.

This section refers to Sections 13.1, "Organizational Structure of Applicant" and 13.2, "Training" regarding the training program development.

The NRC staff reviewed the resolution to STD COL 18.10-1, related to staffing and qualifications included under Section 18.10 of the BLN COL FSAR. The applicant provided the referenced NRC-endorsed NEI 06-13A, Revision 1, to address COL Information Item 18.10-1.

NEI 06-13A, Revision 1 was written to provide COL applicants with a generic program description for use with COL application submittals. In a letter dated December 5, 2008, the staff stated that the training template of NEI 06-13A, Revision 1, was an acceptable means for describing licensed operator and non-licensed plant staff training programs. The staff finds the applicant's incorporation of NEI 06-13A, Revision 1 to be acceptable because it utilizes an NRC-endorsed methodology.

In Table 1.9-202, "Conformance with SRP Acceptance Criteria," of the BLN COL FSAR, the applicant identified two exceptions to the criteria of NUREG-0800, Section 13.2, which recommends following the guidance in NUREG-0711 and RG 1.149. Further, the applicant stated in Table 1.9-202 that NEI 06-13A is incorporated by reference into the BLN COL FSAR. The staff's safety evaluation report for NEI 06-13A (ML0709504790) states that NEI 06-13A complies with the guidance in NUREG-0711 and RG 1.149. Therefore, the staff finds the two exceptions to the criteria in NUREG-0800, Section 13.2 to be acceptable because NEI 06-13A complies with the guidance in NUREG-0711 and RG 1.149.

License Conditions

- *Part 10, License Condition 3, Item B1*

The NRC staff finds the implementation milestone for the Reactor Operator Training Program (18 months prior to schedule date of initial fuel load) to be acceptable because it is consistent with 10 CFR 50.120.

- *Part 10, License Condition 6*

The applicant proposed a license condition in Part 10 of the VEGP COL application to provide a schedule to support the NRC's inspection of operational programs, including the Non-Licensed Plant Staff Training Program, (required in accordance with 10 CFR 50.120), Reactor Operator Training Program, and Reactor Operation Requalification Program. The proposed license condition is consistent with the policy established in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," for operational programs in general, and is acceptable.

The Turkey Point Units 6 and 7 application incorporates the standard content information included in the Vogtle application and there is no additional Turkey Point specific information that required evaluation by the staff and as such the Staff did not pose any RALs to FPL on this section as described above. The staff finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COLA.

13.2.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff finds the following license conditions proposed by the applicant acceptable:

- License Condition (13-1)—The licensee shall implement the Reactor Operator Training Program at least 18 months before scheduled date of initial fuel load.
- License Condition (13-2)—No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors (NRO) a schedule that supports planning for and conduct of NRC inspection of the operational programs (the Non-Licensed Plant Staff Training Program (required in accordance with 10 CFR 50.120), Reactor Operator Training Program, and Reactor Operation Requalification Program). The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until these operational programs have been fully implemented.

13.2.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the acceptance criteria provided in RGs 1.8 and 1.149. The staff based its conclusion on the following:

- STD COL 13.2-1 incorporates by reference NEI 06-13A, Revision 1, which provides an acceptable template for describing licensed operators and nonlicensed plant staff training programs. The staff determined that this is acceptable, as it applies an NRC-endorsed approach.
- STD COL 18.10-1, relating to training, references Section 13.2 of the Turkey Point Units 6 and 7 COL FSAR, in which the applicant has committed to use WCAP-14655 to ensure a systematic approach to training development, and has referenced NEI 06-13A, Revision 1. The staff finds this acceptable because it applies an NRC-endorsed approach.

13.3 Emergency Planning

13.3.1 Introduction

This section addresses the plans, design features, facilities, functions, and equipment necessary for radiological emergency planning (EP) that must be considered in a COL application (COLA). This includes both the COL applicant's onsite emergency plan and State and local (offsite) emergency plans, which the NRC and the Federal Emergency Management Agency (FEMA) evaluated to determine whether the plans are adequate, and whether there is reasonable assurance that they can be implemented. The emergency plans are an expression of the overall concept of operation, and describe the essential elements of advanced planning that have been considered and the provisions that have been made to cope with radiological emergency situations.

FPL is the applicant for the Turkey Point Units 6 and 7 COLs. FPL submitted its COLA (Revision 0) on June 30, 2009 (ADAMS Accession No. ML091830589), for two new nuclear reactors that will be located on the approximately 9,400 acres of Turkey Point plant property, designated as Turkey Point Units 6 and 7, in Miami-Dade County, Florida. The NRC docketed the application on September 4, 2009 (Docket Nos. 52-040 and 52-041) (ADAMS Accession No. ML092380248). FPL submitted COLA Revisions 1, 2, 3, 4, 5, 6, and 7 on September 3, 2010, December 21, 2010, December 16, 2011, December 14, 2012, December 16, 2013, October 29, 2014, and October 14, 2015, respectively. This SER section reflects the results of the staff's evaluation of the application, with regard to radiological emergency planning, which are based on COLA Revision 7 (ADAMS Accession No. ML15301A741).

Currently located on the site are five FPL power plants: two natural gas/oil steam electric generating units (Units 1 and 2), two pressurized-water reactor nuclear units (Units 3 and 4), and a natural gas combined cycle steam electric generating unit (Unit 5). The new reactors, Units 6 and 7, will be constructed on an approximately 218-acre area, south of Units 3 and 4. The boundary for the site footprints for Units 6 and 7 is entirely within the existing Turkey Point site exclusion area boundary, so that for purposes of emergency planning, little distinction exists between the existing reactor units (i.e., Units 3 and 4) and the new Units 6 and 7 proposed to be on the Turkey Point site. The COLA takes advantage of the emergency planning resources, capabilities, and organization that exist at the Turkey Point site for Units 3 and 4.

The applicant has submitted a complete and integrated emergency plan for Units 3, 4, 6, and 7 pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR 52.79(a)(21)), which consists of the Turkey Point Plant Radiological Emergency Plan in Part 5 of the COLA (hereinafter referred to as "emergency plan" or "COL Plan"), and supplemental information that includes the offsite radiological emergency response plans for the State of Florida and Counties of Miami-Dade and Monroe, letters of agreement with various supporting offsite agencies and organizations, and the PTN Evacuation Time Estimate (ETE) Report No. KLD TR-509, Corrected Final Report, Revision 4, "Turkey Point Nuclear Power Plant—Development of Evacuation Time Estimates," April 15, 2015 (ADAMS Accession No. ML15301A346) (hereinafter referred to as "ETE Report"). The application also includes Table 3.8-1, "Emergency Plan Inspections, Tests, Analyses, and Acceptance Criteria," in Part 10, "Proposed License Conditions (Including ITAAC)," which provides a listing of EP inspections, tests, analyses, and acceptance criteria (ITAAC) that address required elements of emergency planning that cannot be completed during the COLA stage, and which will be completed before initial fuel load. The COLA also references the AP1000 standard design certification.

As described below, in consultation with FEMA, the staff reviewed the COLA, ETE Report, the applicant's responses to RAIs, and generally available reference material in accordance with the guidance provided in NUREG-0800 Section 13.3, "Emergency Planning," and Section 14.3.10, "Emergency Planning—Inspections, Tests, Analyses, and Acceptance Criteria." FEMA reviewed the offsite radiological emergency response plans of the State of Florida and local government plans for Miami-Dade and Monroe Counties in Florida.

In a letter dated December 23, 2009 (ADAMS Accession No. ML100980173), FEMA provided the NRC with its Interim Finding Report for Reasonable Assurance for the Turkey Point COLA, dated October 5, 2009 (ADAMS Accession No. ML100980192), which found that all planning standards associated with their review were adequate, and that the State and local emergency plans and preparedness are adequate and continue to be capable of implementation at the Turkey Point site in support of Units 6 and 7. The staff reviewed the FEMA findings, and the overall FEMA conclusions are reflected below in SER Sections 13.3.4 and 13.3.6.

13.3.2 Summary of Application

Section 13.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Revision 19 of the Westinghouse AP1000 DCD, Tier 2 Section 13.3.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 13.3, the applicant provided the following:

Tier 2 Departures

In COLA Part 2, Tier 2,² Table 1.8-201, "Summary of FSAR Departures from the DCD," and COLA Part 7, "Departures and Exemption Requests," the applicant identified the following two (Units 6 and 7) plant-specific departures from the AP1000 generic DCD, which are associated with emergency planning:

- PTN DEP 18.8-1

The Operations Support Center (OSC) is being moved from the location identified in DCD Subsections 18.8.3.6, 12.5.2.2, and 12.5.3.2 and as identified on DCD figures in Subsections 1.2, 12.3, and Appendix 9A. There will be a single OSC for Units 6 and 7 located as described in the Emergency Plan.

- PTN DEP 18.8-2

The Technical Support Center (TSC) is not located in the control support area as identified in DCD Subsection 18.8.3.5. The TSC is common for Turkey Point Units 3, 4, 6, and 7 and is located as described in the Emergency Plan.

The staff's evaluation of the applicant's description of these two DCD departures is addressed below in SER Section 13.3.4.8.

² The definitions of Tier 1, Tier 2, and Tier 2*, which reflect design-related information contained in the generic AP1000 DCD, are provided in 10 CFR Part 52, Appendix D, "Design Certification Rule for the AP1000 Design," Section II.

AP1000 COL Items

Consistent with the AP1000 Tier 2 DCD, in COLA Part 2 Table 1.8-202, “COL Item Tabulation,” the applicant identified DCD COL (information) items, including the DCD subsections and FSAR sections where each COL item is resolved. In COLA Part 2 Section 13.3, the applicant identified the following two COL items relating to emergency planning:

- STD COL 13.3-1

The applicant provided additional information in STD COL 13.3-1 to address COL Information Item 13.3-1 (COL Action Item 13.3-1) of the AP1000 DCD, which states:

Combined License applicants referencing the AP1000 certified design will address emergency planning including post-72 hour actions and its communication interface.

- STD COL 13.3-2

The applicant provided additional information in STD COL 13.3-2 to address COL Information Item 13.3-2 (COL Action Item 13.3.3.3.5-1) of the AP1000 DCD, which states:

Combined License applicants referencing the AP1000 certified design will address the activation of the emergency operations facility [EOF] consistent with current operating practice and NUREG-0654/FEMA-REP-1 [“Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants,” Revision 1 (hereinafter referred to as “NUREG-0654”)].

The applicant also identified the following three additional COL items in their respective FSAR sections, which relate to emergency planning:

- PTN COL 9.5-9 and PTN COL 9.5-10

In COLA Part 2, Subsection 9.5.2.2.5, “Offsite Interfaces and Emergency Offsite Communications,” the applicant provided additional information in PTN COL 9.5-9 and PTN COL 9.5-10 to address COL Information Items 9.5-9 and 9.5.10 (COL Action Items 9.5.2-3 and 9.5.2-1, respectively) of the AP1000 DCD. Specifically, the applicant stated that offsite interfaces and emergency offsite communications are described in the emergency plan. COL Information Items 9.5-9 and 9.5-10 are as follows:

PTN COL 9.5-9—Combined License applicants referencing the AP1000 certified design will address interfaces to required offsite locations; this will include addressing the recommendations of BL-80-15 ([DCD] Reference 21)³ regarding loss of the emergency notification system due to a loss of offsite power.

PTN COL 9.5-10—The emergency offsite communication system, including the crisis management radio system, will be addressed by the Combined License applicant.

³ NRC IE Bulletin No. 80-15 (BL-80-15), “Possible Loss of Emergency Notification System (ENS) with Loss of Offsite Power,” June 18, 1980.

- PTN COL 18.2-2

In COLA Part 2, Section 18.2, “Human Factors Engineering Program Management,” the applicant provided additional information in PTN COL 18.2-2 to address COL Information Item 18.2-2 (COL Action Item 18.2.3.1-1) of the AP1000 DCD. Specifically, the applicant stated that the EOF and TSC communication strategies and human factors attributes are described in the emergency plan. As reflected in DCD Tier 2 Subsection 18.2.6.2, “Emergency Operations Facility,” COL Information Item 18.2-2 states:⁴

Specific information regarding EOF and TSC communications, and EOF and TSC human factors attributes will be provided by the Combined Operating License applicant to address the Combined License information requested in this subsection [i.e., DCD Tier 2 Subsection 18.2.6].

The staff’s evaluation of the applicant’s resolution of these five COL items is addressed below in SER Section 13.3.4.18.

Supplemental Information

- STD SUP 13.3-1

In COLA Part 2, Section 13.3, “Emergency Planning,” the applicant provided supplemental information in STD Supplement (SUP) 13.3-1, which states that FSAR Table 13.4-201, “Operational Programs Required by NRC Regulations,” provides milestones for emergency planning program implementation. STD SUP 13.3-1 is evaluated by the staff as part of its evaluation of implementation milestones and proposed License Condition 6 in SER Section 13.3.4.19.

- PTN SUP 14.3-1

The applicant provided the following statement in COLA Part 2, Subsection 14.3.2.3.1, “Emergency Planning ITAAC (EP-ITAAC),” with regard to EP ITAAC:

EP-ITAAC have been developed to address implementation of elements of the Emergency Plan. Site-specific EP-ITAAC are based on the generic ITAAC provided in Appendix C.II.1-B of Regulatory Guide 1.206 [“Combined License Application for Nuclear Power Plants (LWR Edition)”]. These ITAAC have been tailored to the specific reactor design and emergency planning program requirements.

The EP ITAAC are identified below under *ITAAC*, and PTN SUP 14.3-1 is evaluated by the staff as part of its evaluation of ITAAC and proposed License Condition 1 in SER Section 13.3.4.19.

Onsite Emergency Plan

⁴ See also, Section 18.2.7, “Evaluation of COL Information Item 18.2-2 (no comparable NUREG-1793 section),” of NUREG-1793, Supplement 2, Volume 2, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design – Docket No. 52-006,” August 5, 2011 (published September 2011) (ADAMS Accession No. ML112061231).

Emergency planning for Units 6 and 7 is addressed throughout COLA Part 2, with the Turkey Point Plant Radiological Emergency Plan for Units 6 and 7 (provided in COLA Part 5). The COL Plan consists of a full and integrated emergency plan, which includes three annexes that describe unit-specific information. Specifically, Annex 1 applies to the existing Units 3 and 4; Annex 2 applies to the new Unit 6; and Annex 3 applies to the new Units 6 and 7. The COL Plan also includes six appendices (listed below), which provide additional detailed information on various aspects of the COLA and emergency plan. The staff's review and findings in this SER section apply only to the proposed Units 6 and 7.

- Appendix 1 References
- Appendix 2 Letters of Agreement
- Appendix 3 Procedure Cross-Reference to the Emergency Plan
- Appendix 4 Abbreviations, Acronyms, and Definitions
- Appendix 5 Evacuation Time Estimate
- Appendix 6 NUREG-0654 Cross Reference

Offsite Emergency Plans

Pursuant to 10 CFR 50.33(g), a COL applicant is required to submit the radiological emergency response plans of State and local governments that are wholly or partially within the 16-kilometer (km) (10-mile (mi)) plume exposure pathway emergency planning zone (EPZ), as well as plans of State governments wholly or partially within the 80-km (50-mi) ingestion pathway EPZ (hereinafter referred to as the "10-mi EPZ" and "50-mi EPZ"). The COLA includes supplemental information consisting of the offsite radiological emergency response plans for the State of Florida and Miami-Dade and Monroe Counties in Florida. The supplemental information also includes letters of agreement with various supporting offsite agencies and organization (discussed below in SER Sections 13.3.4.1, 13.3.4.2, 13.3.4.3, and 13.3.4.12), and the detailed ETE Report for the 10-mi EPZ (discussed below in SER Section 13.3.4.17).

License Conditions

COLA Part 10, "Proposed License Conditions (Including ITAAC)," includes the following proposed license conditions related to emergency planning:

- License Condition 1 (ITAAC)

The ITAAC identified in the tables in Appendix B are hereby incorporated into this Combined License. After the Commission has made the finding required by 10 CFR 52.103(g), the ITAAC do not constitute regulatory requirements; except for specific ITAAC, which are the subject of a Section 103(a) hearing, their expiration will occur upon final NRC action in such proceeding.

- License Condition 6 (Operational Program Readiness)

The licensee shall submit to the appropriate director of the NRC, a schedule, no later than 12 months after issuance of the COL, that supports planning for and conduct of NRC inspections of operational programs listed in the operational program FSAR Table 13.4-201. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operational programs in the FSAR table have been fully implemented

or the plant has been placed in commercial service, whichever comes first. This schedule shall also address:

- a. the emergency planning implementation procedures are consistent with 10 CFR Part 50, Appendix E, Section V
- e. an emergency response data system (ERDS) implementation program plan consistent with 10 CFR Part 50, Appendix E, Section [VI]
- g. full implementation of the operational and programmatic elements of responding to an event associated with a loss of large areas of the plant due to explosions or fire, prior to initial fuel load

- License Condition 11.A (Emergency Planning Actions—Emergency Action Levels)

The licensee shall submit a fully developed set of site-specific Emergency Action Levels (EALs) to the NRC in accordance with the NRC-endorsed version of [Nuclear Energy Institute] NEI 07-01, "Methodology for Development of Emergency Action Levels—Advanced Passive Light Water Reactors," Revision 0, July 2009 (ADAMS Accession No. ML090930549), with no deviations. The EALs shall have been discussed and agreed upon with State and local officials. These fully developed EALs shall be submitted to the NRC for confirmation at least 180 days prior to initial fuel load.

- License Condition 11.B (Emergency Planning Actions—On-Shift Staffing Assessment)

At least two (2) years before scheduled initial fuel load, the licensee shall have performed an assessment of emergency response staffing in accordance with NEI 10-05, "Assessment of On-Shift Emergency Response Organization Staffing and Capabilities," or other NRC-endorsed guidance in effect six (6) months prior to commencement of the assessment.

- License Condition 12.C (Fukushima Actions – Emergency Planning Actions)

Staffing

At least two (2) years prior to scheduled initial fuel load, the licensee shall have performed an assessment of the onsite and augmented staffing capability to satisfy the regulatory requirements for response to a multi-unit event. The staffing assessment will be performed in accordance with NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," or other NRC-endorsed guidance in effect six (6) months prior to commencement of the assessment.

At least two (2) years prior to scheduled initial fuel load, the licensee will revise the Emergency Plan to include the following:

- Incorporation of corrective actions identified in the staffing assessment described above.

- Identification of how the augmented staff will be notified given degraded communications capabilities.

Communications

At least two (2) years prior to scheduled fuel load, the licensee shall have performed an assessment of on-site and off-site communications systems and equipment required during an emergency event to ensure communications capabilities can be maintained during prolonged station blackout conditions. The communications capability assessment will be performed in accordance with NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," or other NRC-endorsed guidance in effect six (6) months prior to commencement of the assessment.

At least one hundred eighty (180) days prior to scheduled initial fuel load, the licensee shall complete implementation of corrective actions identified in the communications capability assessment described above, including any related emergency plan and implementing procedure changes and associated training.

The staff's evaluation of these five proposed license conditions is addressed below in SER Sections 13.3.4.2, 13.3.4.4, 13.3.4.6, and 13.3.4.19.

ITAAC

COLA Part 10 proposes License Condition 1 (described above), which incorporates the ITAAC identified in Part 10 Appendix B into the COL. Appendix B includes Table 3.8-1 (EP ITAAC) and incorporates by reference the AP1000 DCD ITAAC. The DCD ITAAC include the six AP1000 design-related EP ITAAC in DCD Tier 1 Table 3.1-1, "Inspections, Tests, Analyses, and Acceptance Criteria." Four of these EP ITAAC in DCD Table 3.1-1 duplicate or overlap similar EP ITAAC in Part 10 Table 3.8-1 (e.g., TSC floor space). The remaining two EP ITAAC in DCD Table 3.1-1 address the display of various plant parameters in the TSC and Control Support Area (CSA) habitability. DCD Table 3.1-1 also addresses the AP1000 locations of the OSC and TSC, which are moved by COLA Tier 2 Departures PTN DEP 18.8-1 and PTN DEP 18.8-2, respectively, and evaluated below in SER Section 13.3.4.8. The EP ITAAC are evaluated below in SER Section 13.3.4.19, and specific EP ITAAC are identified within their respective planning standard in SER Section 13.3.4.

13.3.3 Regulatory Basis

The regulatory basis of the AP1000 DCD information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements. The applicable regulatory requirements for emergency planning are as follows:

- 10 CFR 52.79(a)(21) requires that the FSAR include emergency plans that comply with the requirements of 10 CFR 50.47, "Emergency plans," and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities." In addition, 10 CFR 52.79(a)(22)(i) requires certifications from State and local governmental agencies with emergency planning responsibilities. Under 10 CFR 50.47(a)(1)(ii), no initial COL under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear

Power Plants,” will be issued unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. In addition, under 10 CFR 50.47(a)(2), the NRC will base its findings on a review of the FEMA findings and determinations as to whether State and local emergency plans are adequate, and whether there is reasonable assurance that they can be implemented, and on the NRC assessment as to whether the applicant’s onsite emergency plans are adequate and whether there is reasonable assurance that they can be implemented.

- The staff also considered the applicable requirements in Subsection (g) of 10 CFR 50.33, “Contents of applications; general information”; 10 CFR 50.72, “Immediate notification requirements for operating nuclear power reactors”; 10 CFR 52.80, “Contents of applications; additional technical information”; 10 CFR 52.83, “Finality of referenced NRC approvals; partial initial decision on site suitability”; and 10 CFR 100.21, “Non-seismic siting criteria.”

The applicable regulatory guidance for emergency planning is as follows:

- NUREG-0800 identifies NUREG-0654 and other related guidance that the staff should consider during its review. The related acceptance criteria are identified in NUREG-0800, Section 13.3.II, and the applicable regulatory guidance for reviewing emergency preparedness as an operational program is established in NUREG-0800, Section 13.4. In addition, the staff considered NUREG/CR-7002, “Criteria for Development of Evacuation Time Estimate Studies” (November 2011); NUREG/CR-6863, “Development of Evacuation Time Estimate Studies for Nuclear Power Plants” (January 2005); and Interim Staff Guidance (ISG) NSIR/DPR-ISG-01.⁵
- 44 CFR Part 350, “Review and Approval of State and Local Radiological Emergency Plans and Preparedness,” and 44 CFR Part 352, “Commercial Nuclear Power Plants: Emergency Preparedness Planning,” provide procedures for FEMA’s review and evaluation of the adequacy of offsite radiological emergency planning and preparedness. Pursuant to 44 CFR Part 353, “Memorandum of Understanding between Federal Emergency Management Agency and Nuclear Regulatory Commission Relating to Radiological Emergency Planning and Preparedness,” Appendix A, “Memorandum of Understanding Between Federal Emergency Management Agency and Nuclear Regulatory Commission” (58 FR 47996, September 14, 1993), FEMA provides its findings and determinations on offsite planning and preparedness to the NRC for its use in the licensing process.

13.3.4 Technical Evaluation

The staff reviewed the information in the COLA, including FSAR Section 13.3, “Emergency Planning,” and the COL Plan for conformance with applicable standards and requirements identified in NUREG-0800 Sections 13.3 and 14.3.10. The emergency planning ITAAC for the new reactors are provided below in SER Table 13.3-1, “PTN Units 6 and 7 ITAAC,” which

⁵ NSIR/DPR-ISG-01, Revision 0, “Emergency Planning for Nuclear Power Plants,” November 2011 (ADAMS Accession No. ML113010523), provides updated guidance based on changes to emergency planning regulations in 10 CFR 50.47 and 10 CFR Part 50, Appendix E, that were published as a final rule in the *Federal Register* (FR) on November 23, 2011 (76 FR 72560), and on integrated offsite response organization event response concepts with onsite emergency planning programs.

reflects the EP ITAAC in Part 10 Table 3.8-1, and are supplemented by the EP ITAAC in DCD Tier 1 Table 3.1-1. The EP ITAAC are evaluated below in SER Section 13.3.4.19, and specific EP ITAAC are identified within their respective planning standard.

In addition, the staff reviewed selected portions of the emergency response plans for the State of Florida and Miami-Dade and Monroe Counties for understanding and content, in relation to consistency with various sections of the COL Plan that address offsite support and response. The staff checked the referenced DCD to ensure that the combination of the DCD and the COLA represents the complete scope of information relating to this review topic.⁶ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to emergency planning. The results of the staff's evaluation of the referenced DCD are documented in NUREG-1793 and its supplements.

The staff's and FEMA's technical reviews of the COLA addressed all of the relevant evaluation criteria in the 16 planning standards (i.e., A through P) of NUREG-0654, consistent with NUREG-0800 Section 13.3, which cites the applicable regulations. As stated above, the proposed boundary for the site footprints for Units 6 and 7 is entirely within the existing Turkey Point site exclusion area boundary, so that for purposes of emergency planning, little distinction exists between the Turkey Point site (for existing reactor Units 3 and 4) and the new Units 6 and 7. The COLA takes advantage of the emergency planning resources, capabilities, and organization that currently exist at the Turkey Point site for Units 3 and 4. NUREG-0800 Section 13 Subsection I, "Areas of Review," provides, in part, the following guidance to the staff regarding the appropriate level of review:

In general, if an application is for an additional reactor at an operating reactor site, and the application proposes to incorporate and extend elements of the existing emergency planning program to the new reactor (including by reference), those existing elements should be considered acceptable and adequate. The reviewer will generally focus the review on the extension of the existing program to the new reactor, and will determine whether the incorporated emergency planning program information from the existing reactor site (1) is applicable to the proposed reactor, (2) is up-to-date when the application is submitted, and (3) reflects use of the site for construction of a new reactor (or reactors) and appropriately incorporates the new reactor(s) into the existing plan.

Consistent with this guidance, the staff focused its review on the extension of the existing (Units 3 and 4) site emergency preparedness program to Units 6 and 7, and considered those elements of the existing program that are unchanged in their applicability to Units 6 and 7 as acceptable and adequate.

In COLA Part 1, the applicant incorporated by reference the AP1000 DCD. Section 13.3 of COLA Part 2 further incorporates by reference Tier 2 Section 13.3, "Emergency Planning," of the referenced DCD. COLA Part 5 provides the Plan, which consists of the basic emergency plan, three annexes, and six appendices. The basic plan follows the format of NUREG-0654, and provides detailed information regarding each of the 16 planning standards and associated evaluation criteria in NUREG-0654. The format of the staff's review of the onsite emergency plan (provided below) is patterned after these 16 planning standards, which reflect the requirements in 10 CFR 50.47(b)(1) through (b)(16). Regulations in 10 CFR Part 50,

⁶ See Section 1.2.2 for a discussion on the staff's review related to verification of the scope of information to be included within a COL application that references a design certification (DC).

Appendix E, provide additional requirements that add detail and supplement the evaluation criteria associated with the planning standards. The staff's review of the various aspects of how the application proposes to satisfy 10 CFR Part 50 Appendix E is included within the associated planning standard review. The staff's review and findings apply only to the proposed Units 6 and 7, and any changes to the emergency plan for Units 3 and 4 would be addressed as a separate licensing action, in accordance with 10 CFR 50.54(q).

13.3.4.1 *Assignment of Responsibility (Organization Control)*

As reflected in NUREG-0654 Planning Standard A, "Assignment of Responsibility (Organization Control)," 10 CFR 50.47(b)(1) requires that primary responsibilities for emergency response by the nuclear facility licensee and by State and local organizations within the EPZs have been assigned, the emergency responsibilities of the various supporting organizations have been specifically established, and each principal response organization has staff to respond and to augment its initial response on a continuous basis. In addition, 10 CFR Part 50 Appendix E Section III requires that the emergency plans incorporate information regarding the emergency response roles of supporting organizations and offsite agencies, and that information shall be sufficient to ensure coordination among the supporting groups and with the licensee. Regulations in 10 CFR Part 50 Appendix E Section IV.A require a description of the local offsite services to be provided in support of the licensee's emergency organization; identification of, and a description of the assistance expected from, appropriate local, State, and Federal agencies with responsibilities for coping with emergencies, including hostile action at the site; and identification of the State and local officials responsible for planning for, ordering, and controlling appropriate protective actions, including evacuations when necessary.

In COL Plan Section A, "Assignment of Responsibility," the applicant described the primary responsibilities and organizational control of FPL, Federal, State, county, and other emergency response organizations (EROs) within the 10-mi EPZ and the 50-mi EPZ. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654 Planning Standard A, which provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(1).

COL Plan Section A.1, "Concept of Operations," describes the relationships and concept of operations for the organizations and agencies that are a part of the overall ERO, and identifies the various Federal, State, and county/local government agencies and organizations that are involved in a response to an emergency at Turkey Point. COL Plan Figure A-1 illustrates the agency response organization interrelationships in a block diagram. The National Response Framework (NRF) (73 FR 4887, January 28, 2008) outlines Federal responsibilities during incidents warranting a coordinated Federal response. Within the sphere of the NRF, the NRC provides technical assistance, and acts as a coordinating agency. Section A.1 addresses the primary Federal response for supporting an emergency at Turkey Point, and describes the support and resources for the various agencies. The Department of Homeland Security (DHS) is responsible for the overall coordination of a multi-agency Federal response to a significant radiological incident, and FEMA acts as the lead Federal agency for offsite, nontechnical concerns. Federal agencies are addressed further in COL Plan Section C, and discussed below in SER Section 13.3.4.3.

The State of Florida and Miami-Dade and Monroe Counties have emergency response plans that specify the responsibilities and functions for the major agencies, departments, and key individuals of their emergency response organizations. The State of Florida has the statutory responsibility and authority for responding to emergencies and protecting the health and safety of the public in Florida. The State of Florida Radiological Emergency Preparedness Annex (provided as COL Plan Supplemental Information 6 and 7), which supports the State of Florida Comprehensive Emergency Management Plan, addresses the ability of State and local government to respond to radiological emergencies, and defines responsibilities of State agencies. COL Plan Section A.1 describes the responsibilities of State and local agencies, in the event of a nuclear power plant emergency. The Governor has overall command authority for radiological and nonradiological aspects of a nuclear incident, and will provide for public protection through assignment of appropriate State resources and agencies.

The counties within the 10-mi EPZ include Miami-Dade County and Monroe County. Counties within the 50-mi EPZ include Miami-Dade, Monroe, Broward, and Collier Counties. Miami-Dade and Monroe Counties are responsible for plume exposure risk response, hosting of evacuees, and ingestion pathway protection. Broward and Collier Counties are responsible for ingestion pathway protective measures. The applicant included the plans for the State of Florida and Counties of Miami-Dade and Monroe as COLA supplemental information.

The onsite ERO, directed by the emergency coordinator, provides for control and operation of the plant, mitigation of the emergency condition, protection of plant personnel inside the Protected Area, and emergency support for operations, engineering, maintenance, firefighting, material acquisition, security, and first aid. The offsite ERO, directed by the emergency offsite manager, provides for offsite radiological accident assessment, protection of plant personnel outside the Protected Area, emergency support for acquisition of materials and support of personnel, and interface between Turkey Point personnel and outside organizations responsible for the protection of the public. The Emergency News Center (ENC) organization, directed by the FPL public information officer, coordinates with public information officers from other organizations to provide information to the public through the news media. (The ENC is addressed further in COL Plan Section H.3, and discussed below in SER Section 13.3.4.7.)

At Turkey Point, FPL maintains 24-hour emergency response capability. The normal on-shift complement provides the initial response to an emergency. This group is trained to handle emergency situations (e.g., initiate implementation of the emergency plan, make initial accident assessment, emergency classification, notifications, communications, and protective action recommendations (PARs)) until the augmented ERO arrives. Personnel from the unaffected unit(s) are available and respond when notified. During an emergency condition classified as an Alert, Site Area Emergency, or General Emergency, the plant's augmented ERO is notified and responds to replace the normal plant organization. (Staff augmentation is addressed further in COL Plan Section B, and discussed below in SER Section 13.3.4.2.) The emergency coordinator and recovery manager will assess the emergency situation and expand the ERO, if necessary. The augmented ERO consists of three major response sub-organizations with interrelationships, as illustrated in COL Plan Figure A-2. The recovery manager, located in the EOF, has the authority to request Federal assistance, and the responsibility for assuring continuity of resources (technical, administrative, and material) in the event of ERO activation.

COL Plan Section A.3, "Agreements in Planning Effort," states that written agreements have been developed that establish the concept of operations between the applicant and other support organizations having an emergency response role in support of the COL Plan. These agreements identify the services to be provided, the mutually accepted criteria for

implementation, and the arrangements for exchange of information. COL Plan Appendix 2 provides a list of the 14 letters of agreement, and copies of the letters are included in COLA Supplemental Information 4. In addition, COLA Supplemental Information 3 includes copies of State and county certification letters, which address commitments to continue to support emergency response for the proposed Units 6 and 7 (pursuant to 10 CFR 52.79(a)(22)).

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, the staff finds that the applicant has adequately assigned primary responsibilities for emergency response, and has the staff to respond to and to augment its initial response on a continuous basis. The applicant is capable of providing 24-hour-per-day emergency response and staffing of communications links, including continuous (24-hour) operations for a protracted period. In addition, the applicant has identified the appropriate organizations that are intended to be part of the overall response organization, and has established the emergency responsibilities of the various supporting organizations, including providing adequate written agreements. The applicant has specified the concept of operations and its relationship to the total effort, illustrated the interrelationships in a block diagram, and has identified the individuals in charge of the emergency response and for ensuring continuity of resources.

In addition, the staff finds that the applicant has incorporated information about the emergency response roles of supporting organizations and offsite agencies, and that information is sufficient to ensure coordination among the supporting groups and with the licensee. Furthermore, the applicant has described the local offsite services to be provided in support of the licensee's emergency organization, and has identified the assistance expected from appropriate local, State, and Federal agencies, including State and local officials responsible for planning for, ordering, and controlling appropriate protective actions.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard A. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(1) and 10 CFR Part 50, Appendix E, Sections III and IV.A, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.2 *Onsite Emergency Organization*

As reflected in NUREG-0654 Planning Standard B, "Onsite Emergency Organization," 10 CFR 50.47(b)(2) requires that on-shift facility licensee responsibilities for emergency response are unambiguously defined, adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available, and interfaces among various onsite response activities and offsite support and response activities are specified. In addition, 10 CFR Part 50 Appendix E Section IV.A requires a description of the organization for coping with radiological emergencies, including definition of authorities, responsibilities, and duties of individuals assigned to the licensee's emergency organization, and the means for notification of such individuals in the event of an emergency. This shall include a description of the normal plant operating organization, onsite emergency response organization, headquarters personnel who will

augment the onsite emergency organization, and local offsite services to be provided in support of the licensee's emergency organization. The emergency plan shall identify persons within the licensee organization who will be responsible for making offsite dose projections, and other employees with special qualifications for coping with emergency conditions that may arise. Other persons with special qualifications, who are not licensee employees and who may be called upon for assistance, shall also be identified, including a description of the special qualifications. Regulations in 10 CFR Part 50, Appendix E, Section IV.A.9, require a detailed analysis demonstrating that on-shift personnel assigned emergency plan implementation functions are not assigned responsibilities that would prevent the timely performance of their assigned functions, as specified in the emergency plan.

In COL Plan Section B, "Emergency Response Organization," the applicant described the ERO, its key positions and associated responsibilities, including outlining the staffing requirements that provide initial emergency response actions and provisions for timely augmentation of on-shift personnel when required. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard B, "Onsite Emergency Organization." Planning Standard B provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(2).

The normal plant personnel complement is established with the Site Vice President having overall authority for plant operations. The Site Vice President directs the site organization in the management of the various departments, while the shift manager retains the responsibility for actual operation of plant systems. The plant has personnel on-shift at all times that can provide an initial response to an emergency event. In Part 5 of the COLA, Annex 2 and Annex 3, Table 2-1, "Turkey Point Emergency Response Organization On-Shift Staffing," and Table B-1a, "Shift Emergency Response Organization" outline the unit on-shift ERO and its relation to the normal staff complement. On-shift staffing will be augmented with additional ERO personnel at an Alert (and higher) emergency classification or earlier, as deemed necessary.

Section 2.3, "Shift Emergency Response Positional Responsibilities," states that the affected unit's on-shift personnel may be augmented by personnel from the other site units, and that these additional personnel will provide the needed resources to enhance the response to the event until the on-call ERO personnel respond and are ready to activate the emergency response facilities. Those individuals identified to augment the on-shift personnel within 60 minutes are part of the on-call ERO. Personnel from corporate management, administrative and technical support personnel may be used at the EOF and ENC to augment plant staff and possibly interface with governmental authorities.

COL Plan Section B.1, "On-Shift Emergency Response Organization Assignments," includes a list of on-shift personnel with emergency responsibilities. The shift manager (from the affected unit) has the responsibility and authority to declare an emergency, and then becomes the emergency coordinator. In that role, the emergency coordinator will initiate the appropriate immediate actions in accordance with written procedure, mitigate the consequences of the emergency, and activate the ERO and notify offsite agencies (as appropriate). The line of succession in the Control Room for the emergency coordinator is the shift manager, unit supervisor, and then any other member of the plant staff with an active SRO license. In the event there is a simultaneous emergency condition affecting multiple units, or the site is in an

emergency because of natural phenomena or a security event, the Unit 3 shift manager will typically be designated as the emergency coordinator.

The shift manager, acting as emergency coordinator is responsible for direction and control of the emergency until relieved by another qualified emergency coordinator in the TSC. Upon relieving the shift manager, the emergency coordinator (TSC) is responsible for continued assessment of the severity of the emergency, and for coordinating and directing the combined activities of personnel in the Control Room, TSC, OSC, elsewhere on owner-controlled property and field team monitoring activities. When the EOF is declared operational, overall direction and control of the emergency response is transferred to the recovery manager in the EOF. The emergency coordinator (TSC) maintains responsibility for onsite direction and control for the duration of the event. Prior to transfer of command and control and emergency response functions to the TSC and EOF, various listed conditions must be met.

The emergency coordinator has the responsibility and authority to initiate emergency actions necessary to protect the life, health, and safety of both the plant staff and affected public. The responsibilities include classifying the emergency; authorizing notifications to the State, counties, and the NRC; issuing PARs; authorizing emergency exposure limits; authorizing the distribution and use of potassium iodide (KI); mobilizing the ERO and initiating activation of emergency response facilities; directing onsite emergency response activities; and implementing severe accident management guidelines. Emergency coordinator responsibilities that may not be delegated to other elements of the emergency organization include event classification, notification of offsite authorities, and providing Protective actions recommendations for the general public. Upon activation of the EOF, the responsibilities of notification of offsite authorities and issuance of PARs are transferred to the recovery manager. COLA, Part 5, Appendix 3, "Procedure Cross-Reference to the Emergency Plan," lists an emergency plan implementing procedure (EPIP) titled "Protective Action Recommendations."

In view of the foregoing, the staff finds that the applicant has adequately designated an individual as the emergency coordinator who has the authority and responsibility to initiate emergency actions, including recommending protective actions to the authorities responsible for implementing offsite emergency measures. The staff also finds that the applicant has clearly specified which responsibilities may not be delegated to other elements of the emergency organization, and has identified an adequate line of succession for the emergency coordinator position.

The overall ERO is made up of three sub-organizations (i.e., onsite ERO, offsite ERO, and ENC), and is illustrated in COL Plan Figures B-1a through B-1d. COL Plan Section B.5, "Emergency Response Organization Positional Responsibilities," identifies the specific emergency response positions (by title), including the major tasks (responsibilities) to be performed for each position. Table 2-1 and Table B-1a (located in each unit annex) and COL Plan Table B-1b, "Staffing Requirements for the Turkey Point Plant Emergency Response Organization," list key ERO positions and the supporting positions assigned to interface with Federal, State, and county authorities. Table 2-1 and Table B-1a outline ERO positions required to meet minimum staffing and describe full augmentation of the on-shift complement at an Alert (or higher) classification, including major tasks assigned to each position. The full augmentation staffing levels are used as a planning basis to cover a wide range of possible events. For extended events (i.e., those that are expected to continue for more than 24 hours), actual staffing will be established by the emergency coordinator based on the event and personnel availability. Reduced staffing will only occur after discussion with the recovery manager concerning the impact on plant operations and emergency response.

COL Plan Section A.1 describes the relationships and the concept of operations for the organizations and agencies that are a part of the overall emergency response organization, and the interfaces are shown in COL Plan Figure A-1, "Agency Response Organization Interrelationships." COL Plan Figure A-2, "Turkey Point Plant Augmented Emergency Response Organization Interrelationships," illustrates the interface between the OSC, TSC, and Control Room with the EOF, field monitoring teams, and the ENC. Collectively, the figures in COL Plan Sections A and B illustrate (in block diagrams) the interfaces between and among the onsite functional areas of emergency response, licensee headquarters support, local services support, and State and local government response organizations.

The staff reviewed Tables 2-1, "Turkey Point Unit Emergency Response Organization On-Shift Staffing," B-1a, "Unit Shift Emergency Response Organization," and B-1b, "Staff Requirements for the Turkey Point Plant Emergency Response Organization," which are based on the guidance in NUREG-0654, Table B-1, "Minimum Staffing Requirements for NRC Licensees for Nuclear Power Plant Emergencies," and finds that the required minimum on-shift and augmentation staffing in support of the new plants is acceptable because it is consistent with NUREG-0654, Table B-1.

Fukushima Dai-ichi—NTTF Recommendation 9.3

On March 12, 2012, the NRC requested additional information from all power reactor licensees and holders of construction permits, associated with the NRC Near-Term Task Force (NTTF) review of the accident at the Fukushima Dai-ichi nuclear facility (ADAMS Accession No. ML12053A340). In Recommendation 9.3, the NTTF addressed staffing and communications provisions for enhancing emergency preparedness. On January 23, 2013, the NRC issued a follow-up letter (ADAMS Accession No. ML13010A162),⁷ which identified eight generic technical issues that need to be addressed as part of the Recommendation 9.3 communications capability assessment.⁸

With regard to staffing, the accident at Fukushima highlighted the need to determine and implement the required staff to fill all necessary positions responding to a multi-unit event. Specifically, the March 12, 2012, letter requests that all power reactor licensees and holders of construction permits (in active or deferred status) assess their current staffing levels and determine the appropriate staff to fill all necessary positions for responding to a multi-unit event during a beyond design basis natural event, and determine if any enhancements are appropriate. Single unit sites should provide the requested information, as it pertains to an extended loss of all ac (alternating current) power and impeded access to the site. Emergency communications are addressed below in License Condition (13-4) and SER Section 13.3.4.6. (See also, STD COL 13.3-2 in SER Section 13.3.4.18, with regard to EOF staffing and communications.)

In RAI 6434, Question 01.05-4, May 1, 2012 (ADAMS Accession No. ML12122A973), the staff requested additional information from the applicant, regarding how FPL plans to address the various NRC-approved actions related to the Fukushima Dai-ichi accident in the Turkey Point

⁷ See also, NRC document package at ADAMS Accession No. ML13016A111.

⁸ For Turkey Point, Units 3 and 4, FPL responded to NRC's March 12, 2012, letter on (1) May 10, 2012, FPL Letter No. L-2012-208 (ADAMS Accession No. ML12144A158), and (2) October 25, 2012, FPL Letter No. L-2012-388 (ADAMS Accession No. ML12300A425). FPL responded to NRC's January 23, 2013, letter on February 15, 2013, FPL Letter No. L-2013-060 (ADAMS Accession No. ML13064A359).

Units 6 and 7 COLA. In a June 29, 2012, response to RAI 6434, Question 01.05-4 (ADAMS Accession No. ML121850685), the applicant proposed License Condition 12.C, "Fukushima Actions—Emergency Planning Actions," which addresses both the staffing and communications areas addressed in NTTF Recommendation 9.3. FPL added this license condition to Part 10 of COLA Revision 4.

The staff reviewed proposed License Condition 12.C, and, with the exception of the timeframes for completion and submission of the staffing and communications capability assessments, finds that it is acceptable because it is consistent with NTTF Recommendation 9.3 and reflects the use of NEI technical report NEI 12-01, which the NRC has endorsed as an acceptable method for licensees to employ when addressing NTTF Recommendation 9.3.⁹ However, the staff identified a possible (optional) change in License Condition 12.C that the applicant could make, with regard to the 2-year timeframe for revising the emergency plan to reflect the staffing assessment results. Specifically, the timeframe could be changed from 2 years to 180 days, in order to be consistent with the 180-day timeframe for implementation of corrective actions identified in the communications capability assessment, including revisions to the emergency plan (which is also included in License Condition 12.C).

On September 24, 2014, the staff discussed making this license condition change with the applicant. Subsequently, the applicant informed the staff that this optional change would not be made, and the proposed License Condition 12.C retained the 2-year timeframe in COLA Revision 6. Despite the applicant's preference to retain the 2-year timeframe, the staff believes that the change from 2 years to 180 days in its proposed License Condition (13-3) (below) is necessary and appropriate (see 10 CFR 52.97(c)) for the following reasons:

- (1) There is no regulatory basis for requiring a 2-year timeframe.
- (2) More time will be allowed for the licensee to revise the emergency plan, thus providing additional flexibility.
- (3) Irrespective of a 180-day timeframe, the licensee may still revise the emergency plan 2 years prior to initial fuel load, if so desired.
- (4) The change will provide consistency with the 180-day emergency plan changes required as a result of corrective actions identified in the communications capability assessment (also included in License Condition 12.C).
- (5) The change will support the staff's objective of consistency for this NTTF Recommendation 9.3-related license condition, since it is a common license condition for all other (prior and ongoing) COLA reviews.

The staff also proposes an 18-month timeframe for completion of the staffing and communications capability assessments, which is based on the latest date set forth in the schedule for completing the inspections, tests, and analyses in the ITAAC submitted in

⁹ See (1) NRC May 15, 2012, letter, "U.S. Nuclear Regulatory Commission Review of NEI 12-01, 'Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities,' Revision 0, dated May 2012" (ADAMS Accession No. ML12131A043), (2) NEI May 3, 2012, letter, "Transmittal of NEI 12-01, 'Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities,' Revision 0, dated May 2012" (ADAMS Accession No. ML12125A411), and (3) NEI Report No. 12-01, Revision 0, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," May 2012 (ADAMS Accession No. ML12125A412).

accordance with 10 CFR 52.99(a). In addition, the staff proposes a common 180-day timeframe for submission of the assessments to the NRC, which is based on the date scheduled for initial fuel load set forth in the notification submitted in accordance with 10 CFR 52.103(a). Therefore, with these staff-proposed license condition changes, the staff considers RAI 6434, Question 01.05-4, resolved, with regard to emergency planning.

Consistent with the applicant's proposed License Condition 12.C, and staff-proposed license condition changes (discussed above), the staff identified License Condition (13-3) and License Condition (13-4), which address enhanced staffing and communications capabilities, respectively, and include the staff's proposed timeframes for completion of the assessments and their submission to the NRC. License Condition (13-4) is addressed further in SER Section 13.3.4.6, with regard to communications.

License Condition (13-3)

No later than eighteen (18) months before the latest date set forth in the schedule submitted in accordance with 10 CFR 52.99(a) for completing the inspections, tests, and analyses in the ITAAC, Florida Power & Light Company shall have performed an assessment of the on-site and augmented staffing capability for response to a multi-unit event. The staffing assessment shall be performed in accordance with NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," Revision 0.

No later than one hundred eighty (180) days before the date scheduled for initial fuel load, as set forth in the notification submitted in accordance with 10 CFR 52.103(a), Florida Power & Light Company shall revise the Emergency Plan to include the following:

- (a) Incorporation of corrective actions identified in the staffing assessment required by this license condition; and
- (b) Identification of how the augmented staff will be notified, given degraded communications capabilities.

License Condition (13-4)

No later than eighteen (18) months before the latest date set forth in the schedule submitted in accordance with 10 CFR 52.99(a) for completing the inspections, tests, and analyses in the ITAAC, Florida Power & Light Company shall have performed an assessment of on-site and off-site communications systems and equipment relied upon during an emergency event to ensure communications capabilities can be maintained during an extended loss of alternating current power. The communications capability assessment shall be performed in accordance with NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," Revision 0.

No later than one hundred eighty (180) days before the date scheduled for initial fuel load set forth in the notification submitted in accordance with 10 CFR 52.103(a), Florida Power & Light Company shall have completed

implementation of corrective actions identified in the communications capability assessment, including revisions to the Emergency Plan.

Enhancements to Emergency Preparedness Regulations

In addition to appropriate staffing levels associated with multi-unit events (discussed above), on November 23, 2011, the NRC published a Final Rule, titled “Enhancements to Emergency Preparedness Regulations” (76 FR 72560) (hereinafter referred to as “Final Rule”), which included a new requirement in 10 CFR Part 50, Appendix E, Section IV.A, associated with on-shift ERO personnel. Specifically, Section IV.A.9 requires—by December 24, 2012, for nuclear power reactor licensees—a detailed analysis demonstrating that on-shift personnel assigned emergency plan implementation functions are not assigned responsibilities that would prevent the timely performance of their assigned functions, as specified in the emergency plan.

In Enclosure 1, “Summary of COL Application Revision 4 Changes,” of its December 14, 2012, submittal letter for COLA Revision 4 (ADAMS Accession No. ML123660081), FPL stated that the updates to COLA Part 5 (Emergency Plan) include information and changes that address the recent NRC emergency planning rule change (i.e., Final Rule). In COL Plan Section B, the applicant discussed on-shift staffing, including augmented staffing with additional ERO personnel (at an Alert or higher classification, or earlier if deemed necessary). The applicant did not, however, provide a detailed on-shift staffing analysis that addresses the new Final Rule requirements. COL Plan Section B does state that shift personnel have the capability at all times to perform detection, mitigation, classification, and notification functions required in the early phases of an emergency. In addition, shift augmentation and further ERO involvement will be determined by the extent and magnitude of the event. Furthermore, when plant conditions warrant entry into the Severe Accident Management Guidelines (SAMG), the on-shift crew assumes the duties and responsibilities for mitigating actions in accordance with the SAMG.

As part of the issuance of the Final Rule, NRC issued associated guidance in Interim Staff Guidance NSIR/DPR-ISG-01. In Section IV.C, “On-Shift Staffing Analysis,” of NSIR/DPR-ISG-01, NRC endorsed NEI Technical Report NEI 10-05, “Assessment of On-Shift Emergency Response Organization Staffing and Capabilities,” Revision 0, dated June 2011 (ADAMS Accession No. ML111751698)—stating in part that NEI 10-05 establishes a standard methodology for a licensee to perform the required staffing analysis (in 10 CFR Part 50, Appendix E, Section IV.A.9), and that the NRC has reviewed NEI 10-05 and found it to be an acceptable methodology for this purpose.

In COLA Part 10, the applicant proposed License Condition 11.B, which addresses the requirements in 10 CFR Part 50, Appendix E, Section IV.A.9 for a detailed on-shift staffing analysis associated with the emergency plan. The staff reviewed License Condition 11.B, and, with the exception of the timeframe for submission of the on-shift staffing analysis and changes to the emergency plan, finds that it is acceptable because it is consistent with the Final Rule and NSIR/DPR-ISG-01.

The staff proposes a similar timeframe for submission of the on-shift staffing analysis to the NRC, which is based on the date scheduled for initial fuel load set forth in the notification submitted in accordance with 10 CFR 52.103(a). Therefore, consistent with the applicant’s proposed License Condition 11.B, the staff identified the following License Condition (13-5), which addresses an analysis of on-shift personnel assigned emergency plan implementation functions, and includes the staff’s proposed timeframe for submission of the on-shift staffing analysis to the NRC. This license condition is written to be consistent with License Condition

(13-3) (above), including an 18-month timeframe for completion of the staffing assessment for multi-unit events.¹⁰

License Condition (13-5)

No later than eighteen (18) months before the latest date set forth in the schedule submitted in accordance with 10 CFR 52.99(a) for completing the inspections, tests, and analyses in the ITAAC, Florida Power & Light Company shall have performed a detailed staffing analysis, in accordance with NEI 10-05, "Assessment of On-Shift Emergency Response Organization Staffing and Capabilities," Revision 0.

No later than one hundred eighty (180) days before the date scheduled for initial fuel load set forth in the notification submitted in accordance with 10 CFR 52.103(a), Florida Power & Light Company shall have revised the Emergency Plan to incorporate any changes identified in the staffing analysis that are needed to bring staffing to the required levels.

COL Plan Section B.7, "Industry/Private Support Organizations," states that Turkey Point retains contractors to provide supporting services, and uses a contract/purchase order in lieu of an agreement letter. Agency, contractor, and private organizations who may be requested to provide technical assistance to, and augmentation of the emergency organization include the Institute of Nuclear Power Operations (INPO), Electric Power Research Institute (EPRI), NEI, American Nuclear Insurers (ANI), Department of Energy (DOE) Radiation Emergency Assistance Center/Training Site (REAC/TS), Bechtel Power Corporation, URS Washington Division, and AREVA. (REAC/TS is addressed in COL Plan Section L.3, "Medical Service Facilities," and discussed below in SER Section 13.3.4.12.)

Agreements are maintained with outside support agencies that provide assistance when called on during an emergency or during the recovery phase, which identify emergency measures to be provided, the mutually accepted criteria for implementation, and the arrangements for exchange of information. These support agencies (listed in Appendix 2) provide services of law enforcement, fire protection, ambulance services, and medical and hospital support services. (Support groups providing transportation and treatment of injured plant personnel are described in COL Plan Section L, and addressed below in SER Section 13.3.4.12.) COLA Supplemental Information 4 includes copies of the signed letters of agreement with agencies and organizations, which describe the scope of services to be provided, types of resources available, and points of contact.

In view of the above, and subject to License Condition (13-3) and License Condition (13-5), the staff finds that the applicant has unambiguously defined its responsibilities for emergency response, has adequate staffing to provide and maintain at all times initial facility accident response in key functional areas, and is capable of timely augmentation of the response capabilities. In addition, the applicant has adequately specified the interfaces among various onsite and offsite support and response activities. In addition, the applicant has described the organization for coping with radiological emergencies, including the authorities, responsibilities, and duties of individuals assigned to the licensee's emergency organization, and the means for

¹⁰ FPL Letter No. L-2012-208 (May 10, 2012) discusses the approach taken by FPL for Turkey Point, Units 3 and 4 to address staffing associated with the NTTF recommendations and emergency planning program enhancements in the NRC's November 23, 2011, Final Rule.

their notification in the event of an emergency. The applicant has also described the normal plant operating organization, the onsite ERO, and headquarters and local offsite personnel and services that will augment and support the onsite organization. Furthermore, licensee employees who are responsible for making offsite dose projections, and licensee and other persons with special qualifications for coping with emergency conditions, are also identified. A detailed analysis of on-shift staffing personnel responsibilities is addressed in License Condition (13-5). Communications capabilities addressed in NTTF Recommendation 9.3, associated with License Condition (13-4), are discussed further in SER Section 13.3.4.6.

Conclusion

Subject to License Condition (13-3) and License Condition (13-5), the staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard B. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(2) and 10 CFR Part 50, Appendix E, Section IV.A, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.3 *Emergency Response Support and Resources*

As reflected in NUREG-0654, Planning Standard C, “Emergency Response Support and Resources,” 10 CFR 50.47(b)(3) requires that arrangements for requesting and effectively using assistance resources have been made, arrangements to accommodate State and local staff at the licensee EOF have been made, and other organizations capable of augmenting the planned response have been identified. In addition, 10 CFR Part 50, Appendix E, Section III requires that the emergency plans incorporate information about the emergency response roles of supporting organizations and offsite agencies, and that information shall be sufficient to ensure coordination among the supporting groups and with the licensee. Regulations in 10 CFR Part 50, Appendix E, Section IV.A.7, require identification of, and a description of the assistance expected from, appropriate local, State, and Federal agencies with responsibilities for coping with emergencies, including hostile action at the site.

In COL Plan Section C, “Emergency Response Support and Resources,” the applicant described the provisions for requesting and effectively using support resources and for accommodating offsite officials at the emergency response facilities. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff’s primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard C, “Emergency Response Support and Resources.” Planning Standard C provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(3).

COL Plan Section C.1, “Federal Response Support and Resources,” states that during an emergency, Federal agencies provide assistance through the National Response Framework. The NRC is the lead Federal agency that provides direct assistance to Turkey Point, with other Federal agencies—such as the Department of Homeland Security (DHS) and Department of Energy (DOE)—providing assistance to the State of Florida through implementation of the NRF. COL Plan Sections A and B identify the specific individuals by title who are authorized to request Federal assistance. COL Plan Section A.4 states that the recovery manager in the EOF has the authority to request Federal assistance, and COL Plan Section B.4 states that the

emergency coordinator has the responsibility and authority to initiate emergency actions necessary to protect the life, health, and safety of plant staff and the affected public.

COL Plan Section A identifies Federal agencies that may provide assistance to Turkey Point. NRC personnel are expected to arrive at the site within 6 hours after declaration of a Site Area Emergency or General Emergency, and FEMA may send a representative for near-site coordination. COL Plan Section A describes the various supporting organizations, and includes the roles of the NRC, DHS, DOE, Environmental Protection Agency (EPA), Federal Bureau of Investigation, National Weather Service (NWS), and U.S. Coast Guard. FPL has reserved space for Federal and State agency personnel in the emergency response facilities, which have equipment and communications capability necessary for a continuous high level of response, interaction, and communication among key personnel during emergency conditions. The NRC, FEMA, State of Florida, and Miami-Dade and Monroe Counties may dispatch representatives to the EOF, where accommodations have been provided. At the Alert level and above, Turkey Point personnel are assigned as liaisons to the State of Florida and Miami-Dade and Monroe County emergency operations centers (EOCs) when they are activated. These representatives act as technical liaisons to interpret EALs, explain accident conditions, and provide technical information regarding the affected unit's actions by the plant's ERO.

COL Plan Section C.3, "Radiological Laboratories," states that radiation monitoring and analysis is provided by an onsite laboratory, which is the central point of receipt and analysis for all onsite samples, and includes equipment for chemical and radiological analyses. Additional laboratory facilities that can provide support include the Radiation Protection counting room facilities, St. Lucie Plant radiological facilities, and the State of Florida Mobile Emergency Radiological Laboratory, which can be in position near the site within approximately 6 to 8 hours of notification. A State of Florida Department of Health (DOH) Bureau of Radiation Control (BRC) representative dispatched to the EOF will coordinate all State offsite field monitoring data and sample media.

Through INPO, other utilities with operating nuclear facilities are available to provide certain types of assistance and support, including technicians, engineering, design, consultation, whole body counting, and dosimetry evaluation and equipment. Additional facilities, organizations, and individuals—listed in the Emergency Response Directory (see COL Plan Appendix 3)—are available and may be used in support of emergency response. In addition, American Nuclear Insurers provides insurance to cover FPL's legal liability up to the limits imposed by the Price-Anderson Act, for bodily injury or property damage caused by the nuclear energy hazard resulting from an incident at the plant. COL Plan Section B.7 describes assistance available through INPO, EPRI, NEI, ANI, DOE, Bechtel Power Corporation, URS Washington Division, and AREVA. Written agreement (listed in COL Plan Appendix 2) that describe the level of assistance and resources provided to FPL by external sources are included in COLA Supplemental Information 4.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, the staff finds that the applicant has made arrangements for requesting and effectively using assistance resources, including arrangements to accommodate State and local staff at the EOF, and has identified other organizations capable of augmenting the planned response. In addition, the applicant has made adequate provisions for incorporating the Federal response capability into its operation plan, and has identified radiological laboratories and other

organizations that can be relied on in an emergency to provide assistance. The staff also finds that the emergency plans incorporate information about the emergency response roles of supporting organizations and offsite agencies, and that the information is sufficient to ensure coordination among the supporting groups and the licensee. Finally, the applicant has identified appropriate State, local, and Federal agencies with responsibilities for coping with emergencies, including the expected assistance from each.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard C. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(3) and 10 CFR Part 50, Appendix E, Sections III and IV.A.7, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.4 *Emergency Classification System*

As reflected in NUREG-0654, Planning Standard D, "Emergency Classification System," 10 CFR 50.47(b)(4) requires that a standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and that State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures. In addition, 10 CFR Part 50, Appendix E, Section IV.B, requires a description of the means to be used for determining the magnitude, and for continually assessing the impact, of the release of radioactive materials, including emergency action levels (EALs) that are to be used as criteria for determining the need for offsite agency notifications and participation, and when and what types of protective measures should be considered. The EALs must include hostile actions that may adversely affect the nuclear power plant. The initial EALs shall be discussed and agreed on by the applicant or licensee and State and local governmental authorities, and approved by the NRC. Thereafter, EALs shall be reviewed with State and local governmental authorities on an annual basis. Regulations in 10 CFR Part 50, Appendix E, Section IV.C, require a description of EALs and emergency conditions that involve alerting or activating the total emergency organization, including communication steps to be taken under each emergency class. The emergency classes defined shall include (1) notification of unusual event, (2) alert, (3) site area emergency, and (4) general emergency. Regulations in 10 CFR Part 50, Appendix E, Section IV.C.2, require the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an EAL has been exceeded, and to promptly declare the emergency conditions as soon as possible following identification of the appropriate emergency classification level.

In COL Plan Section D, "Emergency Classification System," the applicant described the classification and EAL scheme used to determine the minimum response to an abnormal event at the plant. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard D, "Emergency Classification System." Planning Standard D provides detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(4).

The classification and EAL scheme is based on plant systems, effluent parameters, and operating procedures for each unit. The emergency plan provides for classification of emergencies into four categories or conditions, covering the postulated spectrum of emergency situations. COL Plan Appendix 3 lists an EPIP titled "Emergency Classification." ITAAC 9.1 addresses the licensee's submission to the NRC of detailed EIPs for the onsite emergency plan no less than 180 days before fuel load. Submission of EIPs is also addressed in STD SUP 13.3-1, and discussed below in SER Section 13.3.4.19. In addition, the adequacy of the procedures will be demonstrated through a review of their use during an exercise pursuant to ITAAC 8.1.1 and ITAAC 8.1.2.

Each emergency classification is characterized by EALs (or event initiating conditions) and addresses emergencies of increasing severity, including security threats to facility protection or a security event that results from intentional malicious dedicated efforts of hostile action. Security-based emergency classification levels and EALs are also addressed in NRC Bulletin 2005-02 (BL 2005-02), "Emergency Preparedness and Response Actions for Security-Based Events," July 18, 2005 (ADAMS Accession No. ML051740058). (See also, SER Section 13.3.4.10, which addresses other areas of concern in BL 2005-02, and the protective actions that the applicant would take in response to a hostile action event.)

An initiating condition is one of a predetermined subset of unit conditions where either the potential exists for a radiological emergency, or such an emergency has occurred. An emergency is classified after assessing abnormal plant conditions and comparing them to EAL threshold values for the appropriate initiating condition. EAL matrix tables, organized by recognition categories, are used to facilitate the comparison. ITAAC 1.1.1 and ITAAC 1.1.2 address the ability of the main control room, TSC, and EOF to retrieve and display the facility system and effluent parameters specified in the emergency classification and EAL technical basis document.

In RAI 5681, Question 13.03-6, August 15, 2011 (ADAMS Accession No. ML11227A063), the staff requested additional information from the applicant, regarding two staff-identified options associated with submission of an EAL scheme in support of the COLA for Units 6 and 7. The staff asked the applicant to identify its preferred option and to provide the required EAL information in support of this option. Option 1 was the submission of an entire EAL scheme, which includes all site-specific information. Option 2 had four parts No. ML092030210), to develop the remainder of the EAL scheme, (critical elements) that address (1) the submission of an overview of the EAL scheme, (2) use of NEI technical report NEI 07-01, , (3) the proposal of a license condition that addresses EAL completion and submission to the NRC, and (4) how the EALs are maintained and controlled.

In a September 14, 2011, response to RAI 5681, Question 13.03-6 (ADAMS Accession No. ML11259A053), the applicant committed to Option 2, addressed the associated four critical elements, and proposed associated conforming revisions to COLA Part 5 and Part 10. The applicant stated that the remainder of the EAL scheme will be developed using NEI 07-01 and proposed a license condition, which addresses completion of plant-specific EALs and submission to the NRC. In addition, the applicant proposed to maintain the EALs in a document that is controlled by the 10 CFR 50.54(q) change process (e.g., in the emergency plan or EIPs). The applicant's response to Option 2 is reflected in Attachment 1, "Emergency Action Levels," to COL Plan Annex 2 and Annex 3. In addition, in COLA Part 10, the applicant proposed License Condition 11.A, which addresses the submission of EALs in accordance with NEI 07-01. Furthermore, in COL Plan Section D.1, "Emergency Classification System," the applicant provided an overview of the EAL scheme, including a definition of the four emergency

classification levels (i.e., Unusual Event, Alert, Site Area Emergency, and General Emergency) and a general list of licensee actions for each level. Required actions for each classification include 15-minute notification of the State and counties, and PARs (if appropriate).

The staff reviewed the applicant's response to RAI 5681, Question 13.03-6, including COLA revisions and proposed License Condition 11.A, and finds that it is acceptable because it adequately addresses the four critical elements of Option 2 (identified above). Therefore, the staff considers RAI 5681, Question 13.03-6, resolved. In addition, the staff finds that proposed License Condition 11.A is acceptable, with the exception of the timeframe for submission of the EALs, because it uses NEI 07-01, Revision 0, to develop the remainder of the EAL scheme. The staff proposes a similar timeframe for submission of the EALs to the NRC, which is based on the date scheduled for initial fuel load set forth in the notification submitted in accordance with 10 CFR 52.103(a). Therefore, consistent with the applicant's proposed License Condition 11.A, the staff identified the following License Condition (13-6), which includes the staff's proposed timeframe for submission of the EALs to the NRC.

License Condition (13-6)

No later than one hundred eighty (180) days before the date scheduled for initial fuel load set forth in the notification submitted in accordance with 10 CFR 52.103(a), Florida Power & Light Company shall submit to the Director of NRO, or the Director's designee, in writing, a fully developed set of plant-specific emergency action levels (EALs), in accordance with NEI 07-01, "Methodology for Development of Emergency Action Levels—Advanced Passive Light Water Reactors," Revision 0, with no deviations. The EALs shall have been discussed and agreed upon with State and local officials.

In COL Plan Section D, the applicant also stated that the initial response of Federal, State, and county agencies depends on information provided by the ERO, and that emergency preparedness staff works closely with the State of Florida and county agencies to ensure consistency in classification schemes and procedural interfaces. In addition, the content of the EALs is reviewed with the State and county authorities on an annual basis, and the State and counties are informed regarding any EAL changes that significantly impact the initiating conditions or technical basis. In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, and subject to License Condition (13-6), the staff finds that the applicant has established a standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, which includes the four emergency classes identified above. The applicant has described EALs and emergency conditions that involve ERO activation, including steps to be taken under each emergency class. The applicant also has described the means to determine the magnitude of, and for continually assessing the impact of, the release of radioactive materials, and EALs (including hostile actions) that are used to determine the need for offsite notifications and protective measures. In addition, the applicant has the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an EAL has been exceeded, and to promptly declare the emergency condition.

In addition, the State and local response plans call for reliance on information provided by the applicant for determination of minimum initial offsite response measures. Under the license

condition identified above, the initial EALs will be discussed and agreed upon with State and local officials, and the fully developed EALs will be submitted to the NRC for confirmation no later than 180 days prior to initial fuel load. Thereafter, the EALs will be reviewed with State and local governmental authorities on an annual basis.

Conclusion

Subject to License Condition (13-6), the staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard D. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(4) and 10 CFR Part 50, Appendix E, Sections IV.B and IV.C, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.5 *Notification Methods and Procedures*

As reflected in NUREG-0654, Planning Standard E, "Notification Methods and Procedures," 10 CFR 50.47(b)(5) requires that procedures have been established for notification, by the licensee, of State and local response organizations and for notification of emergency personnel by all organizations; the content of initial and follow-up messages to response organizations and the public has been established; and means to provide early notification and clear instruction to the populace within the 16-km (10-mi) plume exposure pathway EPZ have been established. In addition, 10 CFR Part 50, Appendix E, Section IV.A.4, requires a description of how offsite dose projections will be made and the results transmitted to State and local authorities, NRC, and other appropriate governmental entities. Regulations in 10 CFR Part 50, Appendix E, Section IV.C, require a description of EALs and emergency conditions that involve alerting or activating the emergency organization, including communication steps to be taken under each class of emergency, and the existence of a message authentication scheme. Regulations in 10 CFR Part 50, Appendix E, Section IV.D.1, require a description of administrative and physical means for notifying local, State and Federal officials and agencies and agreements reached with these officials and agencies for the prompt notification of the public and for public evacuation or other protective measures. The description shall include identification of the appropriate officials, by title and agency, of the State and local government agencies within the EPZs. Regulations in 10 CFR Part 50, Appendix E, Section IV.D.3, require the licensee to have the capability to notify responsible State and local governmental agencies within 15 minutes after declaring an emergency. The licensee shall demonstrate that appropriate governmental authorities have the capability to make a public alerting and notification decision promptly on being informed by the licensee of an emergency condition, and that administrative and physical means have been established for alerting and providing prompt instructions to the public within the plume exposure pathway EPZ. The alerting and notification capability shall include a backup method. Finally, 10 CFR 50.72(a)(3) requires NRC notification no later than one hour after declaring an emergency.

In COL Plan Section E, "Notification Methods and Procedures," the applicant described notification of ERO personnel; State, county, and Federal agencies; and the general public during a declared emergency at Turkey Point. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard E, "Notification Methods and Procedures." Planning Standard E provides the detailed evaluation

criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(5).

COL Plan Section E.1, "Bases for Emergency Response Organization Notification," states that FPL, in cooperation with State and county authorities, has established mutually agreeable methods and procedures for notification of offsite response organizations, consistent with the emergency classification and action level scheme. (The emergency classification system is addressed in COL Plan Section D, and discussed above in SER Section 13.3.4.4.) Notifications to offsite agencies includes a means of verification or authentication, such as the use of dedicated communications networks, verification code words, or providing call-back verification telephone numbers.

If an emergency classification involves all units (i.e., Units 3, 4, 6, and 7) (i.e., for a natural phenomenon emergency or security-related event), and the classification for each unit is the same, the emergency shall be reported as affecting all units at the site. Unit 3 is typically designated as the lead unit for site-wide emergencies that include offsite notifications, unless conditions warrant otherwise. When an event affecting the site is detected, Unit 3 personnel will be contacted and provided information for emergency declaration. If an emergency classification involves only one unit, personnel at the affected unit will declare the emergency and initiate required notifications.

COL Plan Section E.2, "Notification and Mobilization of Emergency Response Personnel," states that EPIPs are established for notification and mobilization of emergency response personnel, and COL Plan Appendix 3 lists an EPIP titled Notifications/Communications. Details regarding notification responsibilities, communications systems, information required to be transmitted to offsite agencies, and notification techniques are specifically described in appropriate EPIPs. (Notification of onsite personnel is addressed in COL Plan Section J.1, and discussed below in SER Section 13.3.4.10.)

After these EPIPs, State and county agencies can be notified of an emergency event within 15 minutes of the initial emergency classification using a dedicated notification system. The emergency warning points are notified using a dedicated notification system, and personnel receiving the information are designated by the State and county agencies. Commercial telephone lines, satellite telephone (i.e., Emergency Satellite Communications System (EMNET)), cellular telephones, or radios are available as backup notification methods. In addition, the State of Florida is responsible for notifying government agencies that are within the 50-mi ingestion pathway EPZ. ITAAC 2.1 tests the capability to notify State and local authorities within 15 minutes after the declaration of an emergency in the main control room and the EOF. State and county authorities are responsible for notifying the general public.

An event will be reported to the NRC Operations Center immediately after notification of the appropriate State and county agencies, but not later than one hour after the time of initial classification, escalation, or event termination. The primary means of notification between the plant and the NRC is a dedicated system called the Emergency Notification System (ENS). The ENS is also addressed in PTN COL 9.5-9. Commercial telephone lines, cellular telephones, and EMNET are available as a backup notification method. The ERDS, which is a computerized data link to the NRC, will be initiated within one hour of the declaration of an Alert classification or higher.¹¹ The ERDS supplements the ENS, and an ERDS implementation

¹¹ See 10 CFR 50.72(a)(4), which states, in part, that the licensee shall activate ERDS as soon as possible, but not later than one hour, after declaring an emergency class of Alert or greater.

program plan is addressed in the applicant's proposed License Condition 6.e (see SER Section 13.3.4.19, below). Emergency communications are addressed in COL Plan Section F, and discussed below in SER Section 13.3.4.6 (see also, PTN COL 9.5-10 and PTN COL 18.2-2 in SER Section 13.3.4.18).

When an emergency is declared, reclassified or terminated, an announcement is made (over the plant public address system or by other means) that includes the emergency classification declared and response actions to be taken by site personnel. At the Unusual Event classification, select ERO augmentation personnel may be notified and requested to remain available to respond. At an Alert classification or higher, ERO augmentation personnel are notified for activation of the TSC, OSC, EOF and ENC using an automated callout system (pagers), or call lists in the Emergency Response Directory (listed as an administrative procedure in COL Plan Appendix 3) using commercial telephone as a backup. ITAAC 2.2 includes a test of the primary and backup ERO notification systems. If required, additional notifications to various support organizations will be made.

COL Plan Section E.3, "Initial Notification Messages," states that FPL, in conjunction with State and county authorities, has established the contents of the Florida Nuclear Plant Emergency Notification Form, which is completed and transmitted to the State and counties during a classified [declared] emergency. For an initial notification, the form includes, at a minimum, the emergency classification, whether a release is taking place, basic meteorological data, potentially affected population/areas, and any recommended protective actions. As additional information describing the emergency situation and local conditions becomes available, supplemental messages containing more detail will be provided. The NRC is notified of a classified [declared] emergency after State/county notification, using the Event Notification Worksheet (NRC Form 361) for initial notifications, and may require an open line of communications (e.g., using ENS or Health Physics Network (HPN)). Follow-up messages to State and county authorities will be provided—to the extent the information is available and appropriate—on a prearranged frequency to provide further description of the emergency. Follow-up notifications are provided to the NRC Operations Center as soon as possible, but not later than one hour after significant new information is available.

COL Plan Section E.6, "Notification of the Public," states that it is the responsibility of FPL, along with State and local governmental organizations, to provide adequate means for prompt notification of the general public within the 10-mi EPZ around Turkey Point. Administrative and physical means have been established for providing early initial warning and subsequent clear instructions to the public within the 10-mi EPZ. This notification capability consists of the Alert and Notification System (ANS) and the Emergency Alert System (EAS) radio and television stations.

The ANS consists of fixed sirens located throughout the 10-mi EPZ, which will alert the public to tune to a local radio or television station affiliated with the EAS for detailed emergency information. ITAAC 2.3 states that notification and clear instructions to the public are accomplished in accordance with the emergency plan requirements. Local and State actions are then initiated in accordance with the State of Florida radiological emergency response plan to ensure the implementation of appropriate protective measures. The ANS will be activated by Miami-Dade County from the EOC or Miami-Dade County 911, upon coordination and direction by State or local authorities, as specified in existing agreements concerning system activation. The siren system is designed in such a fashion that it can be operationally segregated by county boundary within the (Turkey Point) 16-km (10-mi) radius. In the unlikely event that the ANS

would fail to activate, the State of Florida Radiological Emergency Plan and Miami-Dade and Monroe Counties maintain the capacity to perform backup route alerting.

COL Plan Section E.7, "Messages to the Public," states that the offsite response organizations have developed EAS messages, which are consistent with the classification scheme and contain instructions with regard to specific protective actions to be taken by occupants and visitors of affected areas. FPL will provide offsite authorities with supporting information for messages to the public. The messages provide information on the nature of the emergency and recommended protective actions, including sheltering, evacuation, and the use of KI, as appropriate. The State and/or counties control the distribution of KI to the general public. Protective response is addressed in COL Plan Section J, and discussed below in SER Section 13.3.4.10.)

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, the staff finds that procedures for notification of State and local response organizations and emergency personnel by all organizations have been established, and the licensee has the capability to notify offsite officials and agencies, including State and local governmental agencies within 15 minutes, and the NRC no later than one hour, after declaring an emergency. The appropriate officials of the State and local government agencies within the EPZs have been identified. The licensee has described the entire spectrum of emergency conditions that involve alerting or activating the emergency organization, including EALs for offsite agency notification and communication steps to be taken under each class of emergency. Message authentication is described in the State and local emergency plans. The appropriate governmental authorities have the capability to make a public alerting and notification decision promptly following notification of an emergency by the licensee, and administrative and physical means have been established for alerting and providing prompt instruction to the public within the plume exposure pathway EPZ (including a backup method to alert populations), and for public evacuation and other protective measures. In addition, the applicant has described how offsite dose projections will be made and the results transmitted to State and local authorities, NRC, and other appropriate governmental entities.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard E. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(5), 10 CFR 50.72(a)(3), and 10 CFR Part 50, Appendix E, Sections IV.A.4, IV.C, and IV.D.1, and IV.D.3, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.6 *Emergency Communications*

As reflected in NUREG-0654, Planning Standard F, "Emergency Communications," 10 CFR 50.47(b)(6) requires that provisions exist for prompt communications among principal response organizations to emergency personnel and to the public. In addition, 10 CFR Part 50, Appendix E, Section IV.E.9, requires onsite and offsite communication systems with backup power sources, including provisions for communications with State and local governments within the plume exposure EPZ, and Federal emergency response organizations and the NRC.

Also required are provisions for communications among the Control Room, TSC, EOF, principal State and local EOCs, and field assessment teams. Communication systems shall be tested at designated frequencies.

In COL Plan Section F, "Emergency Communications," the applicant described the provisions used for communications between Turkey Point and principal response organizations, and communications between the emergency response facilities. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard F, "Emergency Communications." Planning Standard F provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(6).

COL Plan Section F.1, "Communications/Notifications," provides detailed descriptions of the various communications equipment and capabilities. FPL has extensive and reliable communication systems installed at Turkey Point, which include systems such as normal and dedicated telephone lines on landlines, fiber-optic voice channels, cellular telephones, satellite telephones, mobile radio units, portable radios, and computer peripherals. This network capability serves to maintain communication links to the emergency response facilities and offsite authorities; communications between emergency vehicles and fixed locations; and facsimile, computer network, and modem transmission.

The plant page system, Private Branch Exchange (PBX) telephone system, FPL Intelligent Tandem Network (ITN) System, automated ERO callout system, and commercial telephone system are used for alerting personnel. Separate, dedicated telephone lines provide for communications with NRC headquarters, the NRC Regional Office EOC, and the EOF. These include the HPN, Reactor Safety Counterpart Link (RSCL), Protective Measures Counterpart Link (PMCL), Management Counterpart Link (MCL), ERDS, and ENS. Backup power is provided for the ENS lines, in compliance with the guidance of BL-80-15 regarding loss of offsite power to the ENS (see PTN COL 9.5-9 in SER Section 13.3.4.18). See also, *Fukushima Dai-ichi—NTTF Recommendation 9.3* (below), regarding the availability of communications equipment during a prolonged station blackout and staff identified License Condition (13-4). COL Plan Figures F-2 and F-3 illustrate the primary and alternate methods of communication between FPL emergency response facilities and the NRC communications network.

FPL has established several communication systems that ensure reliable and timely exchange of information necessary to provide effective command and control over any emergency response (1) between the plant and State and county agencies within the EPZs, (2) with Federal EROs, (3) between the plant, the EOF, and State and county EOCs, and (4) between the emergency response facilities and field monitoring teams. FPL maintains the capability to make initial notifications to the designated offsite agencies on a 24-hour-per-day basis. (Notification methods and procedures are addressed in COL Plan Section E, and discussed above in SER Section 13.3.4.5.) The offsite notification system State "hot ring down" telephone provides primary communications to State and county warning points and EOCs from each Control Room, TSC, and the EOF. Backup or secondary methods include commercial telephone lines, EMNET, cellular telephones, and radios (see also, PTN COL 9.5-10 and PTN COL 18.2-2 in SER Section 13.3.4.18). State and county warning points are continuously staffed. COL Plan Figure F-1 shows the initial notification paths and the organizational titles from the Turkey Point emergency response facilities to Federal, State, and county EROs, and industry support agencies.

COL Plan Section F.2, "Communications with Fixed and Mobile Medical Support Facilities," states that communications are established from the site to the primary and backup medical hospitals and transportation services via telephone or radio. In all cases, site personnel notify the hospital by telephone concerning the pending arrival of injured personnel. If a helicopter is needed for transport, the hospital can maintain ground-to-air communications. Cellular telephones are available on site to be used as an alternate means of communications.

COL Plan Section N.2 states that communication between the Control Rooms, TSC, EOF, NRC, State and county warning points and EOCs, and NRC are tested monthly. ERDS is tested quarterly. Annual testing includes communications between Turkey Point and the State and local EOCs and field monitoring teams, and communications between the Control Rooms, TSC, EOF, and ENC. In addition, communications between Turkey Point emergency response facilities and the appropriate offsite response organizations are tested during annual drills. (Communication drills are addressed in COL Plan Section N.2, and discussed in SER Section 13.3.4.14.) ITAAC 3.1 and ITAAC 3.2 address the establishment of onsite and offsite communications (both primary and secondary methods/systems), including the availability of an access port for ERDS (or its successor system) and transfer of data from the unit to the NRC operations center.

Fukushima Dai-ichi—NTTF Recommendation 9.3

On March 12, 2012 (ADAMS Accession No. ML12053A340), the NRC requested additional information from all power reactor licensees and holders of construction permits, associated with the NRC NTTF review of the accident at the Fukushima Dai-ichi nuclear facility. In Recommendation 9.3, the NTTF addressed staffing and communications provisions for enhancing emergency preparedness. On January 23, 2013, the NRC issued a follow-up letter, which identified eight generic technical issues that need to be addressed as part of the Recommendation 9.3 communications capability assessment.

With regard to communications, the accident at Fukushima highlighted the need to ensure that the communications equipment relied upon to coordinate the event response during a prolonged station blackout can be powered. Specifically, the March 12, 2012, letter requests that all power reactor licensees and holders of construction permits (in active or deferred status) assess their current communications systems and equipment used during an emergency event, including consideration of any enhancements that may be appropriate for the emergency plan with respect to communications requirements of 10 CFR 50.47, Appendix E to 10 CFR Part 50, and NUREG-0696, "Functional Criteria for Emergency Response Facilities." In addition, the means necessary to power the new and existing communications equipment during a prolonged station blackout should be considered. Onsite emergency organization and staffing is addressed above in SER Section 13.3.4.2. (See also, COL STD 13.3-2 in SER Section 13.3.4.18.)

In COLA Part 10, the applicant proposed License Condition 12.C, "Fukushima Actions—Emergency Planning Actions," which addresses both the staffing and communications areas addressed in Recommendation 9.3. Consistent with License Condition 12.C—with regard to the communications capability assessment—the staff identified License Condition (13-4), which is addressed above in SER Section 13.3.4.2.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, and subject to License Condition (13-4), the staff finds that provisions exist for prompt communications among principal response organizations to emergency personnel and to the public. Specifically, the applicant has established a reliable primary and backup means of communications for alerting and activating the response organizations and personnel, including 24-hour manning of communications links. Provisions also exist for communications among the Control Room, TSC, EOF, State and local governments within the EPZs, and field assessment teams. In addition, the applicant has provided a coordinated communication link for fixed and mobile medical support facilities. Onsite and offsite communications systems have backup power sources, and are tested at designated frequencies.

Conclusion

Subject to License Condition (13-4), the staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard F. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(6) and 10 CFR Part 50, Appendix E, Section IV.E.9, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.7 *Public Education and Information*

As reflected in NUREG-0654, Planning Standard G, "Public Education and Information," 10 CFR 50.47(b)(7) requires that information be made available periodically to members of the public concerning notification methods and initial actions they should take in an emergency (e.g., listening to a local broadcast station and remaining indoors), that the principal points of contact with the news media for dissemination of information during an emergency (including the physical location or locations) be established in advance, and that procedures for coordinating dissemination of information to the public be established. In addition, 10 CFR Part 50, Appendix E, Section IV.D.2, requires a description of provisions for yearly dissemination to the public within the plume exposure EPZ of basic emergency planning information, such as methods for public notifications and protective actions planned if an accident occurs, general information as to the nature and effects of radiation, and a listing of local broadcast stations that will be used for dissemination of information during an emergency. Signs or other measures shall also be used to disseminate information to any transient population within the plume exposure pathway 10-mi EPZ.

In COL Plan Section G, "Public Education and Information," the applicant described the FPL public education and information program, including the process for keeping the public in the 10-mi EPZ informed in the event of an emergency. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard G, "Public Education and Information." Planning Standard G provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(7).

COL Plan Section G.1, "Public Information Publication," states that FPL is responsible for maintaining a public information program, with support from the State of Florida Division of Emergency Management (DEM) and the Miami-Dade and Monroe Counties emergency management offices. The State of Florida has overall responsibility for maintaining a continuing

disaster preparedness public education program. The Turkey Point public information publication is updated annually, in coordination with State and county agencies, and distributed to all residents within the 10-mi EPZ and to locations where the transient population may obtain a copy. The public information material explains how the public will be notified and what their actions should be during an emergency, and includes educational information on radiation, a description of possible protective measures for the public, a map of major evacuation routes, a list of reception centers, instructions on how to obtain information regarding the disabled or their caretakers, and those without transportation, and who to contact for additional information.

The publications instruct the public to go indoors and turn on their televisions or radios when they hear the ANS sirens operating, and identify the local television and radio stations that will provide information related to the emergency. Information is also provided to the transient population by means of signs on siren poles that instruct them (in English and Spanish) to turn to EAS stations. Public notices at local business establishments, parks, beaches, and other outdoor recreational facilities around Turkey Point provide a list of television and radio stations that will transmit emergency information and numbers where additional information can be obtained.

COL Plan Section G.3, "Media Accommodations," states that the FPL Marketing and Communications Department is notified upon declaration of an Unusual Event or higher emergency classification, and will handle public and media inquiries until the ENC is activated. The ENC is on the second floor of the FPL General Office Building in Miami, FL, and is collocated with the EOF. Once the ENC is activated at an Alert or higher emergency classification, or at an earlier classification if conditions warrant, it has the responsibility and authority for issuing news releases to the public. The FPL public information officer directs activities at the ENC. FPL spokespersons and ENC staff coordinate emergency information with the EOF, Marketing and Communications personnel in the Juno Beach office, and Federal, State, and county spokespersons located in the ENC. COL Plan Appendix 3 lists an EPIP titled "Emergency News Center Activation and Operation," and an administrative procedure titled "Public Education and Information."

The ENC serves as a location where media personnel gather to receive information related to the emergency event, and approved news releases will be provided to the media for dissemination to the public. The ENC functions as the single point of contact to interface with Federal, State, and local authorities that are responsible for disseminating information to the public. Public information personnel coordinate development and distribution of news releases from the EOF and the ENC. The ENC is equipped with appropriate seating, lighting, and visual aids to allow for public announcements and briefings to be given to the news media. Additionally, the ENC is equipped with commercial telephone lines for making outgoing calls. Functions of the ENC include serving as the primary location for accumulating information and developing news releases; providing work space and telephones for public information personnel from the State, counties, NRC, FEMA, and industry organizations; providing work space and telephones for news media personnel; and providing responses to media inquiries. ITAAC 4.1 addresses the adequacy of ENC size, equipment, and communications capabilities.

The ENC is staffed by FPL and government public information representatives who will be the source of public information during an emergency at the plant, and who will coordinate information. The FPL public information officer, who has direct access to all necessary emergency information, is the primary spokesperson for FPL, and is assisted by the chief nuclear spokesperson. The timely exchange of information between designated spokespersons will enhance communications flow to the public and news media, and also aid in dispelling

rumors. Media Monitors and Rumor Control personnel in the ENC may identify rumors or misinformation when responding to telephone calls from the general public and the news media, and from monitoring media reports. In addition, the Miami-Dade County Office of Emergency Management maintains telephones designated for rumor control, and State and local plans and procedures provide further details for control of rumors and other misinformation. FPL, in cooperation with the State of Florida and Counties of Miami-Dade and Monroe, will conduct an annual program to acquaint the news media with information concerning nuclear power, and points of contact for release of public information in an emergency.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, the staff finds that the applicant has provided for a coordinated and periodic dissemination of information to the public—including the permanent and transient adult population within the plume exposure EPZ—regarding how they will be notified and what their actions should be in an emergency. The applicant has also established the principal points of contact with the news media for dissemination of information during an emergency, and procedures for coordinated dissemination of information to the public. In addition, the applicant has described the provisions for yearly dissemination to the public within the plume exposure EPZ of basic emergency planning information, including the use of signs or other measures to disseminate information to any transient population within the plume exposure EPZ.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard G. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(7) and 10 CFR Part 50, Appendix E, Section IV.D.2, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.8 Emergency Facilities and Equipment

As reflected in NUREG-0654, Planning Standard H, “Emergency Facilities and Equipment,” 10 CFR 50.47(b)(8) requires that adequate emergency facilities and equipment to support the emergency response be provided and maintained. In addition, 10 CFR Part 50, Appendix E, Section IV.E.8, requires that adequate provision shall be made and described for emergency facilities and equipment, including an onsite OSC and TSC, and an EOF from which effective direction can be given and effective control can be exercised during an emergency. Regulations in 10 CFR Part 50, Appendix E, Section IV.E.8.b, address various requirements associated with EOF locations and required provisions, which are not applicable to an existing EOF pursuant to 10 CFR Part 50, Appendix E, Section IV.E.8.e. Regulations in 10 CFR Part 50, Appendix E, Section IV.E.8.c, require various EOF capabilities, which include supporting response to multiple reactors/sites and simultaneous events, as applicable. Regulations in 10 CFR Part 50, Appendix E, Section IV.E.8.d, require an alternative facility (for use when onsite emergency facilities cannot be safely accessed during hostile actions) that would be accessible to function as a staging area for augmentation of emergency response staff. Regulations in 10 CFR Part 50, Appendix E, Section IV.G, require a description of provisions to be employed to ensure that the emergency plan, its implementing procedures, and emergency equipment and supplies are maintained up to date. Regulations in 10 CFR Part 50, Appendix E, Section VI.1, require an ERDS data link between the licensee’s onsite computer

system and the NRC Operations Center, which provides for the automatic transmission of a limited data set of selected parameters.

In COL Plan Section H, "Emergency Facilities and Equipment," the applicant described the functions and locations of the emergency response facilities and equipment that will be used and maintained by FPL in coordinating and performing emergency response activities, and the surveillance programs used to monitor and ensure that these facilities and equipment are maintained in a high degree of constant readiness. In addition, COL Plan Appendix 3 lists an administrative procedure titled "Emergency Response Facilities and Equipment." The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard H, "Emergency Facilities and Equipment." Planning Standard H provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(8).

Control Room

There is a Control Room for each of the units on the site where major plant systems are operated. Each Control Room is equipped with instrumentation to supply detailed information on the reactor and major systems. The Control Room for the affected unit is the first onsite facility to become involved with the response to emergency events, and will be the designated location for the emergency coordinator. Emergency coordinator responsibilities will transfer to the TSC and EOF when the facilities are properly staffed and prepared to take over these responsibilities. Control Room personnel must evaluate and effect control over the emergency and initiate activities necessary for coping with the emergency until such time that the augmented emergency response facilities can be activated.

The emergency response facilities that have been established at Turkey Point to assist Control Room personnel in mitigating the consequences of accidents include the TSC, EOF and OSC (discussed below), and the ENC. In FSAR Table 1.8-201 and Section A of COLA Part 7, the applicant described two Tier 2 departures from the AP1000 DCD, which address moving the locations of the OSC and TSC that support Units 6 and 7 (i.e., PTN DEP 18.8-1 and PTN DEP 18.8-2, respectively). These two departures are discussed below under the applicable OSC and TSC subsections.

Technical Support Center

The TSC is located in the Turkey Point Nuclear Training Building, which is outside of the Protected Areas between the Control Rooms for Units 3 and 4 and the Control Rooms for Units 6 and 7. The applicant stated in COL Plan Section H.1.b that this location provides the ability to respond and activate the facility in a timely fashion independent of the unit(s) that may be affected by the emergency, and will permit the use of the TSC in a security event that may curtail the entry of ERO personnel into a Protected Area of the affected unit(s). ITAAC 5.1.2 states that the TSC is located outside the Protected Area, and procedures are in place to enhance passage through security checkpoints expeditiously. The Nuclear Training Building is identified in COL Plan Annex 1 (Units 3 and 4), Figure A1-1, "Units 3 and 4 Facility Layout," and can be seen in COL Plan Part 1 Figure 1-2, "Turkey Point Site Layout," and COLA Part 2 (FSAR) Figure 2.1-204, "Turkey Point Enlarged Site Area Map."

The location of the TSC is addressed in Tier 2 departure PTN DEP 18.8-2, which moves the TSC for Units 6 and 7 from the AP1000 DCD CSA (Room 40403) to a common TSC—supporting Units 3, 4, 6, and 7—in the Nuclear Training Building. In COLA Part 7, the applicant assessed PTN DEP 18.8-2 pursuant to Section VIII.B.5.b of Appendix D to 10 CFR Part 52, and concluded that the departure has no safety significance. Specifically, the departure is for a nonsafety-related system, the alternate location of the TSC meets applicable requirements, and relocating the TSC does not impair its function. The staff agrees with the applicant's evaluation, for the reasons described below.

Pursuant to 10 CFR 50.47(b)(8), the applicant must provide and maintain adequate emergency facilities and equipment to support the emergency response, which includes the TSC. As stated in NUREG-0696, Section 2.1, "Function," the TSC provides guidance and technical assistance to the Control Room, and all plant manipulations shall be performed by the Control Room licensed operators. With regard to the applicant's proposed common TSC location, the staff considered the applicable guidance in NUREG-0696, which states the following in Section 2.2, "Location":

The onsite TSC is to provide facilities near the control room for detailed analyses of plant conditions during abnormal conditions or emergencies by trained and competent technical staff. During recent events at nuclear power plants, telephone communications between the facilities were ineffective in providing all of the necessary management interaction and technical information exchange. This demonstrates the need for face-to-face communications between TSC and control room personnel. To accomplish this, the TSC shall be as close as possible to the control room, preferably located within the same building. The walking time from the TSC to the control room shall not exceed 2 minutes. This close location will facilitate face-to-face interaction between control room personnel and the senior plant manager working in the TSC. This proximity also will provide access to information in the control room that is not available in the TSC data system.

Provisions shall be made for the safe and timely movement of personnel between the TSC and the control room under emergency conditions. These provisions shall include consideration of the effects of direct radiation and airborne radioactivity from inplant sources on personnel traveling between the two facilities. Anticontamination clothing, respiratory protection, and other protective gear may be used to help protect personnel in transit. The 2-minute travel time between the TSC and the control room does not include time required to put on any necessary radiological protective gear, but it does include the time required to clear any security checkpoints. There should be no major security barriers between these two facilities other than access control stations for the TSC and control room.

Further guidance is provided in Supplement 1 to NUREG-0737, "Clarification of TMI Action Plan Requirements—Requirements for Emergency Response Capability (Generic Letter No. 82-33)," in relation to the TSC location. Specifically, Section 8.2, "Technical Support Center (TSC)," states that the TSC will be located within the site protected area so as to facilitate necessary interaction with control room, OSC, EOF and other personnel involved with the emergency. See also, DCD Tier 2 Subsection 18.8.3.5, "Technical Support Center Mission and Major Tasks," which describes various aspects of the TSC, including human factors considerations.

In RAI 5681, Question 13.03-8 (H-1), the staff requested additional information from the applicant, regarding the applicant's justification for locating the TSC outside of the Protected Area, a description of any impediments that could impact or delay the transit time between the TSC and Control Rooms, and a description of communication capabilities that compensate for the increased distance and transit time between the TSC and the Control Rooms. In a September 14, 2011, response to RAI 5681, Question 13.03-8 (H-1), the applicant stated the following:

FPL has chosen to develop a TSC that will support the response to Turkey Point Units 3, 4, 6, & 7. The TSC will be located north of Turkey Point Units 6 & 7 and south of Turkey Point Units 3 & 4. The separation of the TSC from the three control rooms will be approximately 2600 feet [792 m] or within approximately a 10 to 15 minute walk. Use of current technologies such as updated computer equipment, teleconferencing, real time system monitoring through plant computer networks, and telephone and radio systems for primary and emergency communications will bridge the physical separation. The facility will have access to plant drawings, procedures, and computer applications needed to support the evaluation and decision-making processes of the Emergency Response Organization (ERO). The TSC will be a larger dedicated facility located in the Training Building. Procedures are in place to ensure that passage from outside the Protected Area into the Control Room is not hindered during the emergency. The placement of the TSC outside of the Protected Area enhances the ability to reach minimum staffing levels and for activation for the TSC especially during the off-hours. This location also provides an enhanced capability for staff to activate the facility during a hostile action event inside the Protected Area.

The staff had previously considered the "2 minute walking time" criterion associated with the TSC location as part of the development of the emergency planning ITAAC addressed in SECY-05-0197.¹² In relation to the TSC location, generic ITAAC acceptance criterion 5.1.2 of SECY-05-0197 includes the statement that "[t]he COL applicant will adopt design certification criteria, if applicable, or otherwise specify TSC location." The equivalent ITAAC acceptance criterion 8.1.2 of NUREG-0800 (Table 14.3.10-1) and RG 1.206 (Table C.II.1-B1), added a statement that "[a]dvanced communication capabilities may be used to satisfy the two minute travel time."

¹² SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," October 28, 2005 (ADAMS Accession No. ML052770225). See also, the associated February 22, 2006, Staff Requirements Memorandum (ADAMS Accession No. ML060530316).

The staff evaluated various factors to determine the appropriateness and acceptability of providing flexibility relating to the 2-minute walking time between the TSC and Control Room in the guidance documents, including technical advances in both communication and data system technologies since NUREG-0696 and Supplement 1 to NUREG-0737 were published in 1981 and 1983, respectively.¹³ In addition, having a common TSC that supports multiple reactor units and is located a moderate distance (i.e., more than 2 minutes) from the Control Rooms presents distinct advantages. These advantages include the increased efficiency of a centralized point of support for the entire site, the elimination of confusion regarding which TSC on a multiple-unit site would be staffed during an emergency, not having to staff multiple TSCs if an incident involved more than one unit, a single point of contact for offsite support, and consideration of security-related (i.e., hostile action) events. (Additional TSC requirements are addressed within this report section.) From a support and functional standpoint, and subject to a demonstration of adequacy during the full participation exercise (addressed in ITAAC 8.1), the staff finds that the applicant's proposed TSC location outside the Protected Area is acceptable for the following two reasons: First, compared to TSCs in the early 1980's, the proposed TSC will have enhanced staffing and activation capabilities, including use of current technologies for communication and data systems. Second, the location provides an enhanced capability for activation of the TSC during a hostile action event inside the Protected Area. Therefore, the staff finds that the applicant's response is acceptable and considers RAI 5681, Question 13.03-8 (H-1), resolved.

In COL Plan Section H.1.b, "Technical Support Center (TSC)," the applicant stated that the TSC provides plant management and technical support to Control Room personnel and technical data and information to the EOF, and is sized to accommodate a minimum of 40 people and their supporting equipment (including six NRC representatives). ITAAC 5.1.1 states that the TSC has at least 3,000 square feet (279 square meters) of floor space consistent with NUREG-0696 (75 square feet/person, or 6.97 square meters/person) and is large enough for required systems, equipment, records and storage. ITAAC 5.1.5 states that the TSC has the means to receive, store, process, and display various plant and environmental information, and to initiate emergency measures and conduct emergency assessment. Plant parameters that can be retrieved in the TSC are also addressed in DCD Tier 1 Table 3.1-1, ITAAC 3.

The TSC is activated for all emergencies classified as Alert or higher, and may be activated at an Unusual Event if deemed necessary by the emergency coordinator. ITAAC 8.1.1.D.1.a states that the TSC and OSC are activated within 60 minutes from notification of an Alert or higher event classification, with at least minimum staffing. When operational, the TSC provides support for the affected Control Room's emergency response efforts; continued evaluation of event classification; assessment of plant status and potential offsite impact; coordination of emergency response action within the Protected Area; protective actions onsite and offsite (until the EOF is operational); and communication with offsite government agencies (until the EOF is operational). COL Plan Appendix 3 lists an EPIP titled "TSC Activation and Operation." ITAAC 8.1.1.C.1.a states that command and control is demonstrated by the main control room in the early phase of the emergency, and by the TSC within 60 minutes from notification of an Alert or higher event classification, with at least minimum staffing. In addition, ITAAC 8.1.1.C.2 states that the exercise will demonstrate the ability to transfer emergency direction from the main control room (simulator) to the TSC.

¹³ On March 12, 2007, the NRC approved a TSC location that is approximately 15 minutes from the control room for the Clinton Power Station (ADAMS Accession No. ML070540270). See also, Section 13.3, "Emergency Planning," of NUREG-2124, "Final Safety Evaluation Report—Related to the Combined Licenses for Vogtle Electric Generating Plant, Units 3 and 4," Volume 2, September 2012 (ADAMS Accession No. ML12271A048), where the NRC approved the Vogtle site's common TSC location that is approximately 10 minutes from the control room.

Although the TSC does not provide for face-to-face communications with the affected Control Room(s), it has communication links that can transmit and receive direct voice and data communications from the affected Control Room. The TSC is the primary onsite communications center during an emergency and provides reliable voice communications to the Control Room, OSC, EOF, NRC, and other offsite agencies. (The availability of an ERDS data link between the licensee's onsite computer system and the NRC Operations Center is addressed in COL Plan Sections E, F, and N, and is discussed in SER Sections 13.3.4.5, 13.3.4.6, and 13.3.4.14, respectively.) Security personnel are positioned in the TSC to expedite personnel movement between the TSC and Control Room, as necessary. Communication capabilities are addressed further in COL Plan Section F, and discussed above in SER Section 13.3.4.6. ITAAC 5.1.3 addresses the TSC communications equipment and capabilities. In addition, TSC and EOF communications strategies and human functions attributes are addressed in PTN COL 18.2-2, and discussed below in SER Section 13.3.4.18.

In COL Plan Section H.1.b, the applicant stated that personnel in the TSC shall be protected from radiological hazards, including direct radiation and airborne contaminants under accident conditions, with similar radiological habitability as Control Room personnel. Adequate radiological protection will be ensured through permanent Radiation Monitoring Systems (RMSs) or periodic radiation surveys. These systems indicate radiation dose rates and airborne radioactivity inside the TSC while it is in use. In addition, KI is available in the TSC, if needed. If the TSC becomes uninhabitable for any reason, implementing procedures will provide guidance on the transfer of duties and relocation of the staff. ITAAC 5.1.4 addresses radiological and nonradiological protection features for the TSC, and ITAAC 5.1.6 states that a reliable and backup electrical power supply is available for the TSC. In addition, ITAAC 8.1.1.D.2 includes a demonstration of the adequacy of TSC habitability precautions.

In SRP Section 15.0.3, "Design Basis Accident Radiological Consequence Analyses for Advanced Light Water Reactors," Acceptance Criterion 3 states that the radiation protection design of the TSC is acceptable if the total calculated radiological consequences for the postulated fission product release fall within the exposure acceptance criteria specified for the Control Room of 0.05 sievert (Sv) (5 rem) total effective dose equivalent (TEDE) for the duration of the accident.¹⁴ (See also, SER Section 15.0, "Accident Analysis.") In RAI 5997, Question 13.03-17(b), October 26, 2011 (ADAMS Accession No. ML11299A096), the staff requested additional information from the applicant regarding the radiological consequence analyses for the Turkey Point common TSC, for the postulated design basis accidents (DBAs) for the proposed Units 6 and 7 and existing Units 3 and 4. In addition, the staff asked the applicant to describe relevant TSC ventilation system design parameters and assumptions that were used in the radiological habitability analysis.

In a March 19, 2012, response to RAI 5997, Question 13.03-17(b) (ADAMS Accession No. ML12080A085), the applicant stated that the TSC structure and ventilation system will be designed to ensure that the TSC personnel are protected from radiological hazards. In addition, dose calculations have been completed using bounding TSC design considerations for the facility, and the parameters for the ventilation system have been selected to limit the dose in the TSC to less than 0.05 Sv (5 rem) TEDE. The applicant described the radiological habitability

¹⁴ TEDE means the sum of the effective dose equivalent for external exposures and the committed effective dose equivalent for internal exposures (see 10 CFR 20.1003). Rem is a special unit of radiation dose equivalent (see 10 CFR 20.1004). 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," includes Criterion 19—Control Room, which requires adequate radiation protection for control room personnel under accident conditions for the duration of the accident.

analysis for the TSC, and evaluated the radiological consequences in the TSC of a loss-of-coolant accident (LOCA) at Unit 3, 4, 6, or 7 to show compliance with the TSC radiological habitability requirements. The LOCA is the bounding DBA for TSC habitability.

Using the bounding values for heating, ventilation, and air conditioning (HVAC) system flow rates, unfiltered in-leakage, recirculation flow rate and filtration efficiencies, the final TSC design is anticipated to result in a lower dose in the TSC in an accident condition. The applicant provided atmospheric dispersion factors (χ/Q values) for a release from the Unit 4 equipment hatch and emergency core cooling system (ECCS) leakage point, and the Units 6 and 7 release point to the TSC air intake. The highest calculated dose resulted from the Unit 4 postulated LOCA, and was estimated by the applicant to be 0.0437 Sv (4.37 rem).

The staff performed an independent verification of the applicant's TSC χ/Q values based on information given in COLA Part 2 (FSAR) and the COL Plan, and determined that the TSC χ/Q values are reasonable. The staff reviewed the description of the radiological habitability analysis inputs and assumptions—including information provided in FPL's June 25, 2009, License Amendment Request 196 to revise the accident source term for Units 3 and 4 (ADAMS Accession No. ML092050277)—and determined that the inputs and assumptions are reasonable and consistent with the guidance in RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors" (July 2000), for performing DBA radiological consequences analyses. The staff performed an independent calculation using the design values in the applicant's RAI response, and calculated a dose of 0.047 Sv (4.7 rem). As a result, the staff concludes that the applicant has demonstrated, using conservative design parameters and assumptions, that the 0.05 Sv (5 rem) TEDE criterion will be met in the TSC for the duration of an accident at Units 3, 4, 6, or 7.

The TSC-related ITAAC will verify the TSC design, which was bounded by the TSC radiological habitability analysis discussed in response to RAI 5997, Question 13.03-17(b). Based on the above discussion, the staff finds that the radiation protection design of the TSC is acceptable and the TSC radiological habitability requirements will be met, because the total calculated radiological consequences for the postulated fission product release fall within the exposure acceptance criterion identified above. In addition, the staff finds that the TSC will provide adequate nonradiological protection, which includes facility cooling, heating, humidity, electrical power, ventilation and air filtration. Therefore, the staff considers RAI 5997, Question 13.03-17(b), resolved.

COL Plan Section H.1.b further states that the TSC has access to a complete set of drawings, other records, general arrangement diagrams, electrical schematics, and piping and instrument diagrams. The TSC has the capability to record and display vital plant data in real time (e.g., using the Safety Parameter Display System (SPDS)), to be used by knowledgeable individuals responsible for engineering and management support of reactor operations, and for implementation of emergency procedures. As described in COL Plan Section H.6, "Monitoring Equipment Onsite," the SPDS provides a display of plant parameters from which the safety status of operation may be assessed in the Control Room, TSC, and EOF for the plant. The SPDS or other display systems in the TSC and EOF promote the exchange of information between these facilities and the Control Room, and assist the emergency organization in the decisionmaking process.

AP1000 DCD Tier 2 Section 7.5, "Safety-Related Display Information," describes the monitored plant parameter variables, which are based on the guidance in RG 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants." The safety-related display information is

used by the operator to monitor and maintain the safety of the AP1000 throughout operating conditions that include anticipated operational occurrences and accident and post-accident conditions. In RAI 5681, Question 13.03-8 (H-2), the staff requested additional information from the applicant regarding a description of how plant parameter variables, based on RG 1.97, are made available in the TSC. In a September 30, 2011, response to RAI 5681, Question 13.03-8 (H-2) (ADAMS Accession No. ML11276A101), the applicant stated that the TSC is equipped with voice and data communications to each of the unit Control Rooms, and that the data that is provided to the Control Room is provided to the TSC to enable the TSC staff to support the technical response to the emergency. The AP1000 DCD provides the information in Section 7.5.1 and DCD Table 7.5-1. In addition, FPL has provided the site-specific information in FSAR Table 7.5-201. The availability of this information in the TSC is addressed in ITAAC 5.1.5. The staff reviewed DCD Table 7.5-1 and FSAR Table 7.5-201, and finds this acceptable because it is consistent with NUREG-0696. Therefore, the staff considers RAI 5681, Question 13.03-8 (H-2), resolved. Information systems associated with emergency response facilities and the accident monitoring and display systems are discussed in SER Section 7.5, "Information Systems Important to Safety."

COL Plan Section H.6 states that there are two permanent meteorological monitoring stations near the plant for display and recording of wind speed, and direction, and ambient and differential temperature for use in making offsite dose projections. Meteorological information is presented in the Control Room, TSC, and EOF by means of the plant computer system. In addition, COLA Part 2 Section 2.3.3.1.7, "Emergency Preparedness Support," states that provisions are in place to obtain representative regional meteorological data during an emergency if the site meteorological system is unavailable.

For the reasons set forth above, the staff finds that the common TSC provides an area that meets the applicable regulatory guidance in NUREG-0696 and Supplement 1 to NUREG-0737, except for the TSC distance from the Unit 6 and 7 control rooms, which the applicant has justified, and as such, the TSC will adequately support its intended emergency response functions. Therefore, the staff concludes that PTN DEP 18.8-2 is acceptable.

Emergency Operations Facility

The Emergency Operations Facility (EOF) provides management of overall emergency response; notification of offsite government agencies; coordination of radiological and environmental assessments and emergency response activities with government agencies; determination of recommended public protective actions, and management of recovery operations. The COL Plan utilizes the same EOF that currently supports Units 3 and 4, which is located 41.8 km (26 mi) from the Turkey Point site at the existing FPL General Office building in Miami, FL.

The EOF is sized to accommodate about 75 personnel, including FPL, State, county and NRC representatives, and is equipped with reliable voice communications systems including communications to the Control Room, TSC, ENC, offsite State and county EOCs, NRC, and offsite field monitoring teams. In addition, EOF and TSC communications strategies and human functions attributes are addressed in PTN COL 18.2-2, and discussed below in SER Section 13.3.4.18. ITAAC 5.2.1 states that the EOF working space size is a minimum of 5,625 square feet (523 square meters) consistent with NUREG-0696 (75 square feet/person, or 6.97 square meters/person), and is large enough for required systems, equipment, records, and storage. Communication capabilities are addressed further in COL Plan Section F and discussed in SER Section 13.3.4.6.

The EOF contains equipment to gather, store, and display data needed in the EOF to analyze and exchange plant condition information with the plant, and the EOF technical data system receives, stores, processes, and displays information sufficient to perform assessments of actual and potential onsite and offsite environment consequences of an emergency. The EOF has ready access to plant records, procedures, and emergency plans, including RMS information and parameters that are required of the SPDS, needed for overall management of emergency response resources. As described in COL Plan Section H.6, the SPDS provides a display of plant parameters from which the safety status of operation may be assessed in the Control Room, TSC, and EOF for the plant. The SPDS or other display systems in the TSC and EOF promote the exchange of information between these facilities and the Control Room, and assist the emergency organization in the decisionmaking process. COL Plan Appendix 3 lists an EPIP titled “EOF Activation and Operation.” See also, SER Section 13.3.4.10, which addresses FPL’s designation of the EOF as an alternative facility to support the ERO augmentation—including functioning as a back-up TSC and OSC—during hostile action events. ITAAC 5.2 addresses the EOF size, communications capabilities, and availability of environmental and plant system data. ITAAC 8.1.1.D.1.b states that the EOF is activated within 60 minutes from notification of a Site Area Emergency or higher event classification, with at least minimum staffing.

Operations Support Center

Each Protected Area has an OSC to support each unit, which is separate from the Control Room. (In the NRC guidance documents referenced below, the OSC is referred to as the Operational Support Center.) The OSC provides an area for staging and coordination of shift personnel to support emergency response operations, including first aid, search and rescue, and emergency repair and damage control activities. Disciplines reporting to the OSC include, but are not limited to non-Control Room operating personnel, radiation protection, chemistry, and maintenance personnel. (See also, DCD Subsection 18.8.3.6, “Operations Support Center Mission and Major Tasks.”)

The location of the OSC is addressed in Tier 2 departure PTN DEP 18.8-1, which moves the OSC for Units 6 and 7 from the AP1000 DCD ALARA (as low as reasonably achievable) Briefing Room and OSC (Room 40318) to a single OSC—supporting Units 6 and 7—in the Maintenance Shop/Office Building inside the Protected Area. The OSC location is described in Section 4, “Emergency Facilities and Equipment,” of COL Plan Annexes 1, 2, and 3, and shown on Annex 2, Figure B1-1, “Unit 6 Facility Layout,” and Annex 3, Figure C1-1, “Units 6 and 7 Facility Layout.” Room 40318 is renamed the ALARA Briefing Room (see FSAR Section 1.2.3, “Plant Arrangement Description,” and FSAR Section 12.3.1.2, “Radiation Zoning and Access Control”). FSAR Figure 1.1-201, “Units 6 and 7 Layout,” shows the location of the Maintenance Shop/Office (building number 30), which is north of Units 6 and 7 and near the Security Building. ITAAC 5.1.7 states that there is an OSC located inside the Protected Area, and it is separate from the main control room. If the OSC becomes uninhabitable, the emergency coordinator will designate an alternate location in accordance with EIPs. COL Plan Appendix 3 lists an EPIP titled “OSC Activation and Operation.”

In COLA Part 7, the applicant evaluated PTN DEP 18.8-1 under Section VIII.B.5.b of Appendix D to 10 CFR Part 52, and determined that the departure is for a nonsafety-related system, that the alternate location of the OSC meets applicable requirements, and that relocating the OSC does not impair its function. The staff agrees with the applicant’s evaluation, for the reasons described below.

In accordance with 10 CFR 50.47(b)(8), the applicant must provide adequate emergency facilities (including the OSC) to support the emergency response. With regard to the applicant's proposed common OSC location, the staff considered the applicable guidance in NUREG-0696, which states the following in Section 3.0, "Operational Support Center":

The operational support center (OSC) is an onsite area separate from the control room and the TSC where licensee operations support personnel will assemble in an emergency. The OSC shall:

- Provide a location where plant logistic support can be coordinated during an emergency, and
- Restrict control room access to those support personnel specifically requested by the shift supervisor

NUREG-0696 indicates in part that no specific habitability criteria are established for the OSC, and the OSC should have direct communications with the control room and with the TSC so that the personnel reporting to the OSC can be assigned to duties in support of emergency operations.

In addition, the staff considered the applicable guidance in Supplement 1 to NUREG-0737, which indicates in Section 8.3, "Operational Support Center (OSC)," that, when activated, the OSC will be the onsite area separate from the control room where pre-designated operations support personnel will assemble, and that a pre-designated licensee official should be responsible for coordinating and assigning the personnel to tasks designated by control room, TSC, and EOF personnel. The OSC will be located onsite to serve as an assembly point for support personnel and to facilitate performance of support functions and tasks, and capable of reliable voice communications with the control room, TSC, and EOF.

Section 4.1 of COL Plan Annexes 2 and 3 states that the OSC manager is responsible for managing OSC activities including personnel accountability of anyone dispatched from the OSC, radiological exposure control for individuals within the OSC, and mobilizing individuals on the emergency roster needed to fill OSC and other support positions. COL Plan Section B.5 states that the OSC manager supervises the activities of OSC personnel and is responsible for directing OSC operations—including assigning tasks to designated OSC leads, maintaining OSC resources, and maintaining accountability of OSC personnel.

COL Plan Section H.10, "OSC Capabilities," identifies various equipment and supplies that are stored in or near the OSC and available for damage control use, as necessary. This includes first aid and medical treatment equipment and supplies, portable lighting and communications equipment, protective clothing, respiratory protection gear, KI, and other health physics equipment and supplies. Damage control team equipment is available in the maintenance shops near the OSC. Additional supplies can be obtained from other unaffected units and through corporate resources.

COL Plan Table H-1, "Typical Emergency Supplies Available for Emergency Response Facilities," lists typical equipment and supplies available to emergency response personnel. Emergency equipment is listed, maintained, and inspected in accordance with radiation protection procedures. Specific equipment and supplies for each facility are described in emergency plan administrative procedures and other plant procedures. COL Plan Appendix 3

lists an administrative procedure titled “Emergency Response Facilities and Equipment.” Emergency equipment and supplies are addressed further in COL Plan Sections J and K (see SER Sections 13.3.4.10 and 13.3.4.11, respectively), and in Section 4 of COLA Plan Annexes 1, 2, and 3.

COL Plan Section J.6 states that Turkey Point maintains an inventory of adequate supplies of radiation protection equipment for personnel remaining in (or entering) the Protected Area or emergency response facilities, including respiratory protection equipment, protective clothing, and KI. COL Plan Section F.1 describes dedicated phone lines for communications between the affected unit’s Control Room, TSC, and OSC to coordinate dispatch of teams from the OSC. ITAAC 5.1.3 and ITAAC 5.1.8 address the OSC communications equipment and capabilities. In addition, ITAAC 8.1.1.D.1 addresses the activation and functional capabilities (i.e., adequacy of equipment, security provisions, and habitability precautions) of the OSC during the full participation exercise.

The staff finds that the relocation of the units’ OSC to a common OSC in the Maintenance Shop/Office Building is acceptable because the common OSC provides an area that meets the applicable regulatory guidance in NUREG-0696 and Supplement 1 to NUREG-0737; and as such, will allow the OSC to adequately support its intended emergency response functions. From a support and functional standpoint, the staff finds that the applicant’s proposed OSC location is acceptable, subject to a demonstration of adequacy during the full participation exercise (addressed in ITAAC 8.1). Therefore, the staff concludes that PTN DEP 18.8-1 is acceptable.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In light of the above, the staff finds that the applicant has described, provided, and maintains adequate emergency facilities and equipment to support the emergency response, including a licensee onsite OSC and TSC, and an EOF from which effective direction can be given and effective control can be exercised during an emergency. This includes onsite and offsite radiological and meteorological monitoring systems. The applicant has also described provisions to be employed to ensure that the emergency plan, its implementing procedures, and emergency equipment and supplies are maintained up to date. In addition, the applicant has provided for an ERDS data link between the onsite computer system and the NRC Operations Center.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard H. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(8) and 10 CFR Part 50, Appendix E, Sections IV.E.8, IV.G, and VI.1, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.9 Accident Assessment

As reflected in NUREG-0654, Planning Standard I, “Accident Assessment,” 10 CFR 50.47(b)(9) requires the use of adequate methods, systems, and equipment for assessing and monitoring the actual or potential offsite consequences of a radiological emergency condition. In addition,

10 CFR Part 50, Appendix E, Section IV.A.4 requires the identification of persons within the licensee organization who will be responsible for making offsite dose projections, and a description of how these projections will be made and the results transmitted to State and local authorities, NRC, and other appropriate governmental entities. Regulations in 10 CFR Part 50, Appendix E, Section IV.B, require a description of the means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials. Regulations in 10 CFR Part 50, Appendix E, Section IV.E.2, require that adequate provisions shall be made and described for emergency facilities and equipment, including equipment for determining the magnitude of, and for continuously assessing the effect of, the release of radioactive materials to the environment.

In COL Plan Section I, "Accident Assessment," the applicant described the methods, systems, and equipment available for assessing and monitoring actual or potential consequences of a radiological emergency. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard I, "Accident Assessment." Planning Standard I provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(9).

COL Plan Section I.1, "Plant Parameters and Corresponding Emergency Classification," states that plant system and effluent parameter values are used in determining accident severity and subsequent emergency classification. An emergency condition can be the result of just one parameter or condition change, or a combination of several. The specific symptoms, parameter values, or events for each level of emergency classification are detailed in EIPs. Specific plant system and effluent parameters that characterize a classifiable event (EALs) are presented in each unit annex (EALs are addressed in COL Plan Section D, and discussed above in SER Section 13.3.4.4).

To adequately assess the emergency condition, each facility has the necessary equipment and instrumentation installed to make available essential plant information on a continuous basis. Evaluation of plant conditions is accomplished through the monitoring of plant parameters from indication in the Control Room and within the plant. Some of the more important plant parameters to be monitored in the Control Room are assembled into a single display location, which is called the SPDS. The SPDS monitors parameters relative to the plant design, such as reactor coolant system pressure, reactor or pressurizer water level, containment pressure, reactor power, safety system status, containment radiation level, and effluent monitor readings. Resources available to provide initial and continuing information for accident assessment throughout the course of an event include plant parameter display systems, liquid and gaseous sampling system, and area, process and accident RMSs.

COL Plan Appendix 3 identifies EIPs titled "Dose Assessment Methodology," "Core Damage Assessment," and "Offsite Radiological Monitoring." Instrumentation and equipment capabilities are described in COL Plan Section H, and discussed above in SER Section 13.3.4.8. Post-accident monitoring and sampling systems, including capabilities, are also addressed in AP1000 DCD Tier 2 Chapter 7, "Instrumentation and Controls," and Section 9.3.3.1.2.2, "Post-Accident Sampling." ITAAC 6.1 addresses the availability of the means to provide initial and continuing radiological assessment through displays of instrumentation indicators in the main control room, TSC, and EOF during the course of drills or exercises.

COL Plan Section I.3, "Source Term Determination," describes the methods used to estimate the amount or type of core damage occurring under accident conditions, which include containment radiation monitors, core temperatures and coverage, source range monitor readings, containment hydrogen concentration, and sample analyses. Core damage considerations are used as the bases for several of the EAL initiating conditions, and as the threshold for the declaration of a General Emergency. ITAAC 6.2 addresses the use of EIPs to calculate the source terms and the magnitude of the release of postulated accident scenario releases.

COL Plan Section I.4, "Effluent Monitor Data and Dose Projection," states that during an accident, the plant parameter display system and personal computers will provide the ERO with the timely information required to make decisions. Radiological and meteorological instrumentation readings are used to project dose rates at predetermined distances from the plant, and to determine the integrated dose received. Dose assessment methods used by the ERO to project offsite doses include monitored release points, containment failure, or leak rates, release point samples, and field monitoring team data. Computer applications are used to provide dose calculations to evaluate dose against the EPA protective action guides (PAGs). These evaluations are used to determine the necessity for offsite PARs. ITAAC 6.3 demonstrates that the means exist to continuously assess the impact of the release of radioactive materials to the environment, accounting for the relationship between effluent monitor readings, and onsite and offsite exposures and contamination for various meteorological conditions under drill conditions.

Meteorological data is collected at the Turkey Point 10-meter tower, the South Dade Site 60-meter tower, or obtained directly from the NWS in Miami. COL Plan Table I-1 summarizes the available key meteorological parameters (e.g., wind speed and wind direction) that are available at each unit's Control Room, TSC, and EOF via the plant monitoring/information system. COL Plan Table I-2 summarizes meteorological data that represents primary and backup sources. Meteorological data is provided to the State through initial and follow-up notifications, and response to direct inquiries from DEM and DOH-BRC. The EOF and NRC can receive timely meteorological information through the TSC (upon request), from direct data logger and fiber optic modem connection, or the plant monitoring/information system. ITAAC 6.4 states that meteorological data exists at the EOF, TSC, main control room, offsite NRC operations center, and the State of Florida; and that this data is in the format needed for the appropriate EIPs.

Dose projections can be made during a release through use of actual sample data when effluent monitors are off-scale or inoperative, or a release occurs by an unmonitored flow path. In the absence of effluent sample data, a dose projection can be performed by specifying the accident category as a default, which defines the mix, total curies, and release pathway(s). The total number of curies from a default mix for each isotope is used to provide an upper bound for release concentration, and hence, an upper bound for the dose rate and dose to the public. ITAAC 6.5 states that the release rate and projected doses can be determined with off-scale or inoperable instrumentation during training or a drill.

Turkey Point maintains the ability to take offsite soil, water, vegetation, and air samples, and to directly measure gamma dose rates in the event of an airborne or liquid release. The environmental monitoring equipment includes portable survey, counting, and air sampling instrumentation and other radiological monitoring equipment and supplies to be used by the field monitoring teams. Samples are taken at predetermined locations (illustrated in COL Plan Figure I-1), as well as those specified both during and after a release. Environmental measurements are used as an aid in the determination and assessment of protective and

recovery actions for the general public. (See COL Plan Sections J and M, which are addressed in SER Sections 13.3.4.10 and 13.3.4.13, respectively.) ITAAC 6.6 states that the field monitoring teams were dispatched and demonstrated ability to locate and monitor a radiological release within the plume exposure EPZ.

Field monitoring teams are dispatched to perform field monitoring in the 10-mi EPZ during conditions that may involve significant releases of radioactive materials from the plant. These teams are trained, and have the capability, to conduct field surveys and take offsite air, soil, water, and vegetation samples. The State of Florida DOH-BRC has the ability to dispatch their own field monitoring teams to track the airborne radioactive plume, and can be used to perform collection, shipment, and analysis of environmental sample media. DOE offsite monitoring assistance is also available, if needed.

EIPs provide guidance for performance of the field monitoring team activities. Each team is provided with air sampling equipment, personnel dosimetry, radiological survey instruments, procedures, communications equipment, and supplies to facilitate performance of radiation, surface contamination, and airborne radioactivity monitoring. Radiological survey and sample data (e.g., soil, water, and vegetation sampling)—transmitted to the emergency facilities—is used to define affected area boundaries, verify or modify dose projections and PARs, and assess the actual magnitude, extent, and significance of a liquid or gaseous release. The teams are available onsite on a 24-hour basis, and are dispatched into the surrounding area when a release is ongoing or is expected to occur. A minimum of two offsite field monitoring teams are notified and activated at an Alert or higher classification. ITAAC 6.7 addresses the activation of the field monitoring teams, including the ability to make rapid assessments of actual or potential magnitude and locations of any radiological hazards through simulated liquid or gaseous release pathways. Information from FPL offsite radiological assessment is exchanged and coordinated with the State. COL Plan Section B addresses ERO job description, including those associated with licensee radiological accident assessment and dose projection, and offsite field monitoring teams.

Field monitoring equipment has the capability to detect and measure airborne radioiodine concentrations as low as 1×10^{-7} microcuries per cubic centimeter ($\mu\text{Ci/cc}$) in the field. Interference from the presence of noble gas and background radiation will be minimized by ensuring that monitoring teams move to areas of low background before analyzing the sample cartridge. The collected air sample is measured by hand-held survey meter as an initial check of the projection derived from plant data to determine if significant quantities of elemental iodine have actually been released. ITAAC 6.8 states that a field monitoring team was dispatched during a radiological release scenario and demonstrated the use of sampling and detection equipment for air concentrations in the plume exposure EPZ, as low as $10^{-7} \mu\text{Ci/cc}$. Procedures exist for the correlation of air activity levels to dose rate, and provide a method to estimate the integrated dose from the projected and actual dose rates and for the comparison of these estimates with the EPA PAGs. ITAAC 6.9 states that the means are available to estimate integrated dose from the dose assessment program and the field monitoring team reading during a radioactive release scenario, and the results were compared with the EPA PAGs.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, the staff finds that the applicant has described and provided adequate facilities, systems, equipment, and means for assessing and monitoring the actual or potential

offsite consequences of a radiological emergency condition, including determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials. The applicant has also described the capability and resources for field monitoring within the 10-mi EPZ, and has the methods, equipment, and expertise to rapidly assess actual or potential radiological hazards. This includes the capability to detect and measure radioiodine airborne concentrations within the 10-mi EPZ as low as 10^{-7} $\mu\text{Ci/cc}$ under field conditions, and to relate the various measured parameters to dose rates for key isotopes and gross radioactivity measurements. In addition, the applicant has identified, by position and function to be performed, persons within the licensee organization who will be responsible for making offsite dose projections, and has described how these projections will be made and the results transmitted to State and local authorities, NRC, and other appropriate governmental entities.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard I. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(9) and 10 CFR Part 50, Appendix E, Sections IV.A.4, IV.B, and IV.E.2, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.10 Protective Response

As reflected in NUREG-0654, Planning Standard J, "Protective Response," 10 CFR 50.47(b)(10) requires that a range of protective actions have been developed for the (10-mi) plume exposure pathway EPZ for emergency workers and the public. In developing this range of actions, consideration has been given to evacuation, sheltering, and as a supplement to these, the prophylactic use of KI. ETEs have been developed by applicants and licensees, and licensees shall update the ETEs on a periodic basis. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the 80-km (50-mi) ingestion exposure pathway EPZ appropriate to the locale have been developed. In addition, 10 CFR 50.47(c)(2) and 10 CFR Part 50, Appendix E, Section I require that the size and configuration of the EPZs be determined in relation to local emergency response needs and capabilities, as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. Regulations in 10 CFR Part 50, Appendix E, Section IV.I, require the development of a range of protective actions to protect onsite personnel during hostile action to ensure the continued ability of the licensee to safely shut down the reactor and perform the functions of the emergency plan.

In COL Plan Section J, "Protective Response," the applicant described the range of protective actions that have been developed for Turkey Point emergency workers and the general public in the 10-mi EPZ. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard J, "Protective Response." Planning Standard J provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(10).

Protective response consists of emergency actions taken during or after an emergency situation, which are intended to minimize or eliminate hazards to the health and safety of the

public and plant personnel. FPL is responsible for onsite actions, and the responsibility for offsite actions rests with the State, counties, and other offsite response agencies. Detailed information describing onsite and offsite protective response actions is located in EIPs and the State and county emergency plans.

The same EPZs for Turkey Point Units 3 and 4 are used for the new Units 6 and 7, which are based on the requirements in 10 CFR Part 50, Appendix E. As such, the size and configuration of the existing EPZs for Units 3 and 4 were determined in relation to local emergency response needs and capabilities, as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The staff finds that it is appropriate (and necessary) for Turkey Point Units 6 and 7 to use the existing Units 3 and 4 EPZs, because the size and configuration of the EPZs are dependent upon the local (offsite) emergency response needs, and not on the number of reactors on the combined and contiguous sites for Units 3 and 4 and Units 6 and 7.

COL Plan Part 1 Section B.2 describes the plume exposure pathway EPZ and the ingestion exposure pathway EPZ, which are illustrated in COL Plan Figures 1-3 and 1-4, respectively. The 10-mi and 50-mi EPZs are also shown in COLA FSAR Figures 2.1-202 and 2.1-201, respectively. The EPZs are the areas for which planning is performed to assure that prompt effective actions can be taken to protect the public in the event of an accident. The plume exposure pathway (10-mi) EPZ for Turkey Point is an area surrounding the plant with Unit 3 at the center and a radius of approximately 16 km (10 mi), including portions of Miami-Dade and Monroe Counties in Florida. (COL Plan Section J.8 and Appendix 5 address the ETE Report and evacuation of the 10-mi EPZ, which is discussed in SER Section 13.3.4.17.) The principal exposure sources from this pathway are whole body external exposure to beta and gamma radiation from the plume and deposited material, and internal exposure resulting from the inhalation of radioactive material in the plume. The time of potential exposure can range from hours to days.

The ingestion exposure pathway (50-mi) EPZ is an area surrounding the plant with Unit 3 as the center and a radius of approximately 50 mi. The principal exposure sources are from the ingestion of contaminated agricultural products such as milk, fresh fruits and vegetables, aquatic foods, or from contaminated surface water sources. The planning effort for this pathway involves the identification of potentially contaminated food and water, and associated control measures that will be used to minimize danger to the public. Ingestion pathway exposures in general would represent a problem in the days or weeks following an accident, although some early protective actions to minimize subsequent contamination of milk are provided in the State plans.

In COL Plan Section J.1, "Notification of Onsite Personnel," the applicant stated that methods are established for notifying personnel within the Protected Areas and Owner-Controlled Area for all emergency classifications. The primary means of notification within the Protected Areas is the plant public address system and evacuation alarms, as described in COL Plan Section F and discussed in SER Section 13.3.4.6. Announcements include the emergency classification and response actions to be taken by personnel onsite, and are made within 15 minutes of the emergency declaration. Provisions are made to alert personnel in high noise areas and outbuildings within the Protected Areas, and individuals located outside the Protected Areas—but inside the Owner-Controlled Area—are informed via public address system announcements, alarms, and by the Security Force within approximately 30 minutes of the emergency declaration. Information regarding the meaning of the various warning systems and the appropriate response actions is provided via plant training programs, visitor orientation, escort

instructions, posted instructions, or within the content of audible messages. Escorts provide instructions to visitors who may not be trained to take specific emergency response actions. (Notification methods and procedures are addressed in COL Plan Section E, and discussed above in SER Section 13.3.4.5.) (OCA) ITAAC 7.1 states that the means exist to successfully warn and advise various onsite individuals, including those in the Owner-Controlled Area and immediate vicinity.

If a local area evacuation is warranted, personnel will be directed to assemble at a location designated by the emergency coordinator. FPL establishes and maintains preplanned primary and alternate site evacuation routes and assembly areas, which are illustrated in COL Plan Figure J-3. A secondary route is provided for evacuation in the event the primary route is rendered impassable because of radiological or weather conditions, or other impediments. The directions of travel and offsite assembly area(s) are determined by the emergency coordinator based on current meteorological and emergency conditions. Section 5, "Emergency Measures," of Annexes 1, 2, and 3 describes the assembly areas and evacuation routes associated with the respective Turkey Point reactor units.

If an Owner-Controlled Area (OCA) evacuation is warranted, nonessential personnel, including those in the Protected Areas, are directed to exit the site via the primary or alternate evacuation route and reassemble at an offsite location or proceed to their homes. Visitors to the plant will assemble with, and follow the instructions of, their escorts. Affected individuals evacuate the site via personnel vehicles, and personnel without transportation will be identified and provided transportation, as necessary. Security is responsible for traffic direction and control, including special provisions under adverse conditions (e.g., weather-related, radiological, or traffic density conditions). COL Plan Appendix 3 lists an EPIP titled "Evacuation and Accountability."

The emergency coordinator directs contamination monitoring of personnel, vehicles, and personal property if conditions warrant. Personnel evacuating the site will be monitored for contamination using portal monitors as they exit the Protected Areas, or sent to offsite assembly areas and monitored with portable friskers. If there is no release of radioactive materials within the affected unit, limited monitoring may be used to speed the evacuation process. Personnel and vehicle monitoring and decontamination will be conducted in accordance with radiation protection procedures and EIPs. COL Plan Appendix 3 lists an EPIP titled "Offsite Radiological Monitoring."

COL Plan Section J.4, "Protective Actions for Onsite Personnel," describes onsite protective actions and evacuation of onsite personnel for the various emergency classes, including personnel not needed to shut down the fossil units at Turkey Point. Evacuation is the primary protective action anticipated for onsite personnel within the Protected Area who are not filling ERO positions. If conditions warrant, the Owner-Controlled Area outside the Protected Area is evacuated of all non-FPL personnel at an Alert or higher emergency classification. As conditions warrant, the emergency coordinator may delay, postpone, or make special arrangements on the evacuation. Special circumstances can include radiological conditions, security events, certain plant conditions, and onsite hazards. In the event that evacuation is not the best protective action, onsite personnel will be directed to take other protective actions, such as sheltering for extremely inclement weather or during an ongoing radiological release, or taking immediate cover for security events when evacuation will place personnel in jeopardy.

In RAI 5681, Question 13.03-14, the staff requested additional information regarding the applicant's response to a hostile action event (including consideration of BL 2005-02), concerning (1) the availability of an alternative facility to support rapid response, (2) specific

provisions to protect onsite emergency responders and personnel, and (3) how NRC notification would occur. In an October 31, 2011, response to RAI 5681, Question 13.03-14 (ADAMS Accession No. ML11306A140), the applicant stated that FPL has designated the EOF as an alternative facility to support the ERO augmentation during hostile action events. In addition, the EOF also functions as a backup TSC and backup OSC staging areas in the event of an emergency that limits access to the site during a hostile action. FPL will develop implementing procedures (see ITAAC 9.1) to address applicable portions of BL 2005-02 by providing a strategy and direction to protect emergency responders and personnel during a security-based event, including an emergency resulting from a hostile action event. See also, COLA Part 9 (Mitigative Strategies Table),¹⁵ Section 5.2 (“Assembly Areas”) in each annex of the COLA Plan, and COLA Plan Section J.5 (“Accountability”). Finally, NRC notification—within about 15 minutes after recognition of a security event—will be addressed in implementing procedures. The staff finds this response acceptable because it conforms to the guidance in BL 2005-02 and NUREG-0800, and therefore addresses the requirement in 10 CFR Part 50, Appendix E, Section IV.I. Therefore, the staff considers RAI 5681, Question 13.03-14, resolved.

At the declaration of an Owner-Controlled Area evacuation, all nonessential personnel are evacuated. All individuals in the Protected Areas are accounted for, and those who have not been accounted for are identified within 30 minutes of the initiation of the evacuation. Upon notification that personnel are missing, the emergency coordinator initiates search and rescue operations. Accountability is coordinated by personnel in the TSC, and results are forwarded to the emergency coordinator. Once established, accountability within the Protected Areas is maintained throughout the event, unless specifically terminated by the emergency coordinator. Accountability of individuals within the Owner-Controlled Area, but outside the Protected Area, is not required. The movement of personnel for the purposes of accountability may be delayed if their health and safety could be in jeopardy, such as during severe weather or for security concerns. ITAAC 8.1.1.C.4 states that during the full participation exercise, FPL will demonstrate the ability to perform assembly and accountability for all personnel in the Protected Area within 30 minutes of an emergency calling for Protected Area assembly and accountability.

COL Plan Section J.6 indicates that FPL maintains an inventory of adequate supplies of radiation protection equipment for personnel remaining in (or entering) the Protected Area or emergency response facilities, including respiratory protection equipment, protective clothing, and KI. COL Plan Table H-1 lists typical emergency equipment and supplies available to emergency response personnel. Emergency equipment is listed, maintained, and inspected in accordance with radiation protection procedures. Specific equipment and supplies for each facility are described in emergency plan administrative procedures and other plant procedures. COL Plan Appendix 3 lists an administrative procedure titled “Emergency Response Facilities and Equipment.” Section J.6 also describes the use of respirators, protective clothing, and KI. Emergency equipment and supplies are addressed further in COL Plan Sections H and K, and in Section 4 of COLA Plan Annexes 1, 2, and 3.

In COL Plan Section J.7, “Mechanism for Implementing Protective Action Recommendations,” the applicant stated that plant conditions, projected dose and dose rates, or field monitoring data are evaluated to develop PARs for the purpose of preventing or minimizing exposure to the general public. (Accident assessment is addressed in COL Plan Section I, and discussed in SER Section 13.3.4.10.) PARs are approved by the emergency coordinator and provided to the offsite agencies responsible for implementing protective actions for the general public. In an

¹⁵ COLA Part 9, “Withheld Information,” includes information designated as Security-Related Information, and is withheld from public disclosure under 10 CFR 2.390, “Public Inspections, Exemptions, Requests for Withholding.”

emergency that warrants immediate protective actions be taken before activation of the offsite emergency facilities, PARs are provided directly to the State and county 24-hour warning points. COL Plan Figure J-2 provides guidance for plant personnel to determine PARs based on plant conditions and offsite dose estimates. COL Plan Appendix 3 lists an EPIP titled “Protective Action Recommendations.”

As described in EIPs, FPL recommends protective actions to the State of Florida and Counties of Miami-Dade and Monroe, which are responsible for implementing protective measures based on PAGs for the offsite population at risk. ITAAC 2.3 states that notification and clear instructions to the public are accomplished in accordance with the emergency plan requirements. COL Plan Appendix 5 references the ETE Report, which the applicant provided as COLA Supplemental Information 1, “Turkey Point Nuclear Power Plant Evacuation Time Estimate.” Evacuation time estimates provide FPL and State and local governments with site-specific information needed for protective action decisionmaking. If plant conditions are stable and offsite radiological conditions do not pose a danger to public health and safety, FPL may discuss a return to evacuated areas with the State. The State authorities are then responsible for recommending whether return is advisable or not, and transmitting this recommendation to the general public. (Recovery and reentry is addressed in COL Plan Section M, and discussed below in SER Section 13.3.4.13.) Finally, the State is responsible for specifying protective measures for the 50-mi EPZ, including methods for protecting the public from consumption of contaminated water and foodstuffs.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, the staff finds that the applicant has developed a range of protective actions for the 10-mi EPZ for emergency workers and the public, including consideration of evacuation, sheltering, and the prophylactic use of KI. The applicant has developed guidelines for the choice of protective actions during an emergency that are consistent with Federal guidance, including protective actions for the 50-mi EPZ that are appropriate to the locale. The size and configuration of the EPZs have been determined in relation to local emergency response needs and capabilities, as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. In addition, the applicant has developed a range of protective actions to protect onsite personnel during hostile action. Development of ETEs is addressed below in SER Section 13.3.4.17.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard J. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(10), 10 CFR 50.47(c)(2), and 10 CFR Part 50, Appendix E, Sections I and IV.I, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.11 *Radiological Exposure Control*

As reflected in NUREG-0654, Planning Standard K, “Radiological Exposure Control,” 10 CFR 50.47(b)(11) requires that the means for controlling radiological exposures in an emergency be established for emergency workers. The means for controlling radiological

exposures shall include exposure guidelines consistent with EPA “Manual of Protective Action Guides and Protective Actions for Nuclear Incidents,” EPA 400-R-92-001, May 1992 (EPA-400). In addition, 10 CFR Part 50, Appendix E, Section IV.E.3 requires that adequate provisions shall be made and described for emergency facilities and equipment, including facilities and supplies at the site for decontamination of onsite individuals.

In COL Plan Section K, “Radiological Exposure Control,” the applicant described the means for controlling emergency worker radiological exposures during an emergency, including measures to provide assistance to persons injured or exposed to radioactive materials. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff’s primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard K, “Radiological Exposure Control.” Planning Standard K provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(11).

COL Plan Section K.1, “Emergency Exposure Guidelines,” states that in an emergency situation, all reasonable measures will be made to maintain the radiation exposure within the applicable limits specified in 10 CFR Part 20, “Standards for Protection Against Radiation,” for emergency response personnel providing medical treatment, first aid and rescue, corrective and assessment actions, and decontamination. Conditions may warrant entry into high-radiation areas, resulting in exposures in excess of the regulatory limits, and the emergency coordinator is assigned the nondelegable responsibility for authorizing personnel exposures under emergency conditions, consistent with EPA-400. The emergency worker dose guidelines are shown in COL Plan Table K-1, “Emergency Exposure Guidelines,” and are consistent with EPA-400 Table 2-2, “Guidance on Dose Limits for Workers Performing Emergency Services.”

COL Plan Section K.2, “Emergency Radiation Protection Program,” states that the radiation protection manager is responsible for implementing radiation protection actions during an emergency, and describes the relevant guidelines. FPL maintains a site personnel radiation dosimetry program that includes the capability for determining external and internal doses—consistent with 10 CFR Part 20—on a 24-hour-per-day basis. All emergency response personnel under the authority of FPL who potentially will be exposed to radiation in the course of their duties will be monitored by the plant radiation exposure monitoring program. Emergency workers will receive thermoluminescent dosimeter (TLD) badges and personal self-reading dosimeters capable of measuring expected exposures on a real time basis. Emergency worker dose records are maintained by the radiation protection manager, in accordance with the emergency and radiological protection procedures. COL Plan Appendix 3 identifies two implementing procedures—titled “OSC Activation and Operation,” and “EOF Activation and Operation”—that are applicable to personnel monitoring and maintenance of emergency worker dose records. ITAAC 8.1.1.E.2 states that during the full participation exercise, FPL will demonstrate the ability to continuously monitor and control radiation exposure to emergency workers.

COL Plan Section K.5, “Contamination and Decontamination,” describes contamination control measures and decontamination areas. During emergency conditions, normal plant contamination control criteria will be adhered to as much as possible. The limits may be modified by Radiation Protection, in accordance with radiation protection procedures, should conditions warrant. Contaminated personnel will normally be attended to at decontamination areas located onsite, which include decontamination showers, equipment, and supplies.

Personnel with injuries involving radiation or radioactive contamination will be handled by an offsite medical facility, as described in COL Plan Section L.

Controls are established and maintained 24 hours per day to contain the spread of loose surface radioactive contamination. If personnel are contaminated above acceptable levels, they will be decontaminated in accordance with radiation protection procedures. If normal decontamination procedures do not reduce personnel contamination to acceptable levels, the contaminated individuals will be referred to a competent medical authority. Supplies, instruments, and equipment will be monitored and contaminated materials will be disposed of as radwaste. Contaminated vehicles will be decontaminated before being released, and ambulances will be monitored and decontaminated before departing the medical facility by Turkey Point personnel. Measures will be taken to control onsite access to potentially contaminated food and potable water supplies. Under emergency conditions with uncontrolled releases, eating, drinking and chewing are prohibited in all Turkey Point emergency response facilities until habitability surveys indicate these activities are permissible. Contamination control criteria for returning areas and items to normal use are contained in the radiation protection procedures.

In RAI 5681, Question 13.03-10 (K-2), the staff requested additional information from the applicant regarding the action levels for determining the need for decontamination. In a September 30, 2011, response to RAI 5681, Question 13.03-10 (K-2), the applicant stated that Turkey Point Units 6 and 7 radiological procedure 0-HPS-021.3, "Identification, Survey and Release of Material for Unrestricted Use," sets a standard of no detectable radioactivity for releasing material from a radiologically controlled area. In addition, this is the standard that is currently used at Units 3 and 4, and will be used for Units 6 and 7. The staff finds this response acceptable because it is consistent with NUREG-0654, and, therefore, considers RAI 5681, Question 13.03-10 (K-2), resolved.

Efforts will be made to prevent contaminated vehicles operated by nonessential personnel to depart the Turkey Point site, and alternate forms of transportation may be made available to reduce the possibilities of transporting contamination offsite with suspected contaminated vehicles. As conditions warrant, radiological protection personnel at the assembly area monitor evacuees and determine the need for decontamination. Provisions for extra clothing are made and suitable decontaminates are available for the expected types of contamination.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, the staff finds that the applicant has established the means for controlling radiological exposures for emergency workers, consistent with the exposure guidelines in EPA-400. In addition, the applicant has made and described adequate provisions for emergency facilities and equipment, including facilities and supplies for monitoring and decontamination of onsite and relocated personnel, vehicles, and other affected materials, and has established appropriate contamination control measures.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard K. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(11) and 10 CFR Part 50, Appendix E,

Section IV.E.3, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.12 *Medical and Public Health Support*

As reflected in NUREG-0654, Planning Standard L, "Medical and Public Health Support," 10 CFR 50.47(b)(12) requires that arrangements be made for medical services for contaminated injured individuals. In addition, 10 CFR Part 50, Appendix E, Section IV.E requires facilities and medical supplies at the site for appropriate emergency first aid treatment, and arrangements for medical service providers qualified to handle radiation emergencies onsite. Arrangements are also required for transportation of contaminated injured individuals from the site to specifically identified treatment facilities outside the site boundary.

In COL Plan Section L, "Medical and Public Health Support," the applicant described the arrangements for medical services for contaminated injured personnel at the Turkey Point site. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. In this evaluation, the staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard L, "Medical and Public Health Support." Planning Standard L provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(12).

COL Plan Section L.1, "Offsite Hospital and Medical Services," describes arrangements for medical treatment of Turkey Point personnel who may have injuries complicated by the presence of radioactive contamination or overexposure to radiation. Sheridan Emergency Physicians Services of South Dade, at Baptist Hospital of Miami, is available on a 24-hour basis and provides for the immediate availability of fully equipped medical facilities with a staff of physicians and nurses skilled in the treatment of personal injury accompanied by radioactive contamination. Emergency Room Medical Associates, within Mercy Hospital of Miami, is available on a 24-hour basis and also provides for the immediate availability of medical facilities for treatment of personal injury accompanied by radioactive contamination. Letters of agreement with these two organizations are listed in COL Plan Appendix 2, with copies of the letters included in COLA Supplemental Information 4. Turkey Point personnel are available to assist medical personnel with decontamination, radiation exposure, and contamination control.

The site maintains an onsite first aid facility and an emergency vehicle with first aid supplies and equipment necessary for the treatment of contaminated or injured persons. In addition, standard first aid kits are maintained at numerous locations throughout the plant. The First Aid Team, which comprises on-shift personnel who are American Red Cross Multimedia first aid qualified, is dispatched by the Control Room or the OSC (when activated). At least two of these individuals are available on shift at all times to support immediate response in each Protected Area. In addition, FPL may staff their onsite clinic with additional medical support personnel who can aid in the response. Radiation protection personnel at Turkey Point are experienced and trained in the control of radioactive contamination and decontamination activities for injured or ill personnel, and are dispatched to support medical response if there is a possibility of contamination associated with the injury/illness. COL Plan Appendix 3 lists an EPIP titled "Medical Response."

First aid facilities at the site are designed to provide basic first aid to injured or ill personnel before arrival of offsite medical support. Emergency treatment areas, which include medical

equipment and supplies, are in each of the units. In the event of a mass casualty incident, where plant and local response resources are exceeded by the number of casualties, FPL may request additional resources through the State of Florida DEM. Because of the specialized nature of the diagnosis and treatment of radiation injuries, FPL maintains an agreement with the DOE Radiation Emergency Assistance Center/Training Site (REAC/TS) ¹⁶ in Oak Ridge, TN. REAC/TS has a radiological emergency response team of physicians, nurses, health physicists, and necessary support personnel on 24-hour call to provide consultative or direct medical or radiological assistance. The letters of agreement with DOE and the National Nuclear Security Administration (Savannah River Site Office) are listed in COL Plan Appendix 2, with a copy of the letters included in COLA Supplemental Information 4.

Arrangements are in place for transport of persons with injuries and/or illness involving radioactivity from the site to Sheridan Emergency Physicians Services of South Dade or to Emergency Room Medical Associates in Miami. FPL maintains an onsite emergency vehicle that is equipped to provide prompt transport of an injured and/or contaminated victim(s) to an offsite medical facility. The Miami-Dade Fire Rescue Department is available 24 hours a day to provide ambulance support if offsite medical transportation is warranted. The letter of agreement between FPL and Miami-Dade Fire Rescue Department is listed in COL Plan Appendix 2, with a copy of the letter included in COLA Supplemental Information 4. In a life-threatening situation, victims can also be transported to a designated hospital by helicopter provided by the U.S. Coast Guard and Miami-Dade Fire Rescue on an as available basis. A qualified radiation protection person shall accompany the ambulance to the hospital upon the determination that the injured or ill person is contaminated, or if the determination cannot be made that the individual is free of surface contamination.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

The staff reviewed the certification letters from the medical service providers described above and the additional information provided in COL Plan Section L, as described above. In view of the emergency plan provisions, the staff determines that the applicant has made arrangements for hospital and medical services that have the capability of evaluating radiation exposure and uptake, and that persons providing these services are adequately prepared to handle contaminated individuals. In addition, the applicant has provided for appropriate emergency first aid treatment at the site, including qualified medical personnel to handle radiation emergencies, and arrangements for transporting victims of radiological accidents (i.e., contaminated injured individuals) to offsite medical support facilities.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard L. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(12) and 10 CFR Part 50, Appendix E,

¹⁶ U.S. Department of Energy REAC/TS staff is available 24 hours a day/seven days a week to deploy and provide emergency medical consultation for incidents involving radiation anywhere in the world. REAC/TS provides direct support for the National Nuclear Security Administration's Office of Emergency Response and the Federal Radiological Monitoring and Assessment Center (FRMAC) (Source: <http://orise.orau.gov/reacts/>, visited March 25, 2013).

Section IV.E, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.13 *Recovery and Reentry Planning and Post-Accident Operations*

As reflected in NUREG-0654, Planning Standard M, "Recovery and Reentry Planning and Post-Accident Operations," 10 CFR 50.47(b)(13), as reflected in the Planning Standard M, requires that general plans for recovery and reentry be developed. In addition, 10 CFR Part 50, Appendix E, Section IV.H requires a description of criteria to be used to determine when, following an accident, reentry of the facility would be appropriate or when operation could be resumed.

In COL Plan Section M, "Reentry and Recovery Planning," the applicant described activities for reentry into the areas of the plant that have been evacuated because of an accident, and the recovery organization and its concepts of operation. The staff reviewed this section, as well as other relevant portions, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard M. Planning Standard M provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(13).

Reentry during the emergency phase of an accident is performed to save a life, control a release of radioactive material, prevent further damage to plant equipment, or restore plant equipment. If necessary, reentry may be performed using emergency exposure limits. During the recovery phase of an accident, normal exposure limits are used. Items considered when planning for reentry include review of available radiation surveillance data to determine plant areas potentially affected by radiation or contamination; review of radiation exposure history of personnel needed to participate in the accident mitigation or recovery operations; determination of the need for additional personnel; review of adequacy of radiation survey instrumentation and equipment; review of nonradiological hazards and required protective measures; preplanning of activities and reentry team briefings; and review of security controls.

The recovery phase is that period when major repairs are being performed to return the plant to an acceptable condition, and the possibility of the emergency condition degrading no longer exists. When the plant has been stabilized, contained, and controlled, the recovery phase may be entered. The emergency plan lists guidelines that will be used to determine when the recovery phase will begin, including determining when to relax protective measures, and include informing the State and county emergency management agencies and the NRC concerning de-escalation of the emergency classification and initiation of the recovery phase. Detailed information describing reentry and recovery activities is contained in the EIPs. COL Plan Appendix 3 identifies an EIP titled "Reentry and Recovery."

COL Plan Section M.2, "Recovery Organization," describes the authorities and responsibilities of four key positions, consisting of the recovery manager, recovery coordinator, recovery offsite manager, and FPL public information officer. The recovery manager, with assistance from senior management, will determine the extent of staffing for the recovery organization, and is responsible for directing the activities of the plant recovery organization. This includes ensuring sufficient personnel, equipment, and other resources are available to support recovery; directing the development of a recovery plan and procedures; deactivating any of the plant ERO that was retained to aid in recovery; coordinating the integration of available Federal and State

assistance into onsite recovery activities; and determining when the recovery phase is terminated.

The recovery coordinator reports to the recovery manager, and is responsible for coordinating the development and implementation of the recovery plan and procedures, directing all onsite activities, and designating other plant recovery positions needed to support onsite recovery activities. The recovery offsite manager reports to the recovery manager, and is responsible for providing liaison with offsite agencies and coordinating plant assistance for offsite recovery activities, coordinating plant ingestion exposure pathway (50-mi) EPZ sampling activities, developing an offsite accident analysis report and radiological release report, and designating other plant recovery positions necessary to support offsite recovery activities. The FPL public information officer reports to the recovery manager, and is the official spokesperson to the press on all matters relating to the accident or recovery. This includes coordinating with all public information groups—including media monitoring and rumor control—and determining what public information portions of the ERO will remain activated.

When the decision is made to enter the recovery phase, all members of the ERO are informed of the change. All plant personnel are instructed on the recovery organization and their responsibilities associated with the recovery effort. The recovery manager will initiate notification to offsite governmental authorities that the site is transitioning to a recovery organization, and provides information concerning changes in the organizational structure that may occur.

Total population exposure calculations are performed and periodically updated during the recovery phase. Total population exposure is determined (estimated) through a variety of processes, including examination of pre-positioned environment monitoring TLDs, bioassay, estimates based on release rates and meteorology, and estimates based on environmental monitoring of food, water, and ambient dose rates. The State is responsible for environmental monitoring activities to support the plant, and is the lead agency for the collection and analysis of environmental samples—including air, soil, foliage, food, and water. The State is also responsible for generating the radiation monitoring reports.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, the staff finds that the applicant has developed general plans for recovery and reentry, including describing criteria to be used to determine when, after an accident, reentry of the facility is appropriate or operation can be resumed. In addition, the applicant has designated the individuals who will fill key positions in the facility recovery organization. The plans adequately specify the means for informing members of the response organizations that a recovery operation is to be initiated, describe how decisions to relax protective measures are made, and include a method for periodically estimating total population exposure.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard M. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(13) and 10 CFR Part 50, Appendix E, Section IV.H, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.14 Exercises and Drills

As reflected in NUREG-0654, Planning Standard N, “Exercises and Drills,” 10 CFR 50.47(b)(14) requires that periodic exercises be conducted to evaluate major portions of emergency response capabilities, periodic drills be conducted to develop and maintain key skills, and deficiencies identified as a result of exercises or drills be corrected. In addition, 10 CFR Part 50, Appendix E, Section IV.F, requires a description of the program that provides for training of employees, exercising by periodic drills, and participation by other assisting persons. The exercises (including hostile action exercises of the onsite and offsite emergency plans) shall test the adequacy of timing and content of implementing procedures and methods, test emergency equipment and communications networks, test the public alert and notification system, and ensure that emergency organization personnel are familiar with their duties. Regulations in 10 CFR Part 50, Appendix E, Section IV.F, further describe the full participation exercise (including timing), participation by each offsite authority having a role under the radiological response plan, deficiencies identified during the exercise, remedial exercises, exercise scenarios and eight-year exercise cycle.

In COL Plan Section N, “Drill and Exercise Program,” the applicant described the program for drills and exercises conducted to practice, test, and evaluate the adequacy of the emergency preparedness program, including facilities, equipment, procedures, communication links, actions of ERO personnel, and coordination between Turkey Point and offsite EROs. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff’s primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard N, “Exercises and Drills.” Planning Standard N provides the detailed evaluation criteria that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(14).

Exercises are conducted to ensure that all major elements of the emergency plan and preparedness program are demonstrated at least once per 8-year cycle, including during off-hour periods and under various weather conditions. A hostile action-based exercise of the onsite emergency plan is conducted each exercise cycle, including conducting full or partial offsite participation in alternating exercise cycles. Exercises provide the opportunity for ERO teams to demonstrate key skills specific to emergency response duties. If key skills are not successfully demonstrated, a remedial exercise may result. Ingestion pathway exercises are conducted on an 8-year cycle, and Turkey Point participates on a rotating basis with the other fixed nuclear facilities in the State of Florida. ITAAC 8.1 states that a full participation exercise (test) will be conducted within the specified time periods of 10 CFR Part 50, Appendix E, and ITAAC 8.1.1 lists onsite exercise objectives. In addition, ITAAC 8.1.2 addresses personnel mobilization and performance of assigned responsibilities.

In addition to the exercises, FPL conducts drills for the purpose of testing, developing, and maintaining the proficiency of emergency responders. Drills are conducted to ensure that adequate emergency response capabilities are maintained. At a minimum, the following drills will be conducted:

- Communication Drills—Communication between the Control Rooms, TSC, EOF, and State and county warning points and EOCs shall be tested monthly. Communication between the Control Rooms, TSC, and EOF to the NRC Operations Center shall be tested using the ENS. ERDS will be activated and tested quarterly to ensure capability

for data to be transferred to the NRC. Communications between Turkey Point and the State and local EOCs and field monitoring teams shall be tested annually. Communications between the Control Rooms, TSC, EOF and ENC shall be tested annually. Communications between the Turkey Point emergency response facilities and appropriate offsite response organizations shall be tested during annual drills.

- Fire Drills—Fire drills shall be conducted in accordance with the plant Technical Specifications, fire protection plan, or plant procedures.
- Medical Emergency Drills—A medical emergency drill, involving a simulated contaminated individual and containing provisions for participation by local support services organizations (i.e., ambulance and support hospital), shall be conducted annually. The offsite portions of the medical drill may be performed as part of the required biennial exercise.
- Radiological Monitoring Drills—Plant environs and radiological monitoring drills (onsite and offsite) are conducted annually. These drills include collection and analysis of sample media and provisions for communications and record keeping.
- Radiation Protection Drills—Radiation protection drills involving a response to, and analysis of, simulated elevated airborne and liquid samples and direct radiation measurements within the plant are conducted semiannually in each Protected Area.
- Augmentation (off-hour) Drills—Augmentation drills shall be run at least once per 8-year cycle, and are planned outside of normal working hours.
- Assembly and Accountability Drills—Accountability drills are conducted at least once per 8-year cycle. The drill includes ascertaining the names of all missing individuals within the Protected Area, and accounting for all individuals within the Protected Area continuously throughout the event.
- Hostile Action-Based (HAB) Drills—At least once per 8-year cycle, an HAB drill will be conducted with offsite participation.

The emergency preparedness manager will be responsible for planning, scheduling, and coordinating all drills and exercises involving offsite agencies. Advance knowledge of the scenario will be kept to a minimum to allow “free-play” decisionmaking and to ensure realistic participation by those involved. Before the drill or exercise, a package will be distributed to the controllers and evaluators that will include the scenario, a list of performance objectives, and a description of the expected responses. During the drill or exercise, qualified evaluators will evaluate drill/exercise performance objectives against measurable demonstration criteria.

As soon as possible following the conclusion of each drill or exercise, a critique is conducted to evaluate the ability of the ERO to implement the emergency plan and its implementing procedures. The emergency preparedness manager (or designee) will prepare a formal written critique report, which will document the ability of the ERO to respond to simulated emergency situation or sequence of events, and may identify the need for changes to the emergency plan, procedures, equipment, facilities, or other components of the emergency preparedness program. The report will also contain corrective actions and recommendations for improvement. Official observers from Federal, State, or local governments will observe, evaluate, and critique

the required biennial exercise, in which the State and counties participate. In addition, representatives from the NRC will observe and evaluate Turkey Point's ability to conduct an adequate self-critique.

The emergency preparedness manager (or designee) is responsible for evaluating recommendations and comments to determine which items will be incorporated into the program or warrant corrective actions, and for the scheduling, tracking, and evaluation of the resolution to the items. The items designated as corrective actions will be placed and tracked in the station's corrective action program. The emergency preparedness manager is responsible for initiating changes to the emergency plan or supporting procedures resulting from drill/exercise critiques. COL Plan Appendix 3 lists an administrative procedure titled "Drills and Exercises."

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654. In addition, ITAAC 8.1.3 addresses offsite exercise objectives and the absence of uncorrected offsite exercise deficiencies prior to reactor operation above 5 percent of rated power.

In view of the above, the staff finds that the applicant has described provisions for conducting periodic exercises and drills to evaluate major portions of emergency response capabilities, and develop and maintain key skills. The exercises will test the adequacy of implementing procedures, emergency equipment and communications networks, and public notification system, and will ensure the ERO personnel are familiar with their duties. In addition, the applicant has described the full participation exercise, participation by offsite authorities, and how exercise and drill deficiencies will be identified and corrected.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard N. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(14) and 10 CFR Part 50, Appendix E, Section IV.F, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.15 *Radiological Emergency Response Training*

As reflected in NUREG-0654, Planning Standard O, "Radiological Emergency Response Training," 10 CFR 50.47(b)(15) requires that radiological emergency response training is provided to those who may be called on to assist in an emergency. In addition, 10 CFR Part 50, Appendix E, Section IV.F.1, requires a description of the program that provides for training of employees, exercising by periodic drills, and participation by other assisting persons.

In COL Plan Section O, "Emergency Response Training," the applicant described the radiological emergency response training program which ensures the training, qualification, and re-qualification of individuals who will be required to provide assistance during an emergency at Turkey Point. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff's primary focus was to evaluate the emergency plan against NUREG-0654, Planning Standard O, "Radiological Emergency Response Training." Planning Standard O provides the detailed evaluation criteria that the staff

should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(15).

FPL implements a training program that provides for initial training and retraining for individuals who have been assigned emergency response duties, including both Turkey Point ERO personnel and offsite support agencies that may be requested to provide assistance. The Turkey Point emergency preparedness manager has the overall responsibility for the training program, and is responsible for the content and accuracy of the emergency preparedness training. The Turkey Point training manager is responsible for ensuring that initial training and annual retraining of ERO personnel is conducted and documented. The Turkey Point departments of Emergency Preparedness and Nuclear Training share the responsibility for ensuring that the ERO receives all necessary initial training and retraining. Discipline supervisors ensure the attendance of onsite personnel for ERO training, and are responsible for ensuring their personnel maintain current qualifications.

ERO personnel are trained in accordance with the Turkey Point emergency preparedness training program. This training is typically performed every year. The training program ensures the training, qualification, and requalification of individuals who may be called on for assistance during an emergency. The ERO training program consists of lesson plans, written examinations and supporting materials, as described in the Nuclear Training Department Program Manual and administrative guidelines. In addition, COL Plan Section O.3, "First-Aid Response," states that personnel assigned to emergency teams that provide first aid will complete American Red Cross Multi-Media First Aid (or equivalent) on a schedule compatible with the American Red Cross specifications.

General Employee Training (GET) provides initial and annual requalification training on the basic elements of the emergency plan for all personnel working at the plant. New ERO personnel also receive an initial overview course that familiarizes them with the emergency plan by providing basic information in the following areas:

- planning basis
- emergency classifications
- ERO and responsibilities
- call-out of ERO
- emergency response facilities
- offsite organizations

In addition to general and specialized classroom training, members of the onsite ERO may receive periodic performance-based emergency response training, including a facility walk-through and various drills, as described in COL Plan Section N.

In RAI 5681, Question 13.03-12 (O-1_, the staff requested additional information from the applicant regarding a description of specialized training and periodic retraining for various emergency response personnel. In a September 30, 2011, response to RAI 5681, Question 13.03-12 (ADAMS Accession No. ML11227A063), the applicant stated that FPL delineates the training requirements for the ERO in an EPIP. (COL Plan Appendix 3 lists an administrative procedure titled "Radiological Emergency Response Training.") The applicant also provided a detailed description of the training procedure in Enclosure 1 to its response, titled "Emergency Response Organization Training Program." The staff reviewed Enclosure 1, and finds it

acceptable because it is consistent with NUREG-0654. Therefore, the staff considers RAI 5681, Question 13.01-12 (O-1), resolved.

Offsite training is provided to support organizations that may be called upon to provide assistance in the event of an emergency. Training for local law enforcement, fire and rescue, medical support, and principal decisionmakers for the State and county is offered annually, and is designed to acquaint the participants with the special problems potentially encountered during a nuclear plant emergency, notification procedures, and their expected emergency response roles. Training of State and local emergency management agency personnel includes a review of the EALs. Site-specific training is also offered to those organizations that must enter the site. Training of offsite EROs is also described in their respective radiological emergency plans.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, the staff finds that the applicant has provided for radiological emergency response training to those who may be called on to assist in an emergency. In addition, the applicant has described the program that provides for the training of employees to ensure they are familiar with their specific emergency response duties, including exercising by periodic drills. The applicant has also described the participation in training and drill by other persons whose assistance may be needed, including specialized initial training and periodic retraining.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard O. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(15) and 10 CFR Part 50, Appendix E, Section IV.F.1, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.16 *Responsibility for the Planning Effort—Development, Periodic Review, and Distribution of Emergency Plans*

As reflected in NUREG-0654, Planning Standard P, “Responsibility for the Planning Effort—Development, Periodic Review, and Distribution of Emergency Plans,” 10 CFR 50.47(b)(16), as reflected in the Planning Standard P, requires that responsibilities for plan development and review and for distribution of emergency plans are established and that planners are properly trained. In addition, 10 CFR Part 50, Appendix E, Section IV.G requires a description of provisions to be employed to ensure that the emergency plan, its implementing procedures, and emergency equipment and supplies are maintained up to date.

In COL Plan Section P, “Responsibility for the Planning Effort,” the applicant described the responsibilities associated with maintaining the emergency preparedness program, including the development, review, and distribution of the emergency plan. The staff reviewed this section, as well as other relevant portions of the application, to determine whether the application conforms to the applicable guidance and complies with the pertinent regulatory requirements. The staff’s primary focus was to evaluate the emergency plan compared to NUREG-0654, Planning Standard P, “Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans.” Planning Standard P provides the detailed evaluation criteria

that the staff should consider to determine whether the emergency plan meets the applicable regulatory requirements in 10 CFR 50.47(b)(16).

COL Plan Section P.1, "Emergency Preparedness Staff Training," states that the Emergency Preparedness staff is involved in maintaining an adequate knowledge of regulatory requirements, guidance, and accepted good practices on a regular basis. Each member of the staff is normally involved in one of the following activities:

- training courses specific or related to emergency preparedness
- observation of, or participation in, drills or exercises at other plants
- participation in industry review and evaluation programs aimed toward emergency preparedness programs/issues
- participation in regional or national emergency preparedness seminars, committees, workshops, or forums
- specific training courses in related areas, such as systems, equipment, operations, radiological protection, or problem identification and resolution

The Chief Nuclear Officer has overall authority and responsible for radiological emergency preparedness and planning, and is responsible for overall emergency plan implementation. The director, emergency preparedness and the emergency preparedness manager at the site are jointly responsible for the overall radiological emergency preparedness program, including program administration and maintenance. Specific responsibilities include staffing and training, drills and exercises, maintenance of the emergency plan and EIPs, and operational readiness of plant facilities, communication systems, and emergency equipment and supplies.

The Turkey Point emergency preparedness manager is assisted by other staff members to ensure that the program is appropriately implemented and maintained in accordance with EIPs, emergency plan administrative procedures (see COL Plan Appendix 3, which lists an administrative procedure titled "Maintaining Emergency Preparedness"), and plant procedures. The emergency plan and unit annexes are reviewed every year, and implementing procedures are reviewed on a continuing basis through their use in drills, exercises, and actual emergency events. The annual emergency plan review/update includes necessary changes, including those identified during audits, assessments, training, drills, and exercises.

The Turkey Point emergency preparedness manager is responsible for coordinating the annual review of the emergency plan, and determining the need for emergency plan or implementing procedure changes. Additional responsibilities include ensuring that elements of the emergency organization (e.g., FPL, local, State, and Federal) are informed of amendments and revisions to the emergency plan. The emergency plan, unit annexes, and implementing procedures are distributed as necessary on a controlled basis to the emergency response facilities and designated offsite locations, and all controlled document holders are issued revision changes upon approval. The names and telephone numbers in the EIPs and Emergency Response Directory (listed as an administrative procedure in COL Plan Appendix 3) are reviewed and updated at least quarterly.

The Turkey Point nuclear oversight manager will perform an independent audit of the emergency preparedness program at least every 12 months, or as necessary. Results of the audits are submitted to management, and any findings that deal with offsite interfaces are reviewed with the appropriate agencies. The results of independent reviews of the emergency preparedness program, including recommendations for improvement, are retained for a period of five years.

COL Plan Section P.6, "Supporting Emergency Response Plans," contains a detailed list of supporting plans from Federal, State, and county organizations. The format for the emergency plan is outlined in the (COLA Part 5) Table of Contents, and a cross-reference of the plan to the evaluation criteria in NUREG-0654 is provided in COL Plan Appendix 6. In addition, COL Plan Appendix 3 provides a list of procedures used to implement specific sections of the emergency plan.

In its Interim Finding Report for Reasonable Assurance, FEMA found that the offsite emergency plans are adequate for this planning standard and associated evaluation criteria in NUREG-0654.

In view of the above, the staff finds that the applicant has established the responsibilities for plan development and review, including distribution of the emergency plans. In addition, the applicant has established provisions to properly train the planners (i.e., individuals responsible for the emergency planning effort), and has described the provisions to be employed to ensure that the emergency plan, its implementing procedures, and emergency equipment and supplies are maintained up-to-date.

Conclusion

The staff concludes that the information provided in the COLA is consistent with the guidelines in NUREG-0654, Planning Standard P. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(16) and 10 CFR Part 50, Appendix E, Section IV.G, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.17 *Evacuation Time Estimate Analysis*

10 CFR 50.47(b)(10) requires in part that ETEs have been developed by applicants and licensees, and that licensees shall update the ETEs on a periodic basis. In addition, 10 CFR Part 50, Appendix E, Section IV, requires that the applicant provide an analysis of the time required to evacuate various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations, using the most recent U.S. Census Bureau data as of the application submission date. NUREG-0654, Appendix 4, "Evacuation Time Estimates within the Plume Exposure Pathway Emergency Planning Zone," contains the detailed guidance to be used by the staff to determine whether the ETE Report meets the applicable regulatory requirements in 10 CFR Part 50, Appendix E. Additional guidance is contained in NUREG/CR-6863 and NUREG/CR-7002. ETEs are part of the required emergency planning basis and provide FPL and State and local governments with site-specific information needed for protective action decisionmaking.

In COLA Revision 7, Part 5, Supplement 1, the applicant included a corrected final report (Revision 4) of the Turkey Point Nuclear Power Plant—Development of Evacuation Time Estimate, dated April 15, 2015 (the ETE Report). This replaces the version in Revision 6 of the

application (i.e., Revision 4, dated August 22, 2014), which in turn replaced ETE Report Revision 3 (dated August 2012, ADAMS Accession No. ML13357A442). The staff had previously evaluated ETE Report Revision 3 against the applicable criteria set forth in Appendix 4 to NUREG-0654, NUREG/CR-6863, and NUREG/CR-7002. Revision 4 of the ETE Report made changes that include the addition of three new evacuation regions and ETE sensitivity studies, which were requested by Miami-Dade County, and incorporate the applicant's responses to NRC RAIs that were based on ETE Report Revision 3 (discussed below).

The Turkey Point Nuclear Plant is along the shore of Biscayne Bay within parts of Miami-Dade and Monroe Counties, approximately 40.2 km (25 mi) south of Miami, FL. Figure 3-1, "PTN EPZ," and Figure 6-1, "PTN EPZ Areas," of the ETE Report show the 10-mi EPZ (protective action) Areas and surrounding communities, and illustrate the plant's location with regard to major highways and geographic features. Appendix L of the ETE Report describes the physical boundaries of each of the 10 EPZ Areas, which are typically bounded by major roadways or the shoreline. Evacuation time estimates were determined for the 23 evacuation regions (i.e., Regions R01 through R23), which encompass all the groupings of areas considered. The evacuation regions are listed in the ETE Report in Tables 6-1 and H-1, and shown in Figures H-1 through H-23.

COL Plan Section J.8 states that an independent ETE study has been performed to provide estimates of the time required to evacuate resident and transient populations surrounding the Turkey Point site for various times of the year under favorable and adverse weather conditions. Referenced in COL Plan Appendix 5, the ETE Report is based on 2010 U.S. Census Bureau data files, local information and a telephone survey, and is included in the COLA as Supplemental Information 1 to the COL Plan. The ETE Report was prepared by KLD Engineering, P.C., in coordination with FPL personnel and emergency management personnel representing State and local governments, and provides a complete review of the evacuation road network. The EPZ Areas were used to define evacuation regions, which approximated keyhole sections within the EPZ. The ETE Report consists of these 13 sections and has detailed supporting information in Appendices A-H and J-N.

The Executive Summary of the ETE Report includes a summary of the conclusions reached in the report. Specifically, general population (i.e., permanent residents and transients) ETEs were computed for 276 unique cases, consisting of a combination of 23 unique evacuation regions (described in Table 6-1) and 12 unique evacuation scenarios (defined in Table 6-2). The 12 evacuation scenarios address different times of day, days of the week, weather conditions, a special event (i.e., NASCAR championship race at the Homestead-Miami Speedway), and one roadway impact scenario (i.e., a single lane closure on the Florida Turnpike northbound for the duration of the evacuation). The adverse weather condition is identified as rain. The highway capacity and free flow speed were each reduced to 90 percent of the good weather conditions to address the impact of adverse weather. For each evacuation scenario, an analysis was included of the applicable population segments, including permanent residents and transient populations, transit-dependent permanent residents, special facility residents, and schools. In addition, the ETEs considered a *shadow evacuation* in each analysis to reflect evacuation of residents from outside of the official evacuation area.¹⁷ The shadow

¹⁷ NUREG/CR-7002 includes consideration of shadow evacuation in ETE analyses, and states that a shadow evacuation occurs when people outside of any officially declared evacuation zone evacuate without having been

region covered the region between the 10-mi EPZ boundary and approximately 15-mi radius from the plant.

The telephone survey results were used to establish demographic characteristics and auto occupancy information. Section 3.1, "Permanent Residents," explains the values for the average household size of 3.13 persons per household and 1.37 vehicles per household were adapted from the survey. Table 3-2, "Permanent Resident Population and Vehicles by Area," quantifies the residents by evacuation area showing a population of 206,329 using 90,352 vehicles for a ratio of 2.28 permanent residents per vehicle. Figure 3-2, "Permanent Resident Population by Sector," shows the 206,329 residents distributed within radial sectors of the EPZ. In addition to the population segments that will be directed to evacuate, a shadow evacuation is considered in the analysis. Following the guidance in NUREG/CR-7002, the ETE study includes an assumption that 20 percent of the permanent resident population living in the region 5 mi beyond the EPZ will evacuate. The estimated shadow population by sector is shown in Figure 3-4, "Shadow Population by Sector." The transit-dependent population is evaluated separately. The process included identifying the population demand, identifying the evacuation resources and associated response times. The ETE identifies 17,463 transit-dependent residents and assumes 50 percent of these will rideshare. Population demand estimates were adjusted to account for the location of residents when the notification is received. The populations for evening and daytime scenarios as presented in Table 6-3, "Percent of Population Groups Evacuating for Various Scenarios."

Major facilities frequented by transients include lodging, marinas, campgrounds, golf courses, shopping centers, sports complexes, and museums and art centers. Population and vehicle estimates are provided for each type of facility along with the supporting basis for the estimates. Table 3-4, "Summary of Transients and Transient Vehicles," of the ETE report provides estimates by evacuation area and shows a total transient population of 33,075, which would need 13,434 vehicles to evacuate. A separate estimate, based on the Florida journey-to-work data, was developed for employee commuters who live outside the EPZ and commute to jobs within the EPZ. A vehicle occupancy factor of 1.09 employees per vehicle, developed from the telephone survey, was used to estimate the number of evacuating vehicles.

As described in Section 2.1, "Data Estimates," the special facility populations are based on county data and direct contact with facilities. Appendix E, "Special Facility Data," includes lists of schools and special facilities with demographic information provided for each institution. The location and enrollment for public and private schools is provided for Miami-Dade and Monroe Counties. To estimate the school evacuation demand, Table 8-2, "School Population Demand Estimation," identifies each school by area and shows that 38,108 students would need 615 school buses to complete evacuation. This assumes 100 percent of students are in attendance, parents do not pick up children, and high school students who drive will leave their vehicle and evacuate by bus. The location and capacity of medical facilities within the EPZ is also provided. The types of patients are listed as ambulatory, wheelchair, and bedridden to support the quantification of specialized vehicles needed to support the evacuation. The Dade Juvenile Resident Facility is identified as a correctional facility located within the EPZ. The capacity and resources needed to support an evacuation of the facility are described in Section 8.6, "Correctional Facilities," and an ETE for the facility is provided.

instructed to do so. Shadow evacuations are considered in developing the demand estimation because the additional traffic generated has the potential to impede an evacuation of the EPZ.

The computation of ETE assumes that 20 percent of the population within the EPZ, but outside the impacted region, will elect to voluntarily evacuate. In addition, 20 percent of the population in the shadow region will also elect to evacuate. These voluntary evacuees could impede those who are evacuating from within the impacted region. The impedance that could be caused by voluntary evacuees is considered in the computation of ETE for the impacted region.

An analysis of evacuation times, which is consistent with guidance in NUREG/CR-7002, is presented for the permanent resident and transient populations, transit-dependent permanent residents, special facility residents, and schools. The population of the EPZ is largely concentrated in the northwest quadrant such that all available roadways in this area need to be considered in the evacuation. In Revision 4 of the ETE study, potential locations of congestion are illustrated in Figure 7-3, "Congestion Patterns at 1 hour after the Advisory to Evacuate," through Figure 7-7, "Congestion Patterns at 9 Hours and 30 Minutes after the Advisory to Evacuate." These figures illustrate congestion patterns at various hours after the advisory to evacuate. These figures show a level of service F, which represents heavy congestion, in the northwest quadrant of the EPZ beginning immediately and lasting more than 7 hours. For the remaining quadrants of the EPZ, the roadway level of service is generally good.

The ETE statistics provide the elapsed times for 90 percent and 100 percent of the population to evacuate from within the affected region. The 90th percentile ETEs have been identified as the values that should be considered when making protective action decision. The ETEs for the general population range from 1:20 (hr:min) to 8:20 at the 90th percentile. The ETEs for the 100th percentile are significantly longer than those for the 90th percentile as a result of the traffic congestion within the EPZ, and have a maximum ETE of 11:45. U.S. Highway 1, Krome Ave., and the Florida Turnpike northbound are the most congested evacuation routes.

The ETEs for the 8-km (5-mi) region are significantly longer when evacuating additional areas beyond 5 mi because of the routing of vehicles from beyond 5 mi into the 5-mi region to access the Florida Turnpike. A NASCAR race at the Homestead-Miami Speedway was considered as the special event scenario, and has a material effect on the 100th percentile ETEs for regions that evacuate beyond 5 mi from the plant. The event occurs on a winter weekend midday under good weather conditions and represents the peak tourist condition within the EPZ. Approximately 100,000 people and 32,600 corresponding vehicles are considered in the analysis. For this event, a special traffic control plan that includes 54 traffic control points and contraflow on Speedway Boulevard is established.

The computation of ETEs considered *staged evacuation* for those regions wherein the 5-mi radius and sectors downwind to the EPZ boundary were evacuated.¹⁸ Those people within the 5-mi region evacuated immediately, while those beyond 5 mi, but within the EPZ, shelter-in-place. Once 90 percent of the 5-mi region is evacuated, those people beyond 5 mi begin to evacuate. Staged evacuation was shown to expedite the evacuation of those evacuees from within the 5-mi region. Although Federal guidance suggests staged evacuation of the 3.2-km (2-mi) regions and sectors downwind to 5 mi, there are no EPZ residents within 2 mi and only 14 residents within 5 mi. Miami-Dade and Monroe Counties only consider

¹⁸ NUREG/CR-7002 establishes an approach to develop ETEs for the staged evacuation protective actions, and states that evacuation research has shown that implementation of a staged keyhole evacuation can be more beneficial to the public health and safety than the normal keyhole evacuation. A staged evacuation is where one area is ordered to evacuate while adjacent areas are ordered to shelter-in-place until directed to evacuate. . The term "keyhole evacuation" is used to indicate the area around a nuclear power plant that resembles a keyhole, in that it includes a 360 degree area around the plant with a two-mile radius, and continuing in a downwind direction, typically out to five miles from the plant. The keyhole includes the downwind sector and adjoining sectors on each side.

keyhole evacuations wherein the 5-mi region and sectors downwind to the EPZ boundary evacuate. However, the current traffic management plans for Miami-Dade and Monroe Counties are sufficient, and the ETE study has not identified any necessary changes to the plans.

Separate ETEs were computed for schools, medical facilities, transit-dependent persons, homebound special needs persons, and correctional facilities. The average single-wave ETEs for these facilities are comparable to the general population ETEs at the 90th percentile. While the ETE for the full EPZ (Region R03) is sensitive to changes in population growth, a full ETE update would be needed for population growth of 6 percent or more between decennial Censuses. Because of the planned traffic treatments to be implemented during the construction of Units 6 and 7, the ETE for the 2-mi region is not materially impacted (i.e., 15 min decreases for the 90th percentile ETE). However, the 90th and 100th percentile ETEs for the full EPZ increases by 3:10 and 3:40, respectively, due to the significant increase in permanent resident and shadow populations from the extrapolation to year 2019.

The staff evaluated the ETE Report against the criteria set forth in Appendix 4 to NUREG-0654, NUREG/CR-6863, and NUREG/CR-7002. The evaluation included checking the ETE Report for internal consistency, consistency with other parts of the emergency plan, and consistency with other parts of the COLA (including the FSAR). Citations in the ETE Report were verified by comparison to the cited document text. General descriptions of the Turkey Point site region, population, and highways were verified using internet searches, aerial photographs, and field survey observations. Demographic information was gathered, a field survey of the EPZ performed, trip generation times estimated, evacuation regions defined, the procedures specified in the 2010 Highway Capacity Manual applied, the site was modeled using the DYNEV II System traffic simulation model,¹⁹ and ETEs were generated.

ETE Report Section 5.4.3, "Trip Generation for Waterways and Recreational Areas," states that boaters in the waters within the 10-mi EPZ will be notified of the emergency by VHF Radio and loudspeakers from boats and aircraft. As indicated in Table 5-2, "Time Distribution for Notifying the Public," the ETE Report assumes 100 percent notification in 45 minutes, with a 2-hour timeframe for boaters, campers, and other transients to return to their vehicles and begin their evacuation trip. In Revision 3 of ETE Report Section 3.3, "Transient Population," the applicant described visitors to Biscayne National Park, including those arriving by car and boat, and stated in Footnote 2 that waterborne vehicles are not considered in the ETE analysis.

In addition, as shown in ETE Report Figures 3-1 and 6-1, approximately one half of the total 10-mi EPZ surface area consists of the ocean and Biscayne Bay. Furthermore, the majority of this water area is not included within any of the 10 EPZ Areas, or the evacuation regions that are considered in the ETE study. Specifically, only EPZ Areas 2, 3, and 10 include water areas within the 10-mi EPZ. As such, the staff determined that it was unclear whether the evacuation of boaters—located on the water outside of the 10 EPZ Areas, but within the 10-mi EPZ—had been considered in the ETE study.

In RAI 7215, Question 13.03-18.A, August 28, 2013 (ADAMS Accession No. ML13240A502), the staff requested additional information from the applicant regarding an estimate of the number of Biscayne National Park visitors that would evacuate the EPZ by vehicle and by boat;

¹⁹ The DYNEV traffic simulation model is a macroscopic model that describes the operations of traffic flow in terms of aggregate variables: vehicles, flow rate, mean speed, volume, density, queue length, on each link, for each turn movement, during each Time Interval (i.e., simulation time step).

including the ETE for each mode of transportation. In addition, in RAI 7215, Question 13.03-18.B, the staff asked the applicant to describe whether, and how, the ETE includes time for boaters to evacuate the EPZ waterways within 10 mi of the plant, including the Biscayne Bay area. Furthermore, in ETE Report Table 1-1, "Stakeholder Interaction," the applicant identified various interactions among the State and local government agencies, but did not specify if the ETE Report (Revision 3) had been reviewed by them. In RAI 7215, Question 13.03-18.C, the staff requested information regarding the applicant's interactions with State and local stakeholders, including the identification of the offsite agencies that have reviewed the updated (Revision 3) ETE Report.

In an October 15, 2013, response to RAI 7215, Questions 13.03-18.A-C (ADAMS Accession No. ML13290A140), the applicant provided estimated peak transient numbers of 5,050 boat visitors and 1,870 boats for the Biscayne National Park. The number of boat visitors is based on the Biscayne National Park Information Guide,²⁰ which states that the park attracts nearly 500,000 visitors a year, and that most of these visitors enter the park by private boat. The applicant used the peak transient numbers of 9,013 vehicle (nonboat) visitors and 2,774 vehicles in ETE Report Table E-4, "Parks/Recreational Attractions within the EPZ"—reflecting visitors to Biscayne National Park (Convoy Point), Black Point Park and Marina, and Homestead Bayfront Park—to estimate what portion of the park's 500,000 visitors are there via boat. With regard to visitors entering the park via boat, Footnote 2 of ETE Report Section 3.3 states that on a typical day, vehicle occupancy is higher than normal because campsites at the park are only accessible by boat.

Footnote 2 is significant with regard to the applicant's estimates of vehicle versus boat evacuations, in that the staff finds it reasonable to assume that most of the visitors, who arrive by vehicles and enter the park by boat, would return to their vehicles for evacuation. In contrast, those visitors arriving at (and entering) the park by boat, would evacuate by boat. Thus, the staff does not see an inconsistency with the applicant's distinction between vehicle and boat evacuations, with regard to the Information Guide's statement that most of the estimated 500,000 visitors enter the park by private boat.

The applicant described notification of the boating transients, and stated that the 2-hour mobilization time for transients presented in Table 5-8, "Trip Generation Histograms for the EPZ Population for Unstaged Evacuation," of the ETE Report is sufficient time for the boating transients to prepare to evacuate. The applicant calculated boat evacuation times using a conservative boat evacuation speed of 5 mph (4.3 knots) and approximated distances to clear the EPZ. The calculated boat (100th percentile) ETEs (including mobilization time) for the 2-mi and 5-mi regions, and the full EPZ, range from 2:12 to 4:12. The 90th percentile ETEs ranged from 1:27 to 3:27. The applicant stated that the results of the boat ETEs were either less than or in good agreement with their respective (vehicular ETE) regions in Table 7-1 (90th percentile ETEs) and Table 7-2 (100th percentile ETEs). The staff finds the applicant's estimated boat evacuation times reasonable, including consideration that their exit from the 10-mi EPZ water area would not be constrained by exit route capacities; equivalent to highway capacity limitations that affect vehicle evacuations, which are described in ETE Report Section 4, "Estimation of Highway Capacity."

The applicant also provided additional details regarding stakeholder interactions, and stated that on July 26, 2012, the results of the ETE Report (Revision 3) were presented to emergency

²⁰ Uhler, John W., "Biscayne National Park Information Guide," Copyright © 1995-2007, Hillclimb Media. Available at <http://www.biscayne.national-park.com/info.htm>, visited August 28, 2014.

planning personnel from the State of Florida, Miami-Dade County, and Monroe County. The State and counties were provided copies of the ETE before the meeting, and all feedback was discussed and addressed at the meeting on July 26, 2012. All comments were resolved in the final ETE Report (Revision 3). FPL Fleet (Turkey Point Units 3 and 4), the State of Florida, and counties subsequently used the ETE results to formulate a protective action strategy.

The applicant's response to RAI 7215, Questions 13.03-18.A-C included proposed changes that were incorporated into COLA Revision 7, corrected final ETE Report Revision 4. These changes consist of a detailed description of how the applicant determined the estimated number of boat visitors, including the associated ETEs. The applicant also deleted the statement in Footnote 2 of ETE Report Section 3.3, which stated that waterborne vehicles are not considered in the ETE analysis. In addition, the applicant proposed an update to ETE Report Table 1-1 to reflect its interactions with State and local governmental authorities for ETE Report (Revision 4), including discussions of ETE methods and review results, and comments received on the draft ETE Report. The staff reviewed the proposed ETE changes, and finds them acceptable because they are consistent with 10 CFR Part 50, Appendix E, Section IV. In addition, the staff confirmed that the ETE changes were included in ETE Report, Revision 4, of COLA Revision 6. Therefore, the staff considers RAI 7215, Questions 13.03-18.A, 18.B and 18.C, resolved, with regard to emergency planning.

In Section 13, "Recommendations," suggestions are provided that have the potential to reduce the ETE. One suggestion is contacting schools before dispatching buses to get an accurate count of the number of buses required. The ETE uses a conservative estimate assuming 100 percent of the students are at the school, and reducing the number of buses to serve actual needs could eliminate the need for a second evacuation wave. A recommendation for a physical improvement is made based on scenario 12 of the ETE, which evaluated the effect of a lane closure on the Florida Turnpike. The results showed an increase in the ETE of as much as 1.5 hours for the lane closure scenario, and recommends the shoulder be used as an additional lane to increase capacity.

In view of the above, the staff finds that the applicant has developed adequate ETEs for the plume exposure pathway EPZ for transient and permanent populations using the most recent U.S. Census Bureau data (i.e., for the year 2010) as of the application revision submission date (i.e., October 14, 2015, for COLA Revision 7.) In addition, the ETEs are consistent with Appendix 4 to NUREG-0654, NUREG/CR-6863, and NUREG/CR-7002

Conclusion

The staff concludes that the ETE Report (Revision 4) is consistent with the guidelines in Appendix 4 to NUREG-0654, NUREG/CR-6863, and NUREG/CR-7002. Therefore, the staff finds the information acceptable and meets the relevant requirements of 10 CFR 50.47(b)(10) and 10 CFR Part 50, Appendix E, Section IV, insofar as the information describes the essential elements of advanced planning and the provisions made to cope with emergency situations.

13.3.4.18 AP1000 COL Items

COLA FSAR Table 1.8-202, "COL Item Tabulation," identifies two COL information items from AP1000 DCD Tier 2 Section 13.3.1, relating to EP. These consist of STD COL 13.3-1 and STD COL 13.3-2, which correspond to COL Action Items 13.3-1 and 13.3.3.3.5-1 (respectively) in Section 13.3 of NUREG-1793. The following addresses the resolution of these two COL information items.

- STD COL 13.3-1

STD COL Information Item 13.3-1 requires that COL applicants referencing the AP1000 certified design will address EP, including post-72 hour actions and its communications interface. In FSAR Section 13.3, the applicant addressed STD COL 13.3-1 by stating the following:

The emergency planning information is submitted to the Nuclear Regulatory Commission as a separate licensing document and is incorporated by reference (see [FSAR] Table 1.6-201).

Post-72 hour support actions, as discussed in DCD Subsections 1.9.5.4 and 6.3.4, are addressed in DCD Subsections 6.2.2, 8.3, and 9.1.3. Provisions for establishing post-72 hour ventilation for the main control room, instrumentation and control rooms, and dc [direct current] equipment rooms are established in operating procedures.

COLA FSAR Table 1.6-201, "Additional Material Referenced," lists the Turkey Point Plant Radiological Emergency Plan and references FSAR Section 13.3. The staff's evaluation of communications interfaces is addressed above in SER Section 13.3.4.6, "Emergency Communications." With regard to post-72 hour actions associated with the AP1000 DCD, the applicant referenced operating procedures and various DCD Tier 2 sections (identified above) that address post-72 hour support actions. The staff identified additional AP1000 DCD sections that address post-72 hour support actions, which include DCD Tier 2 Sections 6.4, "Habitability Systems"; 9.4, "Air-Conditioning, Heating, Cooling, and Ventilation System"; and 9.5, "Other Auxiliary Systems" (e.g., plant lighting systems described in Subsection 9.5.3).

As discussed in AP1000 DCD Tier 2 Section 1.9.5.4, post-72 hour support actions relate to an extended loss of the nonsafety-related systems for both offsite and onsite alternating current (ac) power sources for more than 72 hours. For purposes of the staff's review of EP information in the COLA, and in the context of COL Action Item 13.3-1, the reference to post-72 hour support actions is limited and indirectly related to the habitability and functionality of the TSC. Specifically, it is limited to the reliability of the electrical power supply (post-72 hours) to the TSC ventilation system and communications equipment. The evaluation of the reliability of the electrical power supplies, including the power supplies to the TSC, is addressed in the AP1000 DCD sections referenced above. The habitability and functionality of the TSC is further addressed in SER Section 13.3.4.8.

The staff finds that the applicant has addressed emergency planning (including communication interfaces—see STD COL 13.3-2, below) in support of Units 6 and 7 in the COL Plan. In addition, the applicant has addressed post-72 hour actions through reference to the AP1000 DCD sections (identified above) that specifically address an extended loss of the nonsafety-related systems for both offsite and onsite ac power sources for more than 72 hours. The staff's evaluation of those systems and power sources, including the establishment of associated operating procedures, are addressed in their respective sections of this report. Therefore, the staff finds that the COL applicant has adequately addressed STD COL 13.3-1.

- STD COL 13.3-2

STD COL 13.3-2 requires that COL applicants referencing the AP1000 certified design will address the activation of the EOF, consistent with current operating practice and NUREG-0654.

In FSAR Section 13.3, the applicant addressed STD COL 13.3-2 by stating that the emergency plan describes the plans for coping with emergency situations, including communications interfaces and staffing of the EOF.

Activation and staffing of the EOF is described in the COL Plan, and the staff's evaluation of this information is addressed above in Section 13.3.4.2, "Onsite Emergency Organization," Section 13.3.4.3, "Emergency Response Support and Resources," Section 13.3.4.5, "Notification Methods and Procedures," and Section 13.3.4.8, "Emergency Facilities and Equipment," of this report. Communication interfaces are addressed in SER Section 13.3.4.6, "Emergency Communications." Integral to EOF activation is augmentation of plant staff by corporate support personnel (addressed in License Condition (13-3)) and reliable communications systems (addressed in License Condition (13-4)), which are addressed in SER Sections 13.3.4.2 and 13.3.4.6, respectively. Therefore, subject to License Condition (13-3) and License Condition (13-4), the staff finds that the COL applicant has adequately addressed STD COL 13.3-2.

- PTN COL 9.5-9 and PTN COL 9.5-10

PTN COL 9.5-9 requires that COL applicants referencing the AP1000 certified design will address interfaces to required offsite locations, including the recommendations of BL-80-15 regarding loss of the emergency notification system due to a loss of offsite power. In addition, PTN COL 9.5-10 requires that COL applicants referencing the AP1000 certified design will address the emergency offsite communication system, including the crisis management radio system. In FSAR Section 9.5.2.2.5, the applicant addressed PTN COL 9.5-9 and PTN COL 9.5-10 together by stating that offsite interfaces and emergency offsite communications are described in the emergency plan (see also, FSAR Table 1.8-202).

The applicant described the emergency notification systems (including the ENS) in COL Plan Section E, and the emergency communications systems in COL Plan Section F. The staff's evaluation of offsite emergency notification and communications systems is addressed above in SER Sections 13.3.4.5 and 13.3.4.6, respectively. Therefore, the staff finds that the COL applicant has adequately addressed PTN COL 9.5-9 and PTN COL 9.5-10, with regard to emergency planning for Units 6 and 7. Offsite interfaces and emergency offsite communications are discussed further in SER Section 9.5.2, "Communication System."

- PTN COL 18.2-2

PTN COL 18.2-2 requires that COL applicants referencing the AP1000 certified design will provide specific information regarding EOF and TSC communications and human factors attributes. FSAR Table 1.8-202 identifies FSAR Section 18.2.1.3 as the location where PTN COL 18.2-2 is addressed. In FSAR Section 18.2.1.3, the applicant addressed PTN COL 18.2-2 by stating that the EOF and TSC communication strategies, as well as the EOF and TSC human factors attributes, are described in the emergency plan.

The applicant described EOF and TSC communications and human factors attributes in COL Plan Sections E, F, and H. The staff's evaluation is addressed above in SER Sections 13.3.4.5, 13.3.4.6, and 13.3.4.8, respectively. Therefore, the staff finds that the COL applicant has adequately addressed PTN COL 18.2-2, with regard to emergency planning for Units 6 and 7. PTN COL 18.2-1 is discussed further in SER Section 18.2, "Human Factors Engineering Program Management."

13.3.4.19 *Supplemental Information, Implementation Milestones, and ITAAC*

- STD SUP 13.3-1

Activities applicable to emergency planning that the COL holder (i.e., licensee) shall perform after the COL is issued consist of the implementation milestones and license conditions listed below. The applicant provided supplemental information in STD SUP 13.3-1, which states that FSAR Table 13.4-201 provides milestones for emergency planning implementation. Table 13.4-201 identifies the emergency planning program as operational program (Item) No. 14, and includes the three associated implementation milestones listed below (see also, SER Table 13.3-1, ITAAC 8.1 and ITAAC 9.1). The staff reviewed Table 13.4-201, and finds that the identified implementation milestones associated with the emergency planning program are acceptable because they are consistent with the relevant guidance and acceptance criteria in NUREG-0800, and therefore meet the respective requirements in 10 CFR Part 50, Appendix E. Implementation milestones associated with emergency planning are also addressed below under *License Condition 6*, and in SER Section 13.4, "Operational Programs."

Implementation Milestones

- Full participation exercise conducted within 2 years of the scheduled date for initial loading of fuel, as required by 10 CFR Part 50, Appendix E, Section IV.F.2(a)(ii).
- Onsite exercise conducted within 1 year before the scheduled date for initial loading of fuel, as required by 10 CFR Part 50, Appendix E, Section IV.F.2(a)(ii).
- Applicant's detailed implementing procedures for its emergency plan submitted at least 180 days prior to the scheduled date for initial loading of fuel, as required by 10 CFR Part 50, Appendix E, Section V.

License Condition 6

Part 10 of the COLA proposes License Condition 6, which provides for submission of a schedule that supports NRC's inspections of operational programs. With regard to emergency planning, the schedule shall address EIPs (Item 6.a), an ERDS implementation program plan (Item 6.e), and responding to explosions or fire (Item 6.g). Specifically, the applicant proposed the following:

The licensee shall submit to the appropriate director of the NRC, a schedule, no later than 12 months after issuance of the COL, that supports planning for and conduct of NRC inspections of operational programs listed in the operational program FSAR Table 13.4-201. The schedule shall be updated every six months until 12 months before scheduled fuel loading, and every month thereafter until either the operational programs in the FSAR table have been fully implemented or the plant has been placed in commercial service, whichever comes first. This schedule shall also address:

- a. the emergency planning implementation procedures to the NRC consistent with 10 CFR Part 50, Appendix E, Section V
- e. an emergency response data system (ERDS) implementation program plan consistent with 10 CFR Part 50, Appendix E, Section [VI]

- g. full implementation of the operational and programmatic elements of responding to an event associated with a loss of large areas of the plant due to explosions or fire, prior to initial fuel load

The schedule for submission of the EIPs to the NRC (Item 6.a) is also addressed above in STD SUP 13.3-1 and Implementation Milestones, and in ITAAC 9.1. The ERDS program, including implementation (Item 6.e), is addressed above in SER Sections 13.3.4.5, 13.3.4.6, 13.3.4.8 and 13.3.4.14, and in ITAAC 3.2. With regard to Item 6.g, 10 CFR Part 50, Appendix E, Section IV, addresses various aspects of the emergency preparedness program related to hostile actions toward the site, which are addressed above in SER Sections 13.3.4.1, 13.3.4.3, 13.3.4.4, 13.3.4.8, 13.3.4.10, and 13.3.4.14. The staff reviewed proposed License Condition 6, and finds that the identified implementation milestones associated with the emergency planning program (i.e., Items 6.a, 6.e, and 6.g) are acceptable because they are consistent with the relevant guidance and acceptance criteria in NUREG-0800 and SECY-05-0197, and therefore meet the respective requirements in 10 CFR Part 50, Appendix E. The staff's review of operational program readiness, including proposed License Condition 6, is addressed further in SER Section 13.4. In addition, implementation milestones associated with emergency planning for source, byproduct, and special nuclear materials are addressed in SER Section 1.5.5.²¹

ITAAC and License Condition 1

- PTN SUP 14.3-1

In COLA Part 2, Subsection 14.3.2.3.1, the applicant provided supplemental information in PTN SUP 14.3-1, which states:

EP-ITAAC have been developed to address implementation of elements of the Emergency Plan. Site-specific EP-ITAAC are based on the generic ITAAC provided in Appendix C.II.1-B of Regulatory Guide 1.206. These ITAAC have been tailored to the specific reactor design and emergency planning program requirements.

As stated above in SER Section 13.3.2, proposed License Condition 1 states that the ITAAC identified in the tables in COLA Part 10 Appendix B are hereby incorporated into the COL. Appendix B includes Table 3.8-1 (EP ITAAC) and incorporates by reference the AP1000 DCD ITAAC. The DCD ITAAC include the six AP1000 design-related EP ITAAC in DCD Tier 1 Table 3.1-1. Four of these EP ITAAC in DCD Table 3.1-1 duplicate or overlap similar EP ITAAC in Part 10 Table 3.8-1 (e.g., TSC floor space). The remaining two EP ITAAC in DCD Table 3.1-1 address the availability of various plant parameters in the TSC and a habitable workspace environment for the CSA. DCD Table 3.1-1 also addresses the AP1000 locations of the OSC and TSC, which are changed by COLA Departures PTN DEP 18.8-1 and PTN DEP 18.8-2, respectively, and evaluated above in SER Section 13.3.4.8.

²¹ Section 1.5.5, "Receipt, Possession, and Use of Source, Byproduct, and Special Nuclear Material Authorized by 10 CFR Part 52 [Subpart C] Combined Licenses," of this report addresses implementation milestones for the various operational programs (including emergency planning) relating to byproduct, source, and special nuclear material—in accordance with 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material"; 10 CFR Part 40, "Domestic Licensing of Source Material"; and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."

The staff reviewed the complete set of EP ITAAC for Turkey Point Units 6 and 7, which consists of the EP ITAAC in COLA Part 10 Table 3.8-1, plus the (EP-related) ITAAC in AP1000 DCD Tier 1 Table 3.1-1, and finds that they are adequate because they conform to the respective generic EP ITAAC and acceptance criteria in NUREG-0800, Section 14.3.10.²² Specific EP ITAAC in Part 10 Table 3.8-1 and DCD Table 3.1-1 are also identified above in SER Section 13.3.4, as they relate to the staff's evaluation of the various planning standards. Therefore, the staff finds that the EP ITAAC in Part 10 Table 3.8-1 (reflected below in SER Table 13.3-1) and DCD Table 3.1-1 are acceptable because they are consistent with NUREG-0800 and RG 1.206.

13.3.5 Post Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following ITAAC and license conditions acceptable:

The licensee shall perform and satisfy the acceptance criteria of the EP ITAAC set forth in SER Table 13.3-1 and AP1000 DCD Tier 1 Table 3.1-1.

- License Condition (13-3) - No later than eighteen (18) months before the latest date set forth in the schedule submitted in accordance with 10 CFR 52.99(a) for completing the inspections, tests, and analyses in the ITAAC, Florida Power & Light Company shall have performed an assessment of the on-site and augmented staffing capability for response to a multi-unit event. The staffing assessment shall be performed in accordance with NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," Revision 0.

No later than one hundred eighty (180) days before the date scheduled for initial fuel load, as set forth in the notification submitted in accordance with 10 CFR 52.103(a), Florida Power & Light Company shall revise the Emergency Plan to include the following:

- (a) Incorporation of corrective actions identified in the staffing assessment required by this license condition; and
- (b) Identification of how the augmented staff will be notified, given degraded communications capabilities.

(See SER Section 13.3.4.2.)

- License Condition (13-4) - No later than eighteen (18) months before the latest date set forth in the schedule submitted in accordance with 10 CFR 52.99(a) for completing the inspections, tests, and analyses in the ITAAC, Florida Power & Light Company shall have performed an assessment of on-site and off-site communications systems and equipment relied upon during an emergency event to ensure communications

²² The generic EP ITAAC in Table C.II.1-B1 of Appendix B to Regulatory Guide (RG) 1.206 are identical to the generic EP ITAAC in Table 14.3.10-1 of Section 14.3.10 to NUREG-0800.

capabilities can be maintained during an extended loss of alternating current power. The communications capability assessment shall be performed in accordance with NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," Revision 0.

No later than one hundred eighty (180) days before the date scheduled for initial fuel load set forth in the notification submitted in accordance with 10 CFR 52.103(a), Florida Power & Light Company shall have completed implementation of corrective actions identified in the communications capability assessment, including revisions to the Emergency Plan.

(See SER Sections 13.3.4.2 and 13.3.4.6.)

- License Condition (13-5) - No later than eighteen (18) months before the latest date set forth in the schedule submitted in accordance with 10 CFR 52.99(a) for completing the inspections, tests, and analyses in the ITAAC, Florida Power & Light Company shall have performed a detailed staffing analysis, in accordance with NEI 10-05, "Assessment of On-Shift Emergency Response Organization Staffing and Capabilities," Revision 0.

No later than one hundred eighty (180) days before the date scheduled for initial fuel load set forth in the notification submitted in accordance with 10 CFR 52.103(a), Florida Power & Light Company shall have revised the Emergency Plan to incorporate any changes identified in the staffing analysis that are needed to bring staffing to the required levels.

(See SER Section 13.3.4.2.)

- License Condition (13-6) - No later than one hundred eighty (180) days before the date scheduled for initial fuel load set forth in the notification submitted in accordance with 10 CFR 52.103(a), Florida Power & Light Company shall submit to the Director of NRO, or the Director's designee, in writing, a fully developed set of plant-specific emergency action levels (EALs), in accordance with NEI 07-01, "Methodology for Development of Emergency Action Levels—Advanced Passive Light Water Reactors," Revision 0, with no deviations. The EALs shall have been discussed and agreed upon with State and local officials.

(See SER Section 13.3.4.4.)

13.3.6 Conclusions

As described in detail above, the staff reviewed the application, including applicable portions of the referenced AP1000 DCD. The staff confirmed that the applicant addressed the required information relating to emergency planning, and there is no additional information needed to support the Turkey Point Units 6 and 7 COLA. The results of the staff's technical evaluation of the information incorporated by reference in the application are documented in NUREG-1793 and its supplements for the AP1000 DCD.

The EP ITAAC that are applicable to Turkey Point Units 6 and 7 are provided below in SER Table 13.3-1, which reflects the ITAAC in COLA Part 10 Table 3.8-1, and in DCD Tier 1 Table 3.1-1. The staff concludes that, pursuant to 10 CFR 52.80(a), the applicant included in

the Turkey Point COLA the proposed inspections, tests, and analyses that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the license, the provisions of the Atomic Energy Act of 1954, as amended, and the NRC's rules and regulations in regard to emergency planning.

As part of its review of the Turkey Point Units 6 and 7 COLA, FEMA provided its findings and determinations concerning the adequacy of offsite emergency planning and preparedness, which are based on its review of State and local emergency plans. FEMA concluded that the offsite State and local emergency plans are adequate to cope with an incident at the Turkey Point site, and there is reasonable assurance that these plans can be implemented. On the basis of its review of the FEMA findings and determinations, the staff concludes that the State and local emergency plans are adequate, and there is reasonable assurance that they can be implemented.

Based on its evaluation, as set forth above, the staff concludes that the onsite emergency plan establishes an adequate planning basis for an acceptable state of onsite emergency preparedness, and there is reasonable assurance that the plan can be implemented.

The staff concludes that the emergency plans provide an adequate expression of the overall concept of operation and describe the essential elements of advanced planning and the provisions made to cope with emergency situations. Therefore, the staff concludes that the overall state of onsite and offsite emergency preparedness, when fully implemented, will meet the requirements of 10 CFR 50.33(g), 10 CFR 50.47, Appendix E to 10 CFR Part 50, 10 CFR 50.72, 10 CFR 52.79(a)(21), 10 CFR 52.79(a)(22)(i), 10 CFR 52.80, 10 CFR 52.83, and 10 CFR 100.21.

Furthermore, pursuant to 10 CFR 50.47(a), the staff concludes that, subject to the required conditions and limitations of the full-power license and satisfactory completion of the ITAAC, there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at the new units, and that emergency preparedness at Turkey Point Units 6 and 7, is adequate to support full-power operations.

Table 13.3-1 Turkey Point Units 6 and 7 ITAAC

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
1.0 Emergency Classification System			
10 CFR 50.47(b)(4)—A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.	1.1 A standard emergency classification and emergency action level (EAL) scheme exists, and identifies facility system and effluent parameters constituting the bases for the classification scheme. [D.1**] [**D.1 corresponds to NUREG-0654/ FEMA-REP-1 evaluation criteria.]	1.1.1 An inspection of the main control room, Technical Support Center (TSC), and Emergency Operations Facility (EOF) will be performed to verify that they have displays for retrieving facility system and effluent parameters as specified in the Emergency Classification and EAL technical basis document for the unit, and the displays are functional.	1.1.1 The specified parameters are retrievable in the main control room, TSC and EOF, and the ranges of the displays encompass the values specified in the Emergency Classification and EAL technical basis document for the unit.
		1.1.2 An analysis of the EAL technical bases will be performed to verify as-built, site-specific implementation of the EAL scheme.	1.1.2 The ranges available in the main control room, TSC, and EOF envelop the values for the specific parameters identified in the EALs in Emergency Plan, Annex 2 and 3, Attachment 1.
2.0 Notification Methods and Procedures			
10 CFR 50.47(b)(5)—Procedures have been established for notification, by the licensee, of State and local response organizations and for notification of emergency personnel by all organizations; the content of initial and follow-up messages to response organizations and the	2.1 The means exist to notify responsible State and local organizations within 15 minutes after the licensee declares an emergency. [E.1]	2.1 A test will be performed to demonstrate the capabilities for providing initial notification to the offsite authorities after a simulated emergency classification.	2.1 The State of Florida and the counties of Miami-Dade, and Monroe received notification within 15 minutes after the declaration of an emergency in the main control room and the EOF.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
public has been established; and means to provide early notification and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone (EPZ) have been established.			
	2.2 The means exists to notify emergency response personnel. [E.2]	2.2 A test of the primary and backup emergency response organization (ERO) notification systems will be performed.	2.2 A test of the primary and backup ERO notification systems results in: <ul style="list-style-type: none"> • ERO personnel received the notification message; • Mobilization communication was validated by personnel response to the notification system or by telephone • Response to electronic notification and plant page system was demonstrated during normal working hours, and off hours.
	2.3 The means exists to notify and provide instructions to the populace within the plume exposure emergency planning zone (EPZ). [E.6]	2.3 A full test of the alert and notification system and emergency alert system capabilities will be conducted.	2.3 Notification and clear instructions to the public are accomplished in accordance with the emergency plan requirements.
3.0 Emergency Communications			
10 CFR 50.47(b)(6)—Provisions exist for prompt communications among principal response organizations to	3.1 The means exists for communications between the main control room, TSC, EOF, principal State and local emergency operations centers (EOCs), and field	3.1 A test will be performed of the capabilities. The test for the contact with the principal EOCs and the field monitoring teams will be from the main control room and the EOF. The TSC	3.1 Communications (both primary and secondary methods/systems) are established among the main control room and the EOF with the State of Florida Division of Emergency Management warning point and EOC,

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
emergency personnel and to the public.	monitoring teams. [F.1.d]	communication with the main control room and the EOF will be performed.	Miami-Dade County warning point and EOC, and Monroe County warning point and EOC. Communications are established between the main control room and the EOF with the Turkey Point Nuclear Plant (PTN) field monitoring teams.
	3.2 The means exists for communications from the main control room, TSC and EOF to the Nuclear Regulatory Commission (NRC) headquarters and regional office EOCs (including establishment of the emergency response data system (ERDS) or its successor system between the onsite computer system and the NRC operations center). [F.1.f]	3.2 A test is performed of the capabilities to communicate using the emergency notification system from the main control room, TSC and EOF to the NRC headquarters and regional office EOCs. The health physics network is tested to ensure communications between the TSC and EOF with the NRC operations center. The ERDS is established, or its successor system, between the onsite computer systems and the NRC operations center.	3.2 Communications are established from the main control room, TSC and EOF to the NRC headquarters and regional office EOCs using the emergency notification system. The TSC and EOF demonstrated communications with the NRC operations center using the health physics network. The access port for ERDS, or its successor system, is provided and successfully completes a transfer of data from the unit to the NRC operations center.
4.0 Public Education and Information			
10 CFR 50.47(b)7)—Information is made available to the public on a periodic basis on how they will be notified and what their initial actions should be in an emergency (e.g., listening to a local broadcast station and remaining indoors), the principal points of contact with the news media for dissemination of	4.1 The licensee has provided space that may be used for a limited number of news media. [G.3.b]	4.1 An inspection of the facility/area provided for the news media will be performed in the emergency news center (ENC). The space provides adequate equipment to support the ENC operation, including communications with the site and with the EOCs in the State and counties as well as a	4.1 The ENC includes equipment to support the ENC operations, including communications with the EOF and State and county EOCs. Designated space is available for news media briefings.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
information during an emergency (including the physical location or locations) are established in advance, and procedures for coordinated dissemination of information to the public are established.		limited number of news media.	
5.0 Emergency Facilities and Equipment			
10 CFR 50.47(b)(8)—Adequate emergency facilities and equipment to support the emergency response are provided and maintained.	5.1 The licensee has established a TSC and onsite operations support center (OSC). [H.1]	5.1 An inspection of the TSC and OSC will be performed, including a test of their capabilities.	<p>5.1.1 The TSC has at least 3,000 square feet of floor space consistent with NUREG-0696 (75 square feet/person) and is large enough for required systems, equipment, records and storage.</p> <p>5.1.2 The TSC is located outside the Protected Area, and procedures are in place to enhance passage through security checkpoints expeditiously.</p> <p>5.1.3 Communications equipment is installed and voice transmission and reception are accomplished between the main control room, the OSC, and EOF.</p> <p>5.1.4 The TSC ventilation system includes a high-efficiency particulate air (HEPA), and charcoal filter and radiation monitors are installed. Controls and displays exist in the TSC to control and monitor the status of the TSC ventilation system including heating and cooling, and the activation of the HEPA and charcoal filter system</p>

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
			<p>upon detection of high radiation in the TSC.</p> <p>5.1.5 The TSC has the means to receive, store, process, and display plant and environmental information, as listed in design control document (DCD) Table 7.5-1 and Final Safety Analysis Report (FSAR) Table 7.5-201, and to initiate emergency measures and conduct emergency assessment.</p> <p>5.1.6 A reliable and backup electrical power supply is available for the TSC.</p> <p>5.1.7 There is an OSC located inside the Protected Area. It is separate from the main control room.</p> <p>5.1.8 Communications equipment is installed, and voice transmission and reception are accomplished between the OSC and OSC teams, the TSC and the main control room.</p>
	5.2 The licensee has established an EOF. [H.2]	5.2 An inspection of the EOF will be performed, including a test of the capabilities.	<p>5.2.1 The EOF working space is a minimum of 5625 square feet consistent with NUREG-0696 (75 square feet/person) and is large enough for required systems, equipment, records, and storage.</p> <p>5.2.2 Communications equipment is installed, and voice transmission and reception are accomplished between the main control room, TSC, EOF, field monitoring teams, NRC,</p>

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
			State and county agencies, and ENC. 5.2.3 Radiological data identified in each Plan Annex, meteorological data, and plant system data pertinent to determining offsite protective measures as listed in DCD Table 7.5-1 and FSAR Table 7.5-201 are available and displayed in the EOF, when activated.
6.0 Accident Assessment			
10 CFR 50.47(b)(9)—Adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition are in use.	6.1 The means exist to provide initial and continuing radiological assessment throughout the course of an accident. [I.2]	6.1 A test will be performed to demonstrate that the means exist to provide initial and continuing radiological assessment throughout the course of an accident through the plant computer or communications with the main control room, TSC, and EOF during the course of drills and/or exercises.	6.1 The means are available to provide initial and continuing radiological assessment through displays of instrumentation indicators in the main control room, TSC and EOF during the course of drills and/or exercises.
	6.2 The means exist to determine the source term of releases of radioactive material within plant systems, and the magnitude of the release of radioactive materials based on plant system parameters and effluent monitors. [I.3]	6.2 A test will be performed to demonstrate that the means exist to determine the source term of releases of radioactive material within plant systems, and the magnitude of the release of radioactive materials based on plant system parameters and effluent monitors.	6.2 Emergency plan implementing procedures (EPIPs), through use in training and drills, provide direction to accurately calculate the source terms and the magnitude of the release of postulated accident scenario releases.
	6.3 The means exist to continuously assess the impact of the release of	6.3 A test will be performed to provide evidence that the impact of a radiological	6.3 Demonstrate that the means exist to continuously assess the impact of the release of

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
	radioactive materials to the environment, accounting for the relationship between effluent monitor readings, and onsite and offsite exposures and contamination for various meteorological conditions. [I.4]	release to the environment is able to be assessed by using the relationship between effluent monitor readings, and onsite and offsite exposures and contamination for various meteorological conditions.	radioactive materials to the environment, accounting for the relationship between effluent monitor readings, and onsite and offsite exposures and contamination for various meteorological conditions under drill conditions.
	6.4 The means exist to acquire and evaluate meteorological information. [I.5]	6.4 A test will be performed to acquire and evaluate meteorological data/information.	6.4 Meteorological data exists at the EOF, TSC, main control room, offsite NRC operations center, and the State of Florida, and that this data is in the format needed for the appropriate EIPs.
	6.5 The means exist to determine the release rate and projected doses if the instrumentation used for assessment is off-scale or inoperable. [I.6]	6.5 A test will be performed of the capabilities to determine the release rate and projected doses if the instrumentation used for assessment is off-scale or inoperable.	6.5 The release rate and projected doses can be determined with off-scale or inoperable instrumentation during training or a drill.
	6.6 The means exist for field monitoring within the plume exposure EPZ. [I.7]	6.6 A test will be performed of the capabilities for field monitoring within the plume exposure EPZ.	6.6 The field monitoring teams were dispatched and demonstrated ability to locate and monitor a radiological release within the plume exposure EPZ.
	6.7 The means exist to make rapid assessments of actual or potential magnitude and locations of radiological hazards through liquid or gaseous release pathways, including activation, notification means, field team composition, transportation,	6.7 A test will be performed of the capabilities to make rapid assessments of actual or potential magnitude and locations of radiological hazards through liquid or gaseous release pathways, including activation, notification means, field team composition,	6.7 The field monitoring teams were activated. They demonstrate an ability to make rapid assessment of actual or potential magnitude and locations of any radiological hazards through simulated liquid or gaseous release pathways. A qualified field monitoring team was notified, activated, briefed, and dispatched from the

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
	communication, monitoring equipment, and estimated deployment times. [I.8]	transportation, communication, monitoring equipment, and estimated deployment times.	EOF during a radiological release scenario. The team demonstrated the procedural guidance in team composition, use of monitoring equipment, communication from the field, and locating specific sampling locations.
	6.8 The capability exists to detect and measure radioiodine concentrations in air in the plume exposure EPZ, as low as 10^{-7} $\mu\text{Ci/cc}$ (microcuries per cubic centimeter) under field conditions. [I.9]	6.8 A test will be performed of the capabilities to detect and measure radioiodine concentrations in air in the plume exposure EPZ, as low as 10^{-7} $\mu\text{Ci/cc}$ under field conditions.	6.8 A field monitoring team was dispatched during a radiological release scenario and demonstrated the use of sampling and detection equipment for air concentrations in the plume exposure EPZ, as low as 10^{-7} $\mu\text{Ci/cc}$.
	6.9 The means exist to estimate integrated dose from the projected and actual dose rates, and for comparing these estimates with the Environmental Protection Agency (EPA) protective action guides. [I.10]	6.9 A test will be performed of the capabilities to estimate integrated dose from the projected and actual dose rates, and for comparing these estimates with the EPA protective action guides.	6.9 The means are available to estimate integrated dose from the dose assessment program and the field monitoring team reading during a radioactive release scenario. The results were compared with the EPA protective action guides.
7.0 Protective Response			
10 CFR 50.47(b)(10)—A range of protective actions has been developed for the plume exposure EPZ for emergency workers and the public. In developing this range of actions, consideration has been given to evacuation, sheltering, and, as a supplement to these, the prophylactic use	7.1 The means exist to warn and advise onsite individuals of an emergency, including those in areas controlled by the operator, including: [J.1] <ul style="list-style-type: none"> employees not having emergency assignments visitors 	7.1 A test will be performed of the capabilities to warn and advise onsite individuals of an emergency, including those in the Owner-Controlled Area, and the immediate vicinity.	7.1 Means exist to successfully warn and advise onsite individuals including: <ul style="list-style-type: none"> nonessential employees visitors contractor and construction personnel other personnel within the Owner-Controlled Area, and the immediate vicinity.

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
of potassium iodide (KI), as appropriate. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure EPZ appropriate to the locale have been developed.	<ul style="list-style-type: none"> contractor and construction personnel other persons who may be in the public access areas, on or passing through the site, or within the Owner-Controlled Area. 		
8.0 Exercises and Drills			
10 CFR 50.47(b)(14)—Periodic exercises are (will be) conducted to evaluate major portions of emergency response capabilities, periodic drills are (will be) conducted to develop and maintain key skills, and deficiencies identified as a result of exercises or drills are (will be) corrected.	8.1 Licensee conducts a full participation exercise to evaluate major portions of emergency response capabilities, which includes participation by the State and local agency within the plume exposure EPZ, and the State within the ingestion control EPZ. [N.1]	8.1 A full participation exercise (test) will be conducted within the specified time periods of Appendix E to 10 CFR Part 50.	<p>8.1.1 The exercise is completed within the specified time periods of 10 CFR Part 50, Appendix E; onsite exercise objectives listed below have been met, and there are no uncorrected onsite exercise deficiencies.</p> <p><i>A. Accident Assessment and Classification</i></p> <p>1. Demonstrate the ability to identify initiating conditions, determine emergency action level (EAL) parameters, and correctly classify the emergency throughout the exercise.</p> <p>Standard Criteria:</p> <p>a. Determine the correct highest emergency classification level based on events which were in progress, considering past events and their impact on the current conditions, within 15 minutes from the time the initiating condition(s) or EAL is identified.</p>

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
			<p>B. Notifications</p> <p>1. Demonstrate the ability to alert, notify and mobilize site emergency response personnel.</p> <p>Standard Criteria:</p> <p>a. Complete the designated checklist and perform the announcement concerning the initial event classification of Alert or higher.</p> <p>b. Activate the emergency recall system within 5 minutes of the initial event classification for an Alert or higher.</p> <p>2. Demonstrate the ability to notify responsible State and local government agencies within 15 minutes and the NRC within 60 minutes after declaring an emergency.</p> <p>Standard Criteria:</p> <p>a. Transmit information using the designated checklist in accordance with approved EIPs within 15 minutes of event classification.</p> <p>b. Transmit information using the designated checklist in accordance with approved EIPs within 60 minutes of last transmittal for a follow-up notification to State and local authorities.</p> <p>c. Transmit information using designated checklist within 60 minutes of event classification for an initial notification of the NRC.</p> <p>3. Demonstrate the ability to warn or advise onsite</p>

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
			<p>individuals of emergency conditions.</p> <p>Standard Criteria:</p> <p>a. Initiate notification of onsite individuals (via plant page or telephone) using designated checklist.</p> <p>4. Demonstrate the capability of the Alert and Notification System (ANS) for the public, to operate properly when required.</p> <p>Standard Criteria:</p> <p>a. ≥ 94 percent of the sirens operate properly as indicated by the siren feedback system.</p> <p><i>C. Emergency Response</i></p> <p>1. Demonstrate the capability to direct and control emergency operations.</p> <p>Standard Criteria:</p> <p>a. Command and control is demonstrated by the main control room in the early phase of the emergency and by the TSC within 60 minutes from notification of an Alert or higher event classification with at least minimum staffing.</p> <p>2. Demonstrate the ability to transfer emergency direction from the main control room (simulator) to the TSC.</p> <p>Standard Criteria:</p> <p>a. Evaluation of briefings that were conducted prior to turnover responsibility. Personnel document transfer of duties.</p>

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
			<p>3. Demonstrate the ability to prepare for 24-hour staffing requirements.</p> <p>Standard Criteria:</p> <p>a. Complete 24-hour staff assignments.</p> <p>4. Demonstrate the ability to perform assembly and accountability for all personnel in the Protected Area within 30 minutes of an emergency requiring Protected Area assembly and accountability.</p> <p>Standard Criteria:</p> <p>a. Protected Area personnel assembly and accountability completed within 30 minutes of an emergency requiring Protected Area assembly and accountability.</p> <p><i>D. Emergency Response Facilities</i></p> <p>1. Demonstrate activation of the OSC and the TSC and EOF within 60 minutes of event classification with at least minimum staffing.</p> <p>Standard Criteria:</p> <p>a. The TSC and OSC are activated within 60 minutes from notification of an Alert or higher event classification with at least minimum staffing.</p> <p>b. The EOF is activated within 60 minutes from notification of a Site Area Emergency or higher event classification with at least minimum staffing.</p> <p>2. Demonstrate the adequacy of equipment, security provisions, and</p>

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
			<p>habitability precautions for the TSC, OSC, EOF and ENC, as appropriate.</p> <p>Standard Criteria:</p> <p>a. Evaluation of the adequacy of the emergency equipment in the emergency response facilities including availability and general consistency with the EIPs.</p> <p>b. The security manager implements and follows applicable EIPs.</p> <p>c. The radiation protection manager (TSC) implements the designated checklist if an onsite/offsite release has occurred.</p> <p>d. Demonstrate the capability of TSC and EOF equipment and data displays to clearly identify and reflect the affected unit.</p> <p>3. Demonstrate the adequacy of communications for all emergency support resources.</p> <p>Standard Criteria:</p> <p>a. Emergency response communications listed in the EIPs are available and operational.</p> <p>b. Communications systems are tested in accordance with the TSC, OSC, EOF and ENC activation checklists.</p> <p>c. Emergency response facility personnel are able to operate all specified communications systems.</p>

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
			<p>d. Clear primary and backup communications links are established and maintained for the duration of the exercise.</p> <p><i>E. Radiological Assessment and Control</i></p> <p>1. Demonstrate the ability to obtain onsite radiological surveys and samples.</p> <p>Standard Criteria:</p> <p>a. Radiation Protection Technicians demonstrate the ability to obtain appropriate instruments (range and type) and perform surveys.</p> <p>b. Airborne samples are taken when the conditions indicate the need for the information.</p> <p>2. Demonstrate the ability to continuously monitor and control radiation exposure to emergency workers.</p> <p>Standard Criteria:</p> <p>a. Emergency workers are issued self-reading dosimeters when radiation levels require, and exposures are controlled to 10 CFR Part 20 limits (unless the emergency coordinator authorizes emergency limits for onsite ERO personnel and the emergency offsite manager authorizes emergency exposures for offsite ERO personnel).</p> <p>b. Exposure records are available either from the Site database or a hard copy dose report.</p>

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
			<p>c. Emergency workers include Security and personnel within all emergency facilities.</p> <p>3. Demonstrate the ability to assemble and dispatch field monitoring teams within 60 minutes from the decision to do so.</p> <p>Standard Criteria:</p> <p>a. One field monitoring team is ready to be deployed within 60 minutes of being requested and no later than 90 minutes from the declaration of an Alert or higher.</p> <p>4. Demonstrate the ability to satisfactorily collect and disseminate field team data.</p> <p>Standard Criteria:</p> <p>a. Field team data to be collected is dose rate or counts per minute (cpm) from the plume, both open and closed window, and air sample (gross/net cpm) for particulate and iodine, if applicable.</p> <p>b. Radiological data is satisfactorily disseminated from the field team to the dose assessment coordinator.</p> <p>5. Demonstrate the ability to develop dose projections.</p> <p>Standard Criteria:</p> <p>a. The on-shift Chemistry Technician performs timely and accurate dose projections, in accordance with the EIPs.</p> <p>6. Demonstrate the ability to develop appropriate</p>

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
			<p>Protective Action Recommendations (PARs), and notify appropriate authorities within 15 minutes of a General Emergency declaration or changes in parameters that affect the previously issued PARs.</p> <p>Standard Criteria:</p> <p>a. Total Effective Dose Equivalent (TEDE) and Committed Dose Equivalent (CDE) dose projections from the dose assessment computer code or a backup method are established in accordance with the EIPs.</p> <p>b. PARs are developed within 15 minutes of data availability.</p> <p>c. PARs are transmitted via voice, fax, or electronically within 15 minutes as required by the EIPs.</p>
			<p>8.1.2 Onsite emergency response personnel were mobilized in sufficient numbers to fill emergency response positions identified in the Radiological Emergency Plan, Part 2, Section B, Emergency Response Organization, and they successfully performed their assigned responsibilities.</p>
			<p>8.1.3 The exercise was completed within the specified time periods of Appendix E to 10 CFR Part 50, offsite exercise objectives were met, and there were no</p>

Planning Standard	EP Program Elements	Inspections, Tests, Analyses	Acceptance Criteria
			uncorrected offsite exercise deficiencies, or a license condition requires offsite deficiencies to be corrected prior to operation above 5 percent of rated power.
9.0 Implementing Procedures			
10 CFR Part 50, Appendix E.V—No less than 180 days prior to the scheduled issuance of an operating license for a nuclear power reactor or a license to possess nuclear material, the applicant's detailed implementing procedures for its emergency plan shall be submitted to the Commission.	9.1 The licensee has submitted detailed implementing procedures for its emergency plan no less than 180 days prior to fuel load.	9.1 Confirm that the submittal letter was submitted on time.	9.1 The date of the submittal letter from the licensee demonstrates that the detailed EIPs for the onsite emergency plan were submitted no less than 180 days prior to fuel load.

13.4 Operational Programs (Related to RG 1.206, Section C.III.1, Chapter 13, C.I.13.4, "Operational Program Implementation")

13.4.1 Introduction

In SECY-05-0197, the staff detailed its plan for reviewing operational programs in a COLA. The Commission approved the staff's plan in the related Staff Requirements Memorandum (SRM), dated February 22, 2006. Although numerous programs support the operation of a nuclear power plant, SECY-05-0197 focused on those programs that meet the following three criteria:

1. Required by regulation
2. Reviewed in a COLA
3. Inspected to verify program implementation as described in the FSAR

The programs that meet the above criteria are collectively referred to as "operational programs" and most are identified in SECY-05-0197.

13.4.2 Summary of Application

Section 13.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 13.4 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 13.4 and in Part 10 of the Turkey Point Units 6 and 7 COLA, "Proposed License Conditions and ITAAC," the applicant provided the following:

AP1000 COL Information Item

- STD COL 13.4-1

The applicant provided additional information in STD COL 13.4-1 to address COL Information Item 13.4-1 and COL Action Item 13.4-1, identified in Appendix F of NUREG-1793 and its supplements. This item states that COL applicants referencing the AP1000 certified design will address each operational program.

License Conditions

- Part 10, License Condition 3, "Operational Program Implementation"
- Part 10, License Condition 6, "Operational Program Readiness"

Both license conditions are related to STD COL 13.4-1. License Condition 3 addresses implementation milestones for those operational programs whose implementation is not addressed in the regulations. License Condition 6 includes the timing of information related to operational programs to support NRC inspection activities.

13.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the regulatory basis for acceptance of the supplementary information presented in this application is identified in the individual chapters of this SER that address the evaluations of the specific operational programs, which are itemized in the next section, as clarified by the regulatory guidance in SECY-05-0197 and RG 1.206.

13.4.4 Technical Evaluation

The staff reviewed Section 13.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COLA represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to operational programs. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COLAs. To ensure that the staff's findings on standard content that were documented in the SER for the reference COLA (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COLA, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COLA, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and has verified that the Turkey Point Units 6 and 7 application incorporates the standard content information included in the Vogtle application. Accordingly, the staff finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COLA. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COLA (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Plant (BLN) Units 3 and 4 COLA. In addition, the Staff did not pose any RAIs to FPL regarding the standard content described above, and there was no need to evaluate any information in addition to the standard content.

The following portion of this technical evaluation section is reproduced from Section 13.4.4 of the VEGP SER:

Although the staff concluded that the evaluation performed for the standard content is directly applicable to the VEGP COL application, there were differences in the response provided by the VEGP applicant from that provided by the BLN applicant regarding the standard content material. These differences affect the two license conditions and the table listing the operational programs. These differences are evaluated by the staff below, following the standard content material.

AP1000 COL Information Item

- STD COL 13.4-1

The applicant provided supplemental information by adding the following statement to Section 13.4 of the VEGP COL FSAR:

Operational programs are specific programs that are required by regulations. Table 13.4-201 lists each operational program, the regulatory source for the program, the section of the FSAR in which the operational program is described, and the associated implementation milestone(s).

Each operational program is evaluated by the staff in the applicable SER chapters.

License Conditions

- License Condition 3, “Operational Program Implementation”
- License Condition 6, “Operational Program Readiness”

These two proposed license conditions are evaluated by the NRC staff as part of its evaluation of each of the operational programs in the applicable SER chapters.

The following portion of this technical evaluation section provides the staff's general evaluation of the operational programs and associated license conditions and is reproduced from Section 13.4.4 of the BLN SER:

The NRC staff's review of the acceptability of the supplemental information added by STD COL 13.4-1 and the proposed license conditions is based on four considerations. The first consideration is the acceptability of the individual operational programs, including the implementation of the different phases of these operational programs. The second consideration is whether the applicant correctly identified those operational programs whose implementation requirements are not addressed in the regulations, and, therefore, need to be included in License Condition 3. The third consideration is whether the applicant correctly specified in License Condition 6 the timing of information related to operational programs to support NRC inspection activities. The fourth consideration is whether the list of operational programs in BLN COL FSAR Table 13.4-201 is complete.

In regard to the first consideration, the SER sections referenced in the above table address the NRC staff's regulatory evaluation of the individual operational programs. For each of these operational programs, the staff has either concluded that the applicant has satisfied the applicable regulatory guidance (including the implementation requirements when specified in the regulations), or the staff's review is still ongoing. For those operational program reviews that are ongoing, the staff's final conclusions will be provided in the SER sections referenced in the above table at a later date.

In regard to the second consideration, the NRC staff verified that those operational programs, whose implementation requirements are not specified in the regulations, are captured in License Condition 3.

In regard to the third consideration, the NRC staff compared License Condition 6 to the recommended license condition in SECY-05-0197 related to the timing of information to support NRC inspection activities of operational programs. The staff finds that the applicant used language similar to the recommended license condition specified in SECY-05-0197 to develop License Condition 6. It should be noted that License Condition 6 addresses additional scheduler requirements (Sections b. through d.) that are not related to the operational programs evaluated in this section of the SER, and, therefore, are not evaluated in this SER section.

In regard to the fourth consideration, the NRC staff compared the operational programs provided by the applicant in BLN COL FSAR Table 13.4-201 (included

in the above table) to the operational programs specified in SECY-05-0197. The staff finds that the applicant has included all the operational programs specified in SECY-05-0197, including the two operational programs (Motor-Operated Valve Testing Program and the Safeguards Contingency Program) added by the NRC to the list of operational programs provided by the NEI in its letter dated August 31, 2005.

There are differences between BLN COL FSAR Table 13.4-201 and the table of operational programs in SECY-05-0197 with respect to implementation milestone information. The first difference is the SECY paper states that there are no required implementation milestones in the regulations for the Maintenance Rule Program and the Quality Assurance Program (Operation), while BLN COL FSAR Table 13.4-201 references regulations that require implementation milestones for these two programs. The staff has reviewed the regulation references provided by the applicant and concludes that they do provide appropriate requirements for implementation milestones. Further support for this conclusion is the regulatory guidance in Section C.I.13.4 of RG 1.206. The example table located in this section of the RG references the same implementation regulatory guidance for the Maintenance Rule Program and the Quality Assurance Program (Operation) as does BLN COL FSAR Table 13.4-201.

The second difference is that the SECY paper states that 10 CFR Part 50, Appendix J, specifies implementation requirements for the Containment Leakage Rate Testing Program, while BLN COL FSAR Table 13.4-201 states that the implementation milestones for this program will be controlled by a license condition. The staff has reviewed the implementation milestone proposed in License Condition 3 for the Containment Leakage Rate Testing Program, and finds that it is more stringent than the regulatory guidance in Appendix J. Therefore, the staff finds this difference to be acceptable.

The applicant added an operational program to BLN COL FSAR Table 13.4-201, the Initial Test Program, which is not in the list of operational programs specified in SECY-05-0197. The option of adding operational programs to this list is specifically allowed by SECY-05-0197. Further support for the acceptability of adding the Initial Test Program is that the example table located in Section C.I.13.4 of RG 1.206 also lists this operational program.

Therefore, the NRC staff concludes that the additional information (STD COL 13.4-1) provided by the applicant in BLN COL FSAR Section 13.4, in conjunction with the conditions specified in BLN COL FSAR, Part 10, License Conditions 3 and 6, complies with the applicable regulatory guidance provided in SECY-05-0197.

Evaluation of Site-specific Response to Standard Content

The staff notes that the VEGP applicant separated the fitness-for-duty (FFD) program from the overall security program and added a new operational program, Cyber Security, to the list of operational programs in FSAR Table 13.4-201. The implementation requirements for these additional operational programs comply with the considerations identified above in the standard content material, and are, therefore, acceptable. In addition, the VEGP

applicant also made minor changes to operational program implementation details in License Condition 3 and also modified Sections a. through d. associated with License Condition 6. The changes to these two license conditions are evaluated by the staff in the applicable SER chapters and do not affect the evaluation of operational programs covered in this section of the SER. Therefore, the conclusions reached by the NRC staff related to STD COL 13.4-1 are directly applicable to the VEGP COL application.

The BLN SER text refers to an SER table listing operational programs. This table was not reproduced for the VEGP SER since it duplicates the information in VEGP COL FSAR Table 13.4-201.

The staff notes that standard format License Condition 6, "Operational Program Readiness" identified above (under "License Conditions") was modified in the Vogtle Unit 3 and 4 licenses to cover all operational programs in a single license condition. For the reasons discussed in the technical evaluation section above, the substance of the requirements of License Condition 6 acceptable, and the substance of those requirements will be included in the license in a more general condition that covers the implementation of all programs as follows:

- License Condition 6:

No later than 12 months after issuance of the COL, FPL shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the operational programs listed in FSAR Table 13.4-201, including the associated estimated date for initial loading of fuel. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until all the operational programs listed in FSAR Table 13.4-201 have been fully implemented.

The NRC will conform the above license condition to the general format (numbering, etc.) of a license, if any, issued for Turkey Point Units 6 and 7. The staff also notes that the Turkey Point Units 6 and 7 applicant added the operational program, Special Nuclear Material Control and Accounting Program, to the list of operational programs in FSAR Table 13.4-201. The implementation requirements for this additional operational program comply with the considerations identified above in the standard content material and is therefore acceptable.

13.4.5 Post Combined License Activities

The license conditions for each of the operational programs are discussed in the applicable SER chapters. Therefore, there are no post-COL activities related to this section. As discussed above, however, the form and content of these license conditions may need to be modified to conform to the general format of any license that may be issued.

13.4.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable based on the regulatory guidance in SECY-05-0197, in conjunction with the applicable regulations specified in the individual sections of this SER that evaluated each of the operational programs discussed above. The staff based its conclusion on the following:

- STD COL 13.4-1, as related to operational programs, is acceptable because each of the operational programs in Turkey Point Units 6 and 7 COL FSAR Table 13.4-201 has been found acceptable by the staff in other sections of this SER, as noted in Section 13.4.4 above. In addition, the guidance in SECY-05-0197 and RG 1.206 was used to verify that the applicant's list of operational programs is complete.

13.5 Plant Procedures

13.5.1 Introduction

Descriptions of the administrative and operating procedures that the applicant uses to ensure routine operating, off-normal, and emergency activities are conducted in a safe manner are provided. The applicant, in its plant procedures, provided a brief description of the nature and content of the procedures and a schedule for the preparation of appropriate written administrative and operating procedures. The applicant delineated in the description of the procedures the functional position for procedural revision and approval prior to implementation. Inspection of procedures will occur as part of the construction inspection program.

13.5.2 Summary of Application

Section 13.5 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 13.5 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 13.5, the applicant provided the following:

AP1000 COL Information Item

- STD COL 13.5-1

The applicant provided additional information in STD COL 13.5-1 to resolve COL Information Item 13.5-1 (COL Action Item 13.5-1), which addresses plant procedures.

- PTN COL 13.5-1

The applicant provided additional information in PTN COL 13.5-1 to address standing orders to shift personnel and to address the nuclear shift manager's administrative duties.

The applicant also provided additional information in PTN COL 13.5-1 to address a process for implementing 10 CFR 73.58, "Safety/Security Interface Requirements for Nuclear Power Reactors," while the security procedures and the emergency plan implementing procedures are being developed and implemented. This information is reviewed in Section 13.6.4.1.17 of the SER.

13.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for plant procedures are given in Sections 13.5.1.1 and 13.5.2.1 of NUREG-0800.

The applicable regulations are as follows:

- 10 CFR 50.34(a), "Preliminary safety analysis report"
- 10 CFR 50.34(b), "Final safety analysis report"
 - The applicable regulatory guidance is as follows:
- RG 1.33, "Quality Assurance Program Requirements (Operation)"

13.5.4 Technical Evaluation

The staff reviewed Section 13.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COLA represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to plant procedures. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COLAs. To ensure that the staff's findings on standard content that were documented in the SER for the reference COLA (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COLA, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COLA, as applicable).
- The staff confirmed that all responses to VEGP COL FSAR RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and has verified that the Turkey Point Units 6 and 7 application incorporates the standard content information included in the Vogtle application. Accordingly, the staff finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COLA. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COLA (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COLA.

The following portion of this technical evaluation section is reproduced from Section 13.5.4 of the VEGP SER:

AP1000 COL Information Item

- STD COL 13.5-1, addressing plant procedures

The applicant provided the following additional information to resolve COL Information Item 13.5-1, which addresses the plant procedures of the COL applicant. COL Information Item 13.5-1 states:

Combined License applicants referencing the AP1000 certified design will address plant procedures including the following:

- Normal operation
- Abnormal operation
- Emergency operation
- Refueling and outage planning
- Alarm response
- Maintenance, inspection, test and surveillance
- Administrative
- Operation of post-72 hour equipment

The commitment was also captured as COL Action Item 13.5-1 in Appendix F of the staff's FSER for the AP1000 DCD (NUREG-1793).

The applicant provided additional text in BLN COL FSAR Section 13.5 to describe the administrative, operating and maintenance procedures that the operating organizational staff uses to conduct routine operating, abnormal, and emergency activities in a safe manner.

In BLN COL FSAR Section 13.5, the applicant described the different classifications of procedures that the operators will use, including normal, abnormal, emergency, refueling and outage, and alarm response procedures. The staff finds this information acceptable because it meets the criteria in NUREG-0800, Chapter 13.5.2.1.

In BLN COL FSAR Section 13.5, the applicant stated that the format and content of procedures are controlled by the applicable AP1000 writer's guideline. The DCD, Section 13.5.1, describes a referenced document, APP-GW-GLR-040, "Plant Operations Maintenance and Surveillance Procedures," dated August 23, 2007, which includes the AP1000 writer's guidelines. The staff finds this acceptable because the applicant-provided procedure format and content are consistent with the guidance in NUREG-0800, Section 13.5.2.1.

In BLN COL FSAR Section 13.5.1, the applicant describes the nature and content of administrative procedures for both Category (A) - Controls, and Category (B) - Specific Procedures. The staff finds this acceptable because the listed procedures are consistent with the guidance in NUREG-0800, Section 13.5.1.1.

In BLN COL FSAR Section 13.5.2, the applicant stated that EP procedures are discussed in the Emergency Plan and that security procedures are discussed in the Security Plan. The evaluation of EP procedures may be found in Section 13.3 of this SER. The evaluation of security procedures is found in Section 13.6 of this SER.

In BLN COL FSAR Section 13.5.2, the applicant stated the Quality Assurance Program description (QAPD) provides a description of procedural requirements for maintenance, instrument calibration and testing, inspection, and material control. The evaluation of QAPD procedures is found in Section 17.5 of this SER.

In BLN COL FSAR, Section 13.5.2.1, the applicant stated that information related to EOPs is addressed in the DCD. The DCD, Section 13.5.1, describes the program for developing and implementing EOPs and the required content of EOPs procedures in the referenced document, APP-GW-GLR-040. In addition, this information clarifies the procedure development program (PDP) as described in the procedures generation package (PGP) for EOPs, provides a description of the EOP [emergency operating procedures] verification and validation (V&V) program, and describes the program for training operators on EOPs, including an explanation of how the recommendations of TMI Action Plan, Item I.C.1, will be met. The staff finds the program for developing and implementing EOPs acceptable because it meets the criteria in NUREG-0800, Section 13.5.2.1.

Evaluation of Plant Procedure Issues Not Address in the Standard Content Evaluation

In VEGP COL FSAR Table 1.9-202, "Conformance with SRP Acceptance Criteria," the applicant identified two exceptions to the criteria of NUREG-0800, Section 13.5, which recommend[s] providing a schedule for procedure development in the FSAR, and including a description of procedures to be used by operators in the FSAR. The staff notes that the BLN COL FSAR Table 1.9-202 includes these same two exceptions to the criteria of Section 13.5 of NUREG-0800. The guidance of NUREG-0800, Section 13.5.2.1, states that while the submittal should describe the different classifications of procedures that operators will use, it is not necessary that each applicant's procedures conform precisely. In addition, the procedures, regardless of title or classification, are to be available to accomplish the functions identified in RG 1.33. NUREG-0800 makes allowance for "general areas." The staff finds the two exceptions to the criteria of NUREG-0800, Section 13.5 to be acceptable because the applicant's procedure classification follows the guidance in NUREG-0800, Section 13.5.

In RAI [request for additional information] 13.6-36, the staff requested the VEGP applicant address the requirements of 10 CFR 73.58, "Safety/security requirements for nuclear power plants." In its response dated May 14, 2010, the applicant stated that management controls and processes used to establish and maintain an effective interface between nuclear safety and physical security are addressed by administrative controls. The VEGP applicant committed to revise FSAR Section 13.5.1 to include the safety/security interface implementation process in the list of procedural instructions provided in plant administrative procedures. The NRC staff's review of this safety/security procedural issue,

which includes tracking the incorporation of the relevant material into the VEGP COL application, is addressed in Section 13.6.4.1.17 of this SER.

Supplemental Information

- PTN COL 13.5-1

The staff reviewed PTN COL 13.5-1 related to the applicant providing procedural instructions for standing orders for shift personnel, including the authority and responsibility of the shift manager, unit supervisor, reactor control operator, and shift technical advisor. The staff finds these changes acceptable as they are only changes of position title and meet the guidance of NUREG-0800, Section 13.5.1.1.

The applicant provided additional information in FSAR Section 13.5.1 related to the process for implementing the safety/security interface requirements of 10 CFR 73.58. This information is reviewed in Section 13.4.1.17 of the SER.

The Turkey Point Units 6 and 7 application incorporates the standard content information included in the Vogtle application and there is no additional Turkey Point specific information that required evaluation by the staff and as such the Staff did not pose any RAs to FPL on this section as described above. The staff finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COLA.

13.5.5 Post Combined License Activities

There are no post-COL activities related to this section.

13.5.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the recommendations of NUREG-0800, Sections 13.5.1.1 and 13.5.2.1. The staff based its conclusion on the following:

- STD COL 13.5-1, as related to plant procedures, is acceptable because it describes the procedures used by the applicant's operating organizational staff to conduct routine administrative, operating, abnormal, and emergency activities in a safe manner, in accordance with the regulatory guidance in NUREG-0800, Sections 13.5.1.1 and 13.5.2.1.
- In Turkey Point Units 6 and 7 COL FSAR Table 1.9-202, the applicant identified two exceptions to the criteria of NUREG-0800, Section 13.5, related to providing FSAR descriptions of, and a development schedule for, procedures to be used by operators. The guidance of NUREG-0800, Section 13.5.2.1, makes allowances for "general areas,"

stating that while the FSAR submittal should describe the different classifications of procedures used by operators, it is not expected that each applicant's procedures conform precisely. The staff finds the two exceptions to be acceptable because the applicant's procedure classification follows the guidance in RG 1.33.

13.6 Physical Security

13.6.1 Introduction

The COLA for the Turkey Point Units 6 and 7 describes the COL applicant's physical protection program, which is intended to meet NRC regulations for protection against the design-basis threat (DBT) of radiological sabotage as stated in 10 CFR 73.1, "Purpose and Scope," and provide a high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety.

The physical protection program includes the design of a physical protection system that ensures the capabilities to detect, assess, interdict, and neutralize threats of radiological sabotage are maintained at all times. The applicant incorporates by reference the standard AP1000 design that includes design of physical protection systems within the design of the vital island and vital structures, as described in the Westinghouse DC document for the AP1000 standard design Tier 1 and Tier 2 information, including TR-49, "AP1000 Enhancement Report"; TR-94; "AP1000 Safeguards Assessment Report"; and TR-96, "Interim Compensatory Measures Report." Part 8 of the COLA consists of the Turkey Point Units 6 and 7 Physical Security Plan (PSP), Training and Qualification Plan (T&QP), and Safeguards Contingency Plan (SCP). Section 13.6 of the Turkey Point COL FSAR describes the physical protection program and the physical protection system that are not addressed within the scope of the standard AP1000 design for meeting NRC performance and prescriptive requirements for physical protection stated in 10 CFR Part 73, "Physical Protection of Plants and Material." The staff evaluation of the physical protection program is provided in detail in the safeguards information version of the Turkey Point Units 6 and 7 COLA Section 13.6 SER, and includes a complete set of the staff bases for its findings regarding the program. Because of security constraints, the staff evaluation of the physical security protection program presented in this publicly available SER does not include the same level of detail as the safeguards information version. Those persons with the correct access authorization and need-to-know may view the safeguards information version of the Turkey Point COLA Section 13.6 SER, which is located in the NRC's Secure Local Area Network.

13.6.2 Summary of Application

Section 13.6 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 13.6 of the AP1000 DCD, Revision 19.

Part 8—Safeguards/Security Plans

In a letter dated June 30, 2009, FPL, submitted a Security Plan to the NRC as part of the COLA for proposed Turkey Point Units 6 and 7. In a letter dated September 3, 2010, FPL submitted Revision 1 to the Security Plan. In a letter dated December 21, 2010, FPL submitted Revision 2 to its Security Plan. In a letter dated December 16, 2011, FPL submitted Revision 3 to its Security Plan.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 13.6, the applicant provided the following:

AP1000 COL Information Items

- STD COL 13.6-1

The applicant provided additional information in STD COL 13.6-1 to address COL Information Item 13.6-1, which provides information related to the security plan. The security plan consists of three parts, the PSP, T&QP, and SCP.

- STD COL 13.6-5

The applicant provided additional information in STD COL 13.6-5 to address COL Information Item 13.6-5, which provides information related to the cyber security program. This COL item is evaluated in Section 13.8 of this SER.

License Conditions

- Part 10, License Condition 3, Items C.5, D.3, and G.9

The applicant proposed a license condition in Part 10 of the Turkey Point Units 6 and 7 COLA, which provides the milestones for implementing applicable portions of the Security Program.

- Part 10, License Condition 5

The applicant proposed a license condition in Part 10 of the Turkey Point Units 6 and 7 COLA, which proposed the maintenance of the PSP, T&QP, and the SCP when nuclear fuel is onsite (protected area), and continuing until all nuclear fuel is permanently removed from the site.

- Part 10, License Condition 6

The applicant proposed a license condition to provide a schedule to support the NRC's inspection of operational programs including the PSP, T&QP, and the SCP.

13.6.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, and its supplements. In addition, the relevant requirements of the Commission regulations for the physical security, and the associated acceptance criteria, are summarized in Subsection 13.6.1 of NUREG-0800.

The applicable regulatory requirements for physical protection are as follows:

- The provisions of 10 CFR 52.79(a)(35)(i) and (ii), require that information submitted for a COL describe how the applicant will meet the requirements of 10 CFR Part 73; and provide a description of the implementation of the PSP. The provisions of 10 CFR 52.79(a)(36)(i) through (v), require that the application include an SCP in accordance with the criteria set forth in Appendix C, "Nuclear Power Plant Safeguards Contingency Plans" to 10 CFR Part 73, and a T&QP in accordance with Appendix B, "General Criteria for Security Personnel" of 10 CFR Part 73. The provisions also require

that the applicant provide a description of the implementation of the SCP and the T&QP; and that the applicant protect the PSP, T&QP and SCP, and other related safeguards information in accordance with the requirements of 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements" and 10 CFR 73.22, "Protection of Safeguards Information: Specific requirements."

- The provisions of 10 CFR Part 73 include performance-based and prescriptive regulatory requirements that, when adequately met and implemented, provide high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety. A COL applicant must describe how it will meet the regulatory requirements of 10 CFR Part 73 that are applicable to nuclear power plants.
- The provisions of 10 CFR 52.79(a)(41) require an evaluation of the facility against the SRP in effect 6 months before the docket date of the application. The evaluation required by this section shall include an identification and description of all differences in design features, analytical techniques, and procedural measures proposed for a facility and those corresponding features, techniques, and measures given in the SRP acceptance criteria. Where a difference exists, the evaluation shall discuss how the proposed alternative provides an acceptable method of complying with the Commission's regulations, or portions thereof, that underlie the corresponding SRP acceptance criteria. The SRP is not a substitute for the regulations, and compliance is not a requirement.

The staff used NUREG-0800 Section 13.6.1, Revision 1, dated October 2010, to complete the physical security COL review.

Regulatory guidance documents, technical reports (TRs), accepted industry codes and standards that an applicant may apply to meet regulatory requirements include, but are not limited to the following:

- RG 5.7, Revision 1 "Entry/Exit Control for Protected Areas, Vital Areas, and Material Access Areas," May 1980
- RG 5.12, "General Use of Locks in the Protection and Control of Facilities and Special Nuclear Materials," November 1973.
- RG 5.44, Revision 3 "Perimeter Intrusion Alarm Systems," October 1997.
- RG 5.62, Revision 1 "Reporting of Safeguards Events," November 1987.
- RG 5.65, "Vital Area Access Controls, Protection of Physical Protection Security Equipment and Key and Lock Controls," September 1986.
- RG 5.66, Revision 1, "Access Authorization Program for Nuclear Power Plants," July 2009.
- RG 5.68, "Protection Against Malevolent Use of Vehicles at Nuclear Power Plants," August 1994.
- RG 5.74, "Managing the Safety/Security Interface," March 2009.

- RG 5.75, "Training and Qualification of Security Personnel at Nuclear Power Reactor Facilities," June 2009.
- NRC letter dated April 9, 2009, NRC Staff Review of NEI 03-12, "Template for Security Plan, Training and Qualification, Safeguards Contingency Plan, [and Independent Spent Fuel Storage Installation Security Program]" (Revision 6) (ADAMS Accession No. ML090920528)
- SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," October 28, 2005 (ADAMS Accession No. ML052770257)

The following documents include security-related or safeguards information and are not publicly available:

- RG 5.69, "Guidance for the Application of Radiological Sabotage Design Basis Threat in the Design, Development, and Implementation of a Physical Security Protection Program that Meets 10 CFR 73.55 Requirements," June 2006.
- RG 5.76, "Physical Protection Programs at Nuclear Power Reactors," July 2009.
- RG 5.77, "Insider Mitigation Program" March 2009
- NEI 03-12, Revision 6, "Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan, and Independent Spent Fuel Installation Security Program"
- NUREG/CR-6190, "Update of NUREG/CR-6190 Material to Reflect Postulated Threat Requirements," March 27, 2003.

13.6.4 Technical Evaluation

The staff reviewed Section 13.6 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COLA represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to physical security. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COLAs. To ensure that the staff's findings on standard content that were documented in the SER for the reference COLA (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COLA, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COLA, as applicable) resulting from RAls.

- The staff compared the VEGP PSP, T&QP, and SCP to the corresponding Turkey Point Units 6 and 7 programs. The staff has determined that these plans are sufficiently similar to warrant standard content treatment.
- The staff confirmed that all responses to RAls identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COLA, with the exception discussed in the following paragraph. This standard content material is identified in this SER by use of italicized, double-indented formatting. One clarification to the standard content material presented below is that the staff's detailed evaluation of the physical protection program, which is site-specific, is provided in the safeguards information version of the Turkey Point Units 6 and 7 COL application Section 13.6 SER.

There were site-specific RAls issued to the Turkey Point Units 6 and 7 applicant that resulted in site-specific evaluations for several of the Security Plan review areas. There were also site-specific RAls issued to the VEGP applicant that were not applicable to the Turkey Point Units 6 and 7 application. In addition, there are several Security Plan review areas with site-specific characteristics requiring a specific review by the staff. For these cases, the staff provides the Turkey Point Units 6 and 7 evaluation in the same location as provided in the VEGP SER, but without the use of italicized, double-indented formatting.

The following portion of this technical evaluation section is reproduced from Section 13.6.4 of the VEGP SER:

AP1000 COL Information Item

- STD COL 13.6-1

The NRC staff reviewed STD COL 13.6-1 related to COL Information Item 13.6-1, which identified the need for a COL applicant to address the security plan. STD COL 13.6-1 supplemented Section 13.6 of the VEGP COL FSAR by stating the following text is to be added after Section 13.6 of the VEGP ESP SSAR:

The Security Plan consists of the Physical Security Plan, the Training and Qualification Plan, and the Safeguards Contingency Plan. The Security Plan is submitted to the Nuclear Regulatory Commission as a separate licensing document in order to fulfill the requirements of 10 CFR 52.79(a)(35) and 52.79(a)(36). The Security Plan meets the requirements contained in 10 CFR Part 73 and will be maintained in accordance with the requirements of 10 CFR 52.98. The Plan is categorized as Security Safeguards Information and is withheld from public disclosure pursuant to 10 CFR 73.21.

Section 13.6 of the VEGP COL FSAR also refers to FSAR Table 13.4-201, "Operational Programs Required by NRC Regulations," as providing the milestones for implementing the security program and cyber security program.

The NRC staff's evaluation of the PSP is documented in Section 13.6.4.1 of this SER. The NRC staff's evaluation of the T&QP is documented in Section 13.6.4.2 of this SER. The NRC staff's evaluation of the SCP is documented in Section 13.6.4.3 of this SER. The NRC staff's evaluation of the safety/security interface is documented in Section 13.6.4.1.17 of this SER. Section 13.6.5 of this SER includes the post-combined license activities. Section 13.6.6 of this SER includes the NRC staff's overall conclusions regarding each of the plan submissions.

The NRC staff's evaluation of the physical protection program is provided in detail in the safeguards information version of the VEGP COL application Section 13.6 SER, which is located in the NRC's Secure Local Area Network, document number ES1000015157. Due to security restraints, the NRC staff's evaluation of the physical protection program presented in this publicly-available SER does not include the same level of detail as the safeguards information version. Those persons with the correct access authorization and need-to-know may view the safeguards information version of the VEGP COL application Section 13.6 SER.

License Conditions

- Part 10, License Condition 3, Items C.5, D.3, and G.9

The applicant provided a license condition in Part 10 of the VEGP COL application, which provides the milestones for implementing applicable portions of the Security Program. Specifically, the applicant proposed the following:

C. Receipt of Materials – The licensee shall implement each operational program identified below prior to initial receipt of byproduct, source, or special nuclear materials onsite (excluding Exempt Quantities as described in 10 CFR 30.18).

C.5 – Security Program (applicable portions)

D. Fuel Receipt – The licensee shall implement each operational program identified below prior to initial receipt of fuel onsite.

D.3 – Security Program (applicable portions)

G. Fuel Loading – The licensee shall implement each operational program identified below prior to initial fuel load.

G.9 – Physical Security

- *Part 10, License Condition 5*

The applicant provided a license condition in Part 10 of the VEGP COL application, which proposed the maintenance of the PSP, T&QP, and the SCP when nuclear fuel is onsite, and continuing until all nuclear fuel is permanently removed from the site. Specifically, the applicant proposed the following:

The licensee shall maintain in effect the provisions of the physical security plan, security personnel training and qualification plan, and safeguards contingency plan, and all amendments made pursuant to the authority of 10 CFR 50.90, 50.54(p), 52.97, and Section VIII of Appendix D to Part 52 when nuclear fuel is onsite, and continuing until all nuclear fuel is permanently removed from the site.

*In a letter dated October 22, 2010, the applicant proposed to revise the [security plan] milestone included in VEGP COL FSAR Table 13.4-201 to implement the [security plan] prior to receipt of fuel onsite (protected area.) The NRC staff finds the implementation milestone for the security program [security plan] (security prior to receipt of fuel onsite (protected area)) appropriate and in accordance with the requirement in 10 CFR 73.55. Therefore the staff finds that the proposed License Condition 3, Items C.5, D.3, and G.9 and License Condition 5 are not necessary. The incorporation of proposed changes to the VEGP COL FSAR are tracked as **Confirmatory Item 13.6-1**.*

Resolution of Standard Content Confirmatory Item 13.6-1

Confirmatory Item 13.6-1 is an applicant commitment to revise its FSAR Table 13.4-201 regarding the implementation milestones for the security program. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 13.6-1 is now closed.

In a letter dated April 20, 2011, the applicant proposed to revise the security plan milestone included in Turkey Point Units 6 and 7 COL FSAR Table 13.4-201 to implement the security plan before receipt of fuel onsite (protected area.) The staff verified that the Turkey Point Units 6 and 7 COL FSAR Table 13.4-201 was appropriately revised in Revision 3. As a result Confirmatory Item 13.6-1 is now closed.

- *Part 10, License Condition 6*

The applicant proposed a license condition to provide a schedule to support the NRC's inspection of operational programs including the PSP, T&QP, and the SCP. Specifically, the applicant proposed the following:

The licensee shall submit to the appropriate Director of the NRC, a schedule, no later than 12 months after issuance of the COL,

that supports planning for and conduct of NRC inspections of operational programs listed in the operational program FSAR Table 13.4-201. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operational programs in the FSAR table have been fully implemented or the plant has been placed in commercial service, whichever comes first.

The staff reviewed the above proposed license condition against the recommendations in SECY-05-0197 as endorsed by the related SRM dated February 22, 2006. The staff concludes these proposed license conditions conform to the guidance in SECY-05-0197 and is [sic], therefore, acceptable.

13.6.4.1 Physical Security Plan

The applicant submitted Part 8 of the COL application for the VEGP PSP, T&QP and SCP, to meet the requirements of 10 CFR 52.79(a)(35) and (36). Part 2, FSAR, Chapter 13, Section 13.6 references the VEGP PSP, T&QP, and SCP in describing the licensing basis for establishing a physical protection program, design of a physical protection system, and security organization, which will have, as its objective, to provide high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety. The VEGP submitted PSP makes references to 10 CFR 50.34(c)(2) and (d)(2). The correct references should be 10 CFR 52.79(a)(35) and (36). It is noted that this is a template error, and both references require that the same criteria be met.

Security plans must describe how the applicant will implement Commission requirements and those site-specific conditions that affect implementation as required by 10 CFR 73.55(c)(1)(i).

The requirements are provided in 10 CFR 73.55(c), and (d) to establish, maintain, and implement a PSP to meet the requirements of 10 CFR 73.55, and 10 CFR Part 73, Appendices B and C. The applicant must show establishment and maintenance of a security organization, the use of security equipment and technology, the training and qualification of security personnel, the implementation of predetermined response plans and strategies, and the protection of digital computer and communication systems and networks. The applicant must have a management system for development, implementation, revision, and oversight of security implementing procedures. The approval process for implementing security procedures will be documented.

The NRC staff has reviewed the applicant's description in PSP Section 1 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(c) and (d), and is, therefore, acceptable.

13.6.4.1.1 Introduction and Physical Facility Layout

The provisions of 10 CFR 52.79(a)(35):

- (i) A PSP, describing how the applicant will meet the requirements of 10 CFR Part 73 (and 10 CFR Part 11, if applicable, including the identification and description of jobs as required by 10 CFR 11.11(a) of this chapter, at the proposed facility). The plan must list tests, inspections, audits, and other means to be used to demonstrate compliance with the requirements of 10 CFR Parts 11 and 73, if applicable;
- (ii) A description of the implementation of the PSP;

The provisions of 10 CFR 52.79(a)(36) require:

- (i) An SCP in accordance with the criteria set forth in Appendix C to 10 CFR Part 73. The safeguards contingency plan shall include plans for dealing with threats, thefts, and radiological sabotage, as defined in 10 CFR Part 73 of this chapter, relating to the special nuclear material and nuclear facilities licensed under this chapter and in the applicant's possession and control. Each application for this type of license shall include the information in the applicant's SCP. (Implementing procedures required for this plan need not be submitted for approval);
- (ii) A T&QP in accordance with the criteria set forth in Appendix B to 10 CFR Part 73;
- (iii) A cyber security plan (CSP) in accordance with the criteria set forth in 10 CFR 73.54 of this chapter;
- (iv) A description of the implementation of the SCP, T&QP, and CSP; and
- (v) Each applicant who prepares a PSP, an SCP, a T&QP, or a CSP, shall protect the plans and other related Safeguards Information against unauthorized disclosure in accordance with the requirements of 10 CFR 73.21 of this chapter.

The provisions of 10 CFR 52.79(a)(44) require a description of the FFD program required by 10 CFR Part 26 and its implementation.

Requirements are established in 10 CFR 73.55(c)(2) to ensure protection of safeguards information (SGI) against unauthorized disclosure in accordance with 10 CFR 73.21. The applicant's submittal acknowledges that the PSP, the TQ&P and the SCP discuss specific features of the physical security system or response procedures and are SGI.

Section 1 of the PSP describes the applicant's commitment to satisfying 10 CFR 50.34(c), 10 CFR 50.34(d) and 10 CFR Part 73 by submitting a PSP, and to controlling the PSP and appendices as Safeguards Information according to 10 CFR 73.21.

The provisions of 10 CFR Part 73, Appendix C, Section II.B.3.b, requires a description of the physical layout of the site.

Section 1.1 of the PSP provides descriptions of location, site layout, and facility configuration. The PSP describes the physical structures and their locations on the site, description of the protected area, and a description of the site in relation to nearby town, roads, and other environmental features important to the coordination of response operations. The plant layout

includes identification of main and alternate entry routes for law enforcement assistance forces and the location of control points for marshalling and coordinating response activities.

In addition, FSAR, Chapter 2, "Site Characteristics" of the Turkey Point Units 6 and 7 COLA, provides general plant descriptions that include details of the 10- to 50-mile radius of the geographical area of the Turkey Point Units 6 and 7 site, a site area map, and general plant and site descriptions. Turkey Point Units 6 and 7 COL FSAR, Chapter 1, references the AP1000 DCD for the principal design and operating characteristics for the design and construction of the Turkey Point Units 6 and 7. Part 1, "General Information," of the Turkey Point Units 6 and 7 COLA describes the name of the applicant and principal business locations.

The staff has reviewed the facility physical layout provided in Section 1.1 of the PSP and as supplemented by Turkey Point Units 6 and 7 COL FSAR. The staff determined that the applicant included site-specific conditions that affect the applicant's capability to satisfy the requirements of a comprehensive PSP. The applicant has adequately described the physical structures and their locations onsite and the site in relation to nearby towns, roads, and other environmental features important to the effective coordination of response operations. The applicant described the main and alternate entry routes for law-enforcement assistance forces and the location of control points for marshaling and coordinating response activities in the site-specific law enforcement response plan. The staff concludes that the applicant's security plans have met the requirements for content of a PSP as stated above. Therefore, the staff finds the "Facility Layout" described in the PSP and the Turkey Point Units 6 and 7 COL FSAR is adequate.

The following portion of this technical evaluation section is reproduced from Section 13.6.4.1 of the VEGP SER:

13.6.4.1.2 Performance Objectives

The provisions of 10 CFR 73.55(b)(1) requires, in part, that the applicant shall establish and maintain a physical protection program with an objective to provide high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety. The provisions of 10 CFR 73.55(b)(2) establish, in part, the requirement to protect a nuclear power reactor against the DBT of radiological sabotage as described in 10 CFR 73.1, [. The provisions of] 10 CFR 73.55(b)(3)(i), and 10 CFR 73.55(b)(3)(ii) require the applicant to establish a physical protection program designed to ensure the capabilities to detect, assess, interdict, and neutralize threats up to and including the DBT of radiological sabotage as stated in 10 CFR 73.1, are maintained at all times, provide defense-in-depth, supporting processes, and implementing procedures, which ensure the effectiveness of the physical protection program.

Section 2 of the PSP outlines the requirements for the establishment and maintenance of an onsite physical protection system, security organization, and integrated response capability. As part of the objective, the security program design shall incorporate supporting processes such that no single event can disable the security response capability because of defense-in-depth principles including diversity and redundancy. The physical protection systems and programs described herein are designed to protect against the DBT of radiological sabotage in accordance with the requirements of 10 CFR 73.55(a)

through (r) or equivalent measures that meet the same high assurance objectives provided by paragraph (a) through (r). VEGP Units 3 and 4 uses the corrective action program to track, trend, correct and prevent recurrence of failures and deficiencies in the physical protection program.

The NRC staff has reviewed the applicant's description in PSP Section 2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(b), and is, therefore, acceptable.

13.6.4.1.3 Performance Evaluation Program

Requirements are established in 10 CFR 73.55(b)(4) through (b)(11) for the applicant to analyze and identify site-specific conditions, establish programs, plans, and procedures that address performance evaluations, access authorization, cyber security, insider mitigation, fitness for duty (FFD), corrective actions, and operating procedures. 10 CFR 73.55(b)(6) prescribes specific requirements to establish, maintain, and implement a performance evaluation program in accordance with 10 CFR Part 73, Appendix B, Section VI for implementation of the plant protective strategy.

Section 3.0 of the PSP describes that drills and exercises, as discussed in the T&QP, will be used to assess the effectiveness of the contingency response plan and the effectiveness of the applicant's response strategy. Other assessment methods include formal and informal exercises or drills, self-assessments, internal and external audits and evaluations.

The performance evaluation processes and criteria that assess the effectiveness of the security program, including adequate protection against radiological sabotage, will be established in facility procedures and the deficiencies identified are managed through the corrective action program.

Section 3.0 of the PSP references Section 4.0 of the T&QP, which provides additional details related to the performance evaluation of security personnel in accordance with 10 CFR Part 73, Appendix B, Section VI. Section 4.0 of the T&QP includes the requirements to conduct security force tactical ~~drills~~ [drills] and force-on-force exercises to evaluate security systems effectiveness and response performances of security personnel. In addition, Section 17 of the PSP describes additional detail regarding the applicant's processes for reviews, evaluations and audits that will complement the performance evaluation program.

The NRC staff has reviewed the applicant's description in PSP Section 3, and the T&QP Section 4 (evaluated separately) for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(b)(6), and is, therefore, acceptable.

13.6.4.1.4 Establishment of Security Organization

The provisions of 10 CFR 73.55(d) establish requirements to describe a security organization, including the management system for oversight of the physical protection program. The security organization must be designed, staffed, trained, qualified, re-qualified, and equipped to implement the physical protection program as required by 10 CFR 73.55(b) and 10 CFR Part 73, Appendices B and C.

Section 4.0 of the PSP describes how the applicant meets the requirements of 10 CFR 73.55(d)(1).

Security Organization Management

Section 4.1 of the PSP describes the organization's management structure. The PSP establishes that the security organization is a critical component of the physical protection program and is responsible for the effective application of engineered systems, technologies, programs, equipment, procedures, and personnel necessary to detect, assess, interdict, and neutralize threats up to and including the DBT of radiological sabotage. The security organization may be proprietary, contractor, or other qualified personnel.

The PSP describes that the organization will be staffed with appropriately trained and equipped personnel, in a command structure with administrative controls and procedures, to provide a comprehensive response. Section 4.1 of the PSP also describes the roles and responsibilities of the Security Organization. The PSP provides that at least one full-time, Security Shift Supervisor that has the authority for command and control of all security operations is onsite at all times.

The security force implementing the security functions as described in this section of the plan will be either a proprietary force, contractor, or other qualified personnel. The training qualification requirements are described in the T&QP.

The staff has reviewed the applicant's description in PSP Sections 4 and 4.1 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP provides reasonable assurance that the licensee will meet the requirements of 10 CFR 73.55(d) and is, therefore, acceptable.

The following portion of this technical evaluation section is reproduced from Section 13.6.4.1 of the VEGP SER:

13.6.4.1.5 Qualification for Employment in Security

The requirements of 10 CFR 73.55(d)(3) state, in part, that the applicant may not permit any individual to implement any part of the physical protection program unless the individual has been trained, equipped and qualified to perform assigned duties and responsibilities in accordance with Appendix B to 10 CFR Part 73 and the applicant's T&QP.

Section 5 of the PSP describes that employment qualifications for members of the security force are delineated in the T&QP.

The NRC staff has reviewed the applicant's description in PSP Section 5 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(d)(3), and is, therefore, acceptable.

13.6.4.1.6 Training of Facility Personnel

Consistent with requirements in 10 CFR 73.55(d)(3), 10 CFR 73.56 and 10 CFR Part 73, Appendix B, Section VI.C.1, all personnel who are authorized unescorted access to the applicant's PA receive training, in part to ensure that they understand their role in security and their responsibilities in the event of a security incident. Individuals assigned to perform security-related duties or responsibilities, such as, but not limited to, material searches and vehicle escort are trained and qualified in accordance with the T&QP to perform these duties and responsibilities and to ensure that each individual has the minimum knowledge, skills, and abilities required for effective performance of assigned duties and responsibilities.

Section 6 of the PSP describes the training provided for all personnel who have been granted unescorted access to the applicant's PA.

The NRC staff has reviewed the applicant's description in PSP Section 6 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.56 and 10 CFR Part 73, Appendix B, and is, therefore, acceptable.

13.6.4.1.7 Security Personnel Training

The provisions of 10 CFR 73.55(d) require that all security personnel are trained and qualified in accordance with 10 CFR Part 73, Appendix B, Section VI prior to performing their duties.

Section 7 of the PSP describes that all security personnel are trained, qualified and perform tasks at levels specific for their assignments in accordance with the applicant's T&QP.

The NRC staff has reviewed the applicant's description in PSP Section 7 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(d), and is, therefore, acceptable. The NRC staff's review of the licensee T&QP is located in Section 13.6.4.2 of this SER.

13.6.4.1.8 Local Law Enforcement Liaison

The following requirement is stated in 10 CFR 73.55(k)(9) "To the extent practicable, licensees shall document and maintain current agreements with applicable law enforcement agencies to include estimated response times and capabilities." In addition, 10 CFR 73.55(m)(2) requires, in part, that an evaluation of the effectiveness of the physical protection system include an audit of response commitments by local, State and Federal law enforcement authorities.

Section 8 of the PSP provides a detailed discussion of its ongoing relationship with local law enforcement agencies (LLEAs). The plans addressing response, communication methodologies and protocols, command and control structures and marshaling locations are located in the operations procedures, emergency plan procedures and the site-specific law enforcement response plan. The law enforcement response plan is reviewed biennially concurrent with the PSP effectiveness review.

The NRC staff has reviewed the applicant's description in PSP Section 8 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(k)(9) and 10 CFR 73.55(m)(2), and is, therefore, acceptable.

13.6.4.1.9 Security Personnel Equipment

The requirements of 10 CFR 73.55(d)(3) state, in part, the applicant may not permit any individual to implement any part of the physical protection program unless the individual has been trained, equipped and qualified in accordance with 10 CFR Part 73, Appendix B, and the T&QP. The provisions of 10 CFR Part 73, Appendix B, Section VI.G.2(a), state, in part, that the applicant must ensure that each individual is equipped or has ready access to all personal equipment or devices required for the effective implementation of the NRC-approved security plans, the applicant's protective strategy, and implementing procedures. The provisions of 10 CFR Part 73, Appendix B, Sections VI.G.2(b) and (c), delineate the minimum equipment requirements for security personnel and armed response personnel.

Section 9 of the PSP describes the equipment, including armament, ammunition, and communications equipment that is provided to security personnel in order to ensure that security personnel are capable of performing the function stated in the Commission-approved security plans, applicant's protective strategy, and implementing procedures.

The staff has reviewed the applicant's description in PSP Section 9 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP provides reasonable assurance that the licensee will meet the requirements of 10 CFR 73.55(d)(3) and Appendix B, Section VI.G.2, and is, therefore, acceptable.

The following portion of this technical evaluation section is reproduced from Section 13.6.4.1 of the VEGP SER:

13.6.4.1.10 Work Hour Controls

The provisions of 10 CFR Part 26, "Fitness for Duty Programs," Subpart I, "Managing Fatigue," establish the requirements for managing fatigue. 10 CFR 26.205 establishes requirements for work hours. 10 CFR 26.205(a) requires that any individual who performs duties identified in 10 CFR 26.4(a)(1) through (a)(5) shall be subject to the requirements of this section.

Section 10 of the PSP describes that the site will implement work hour controls consistent with 10 CFR Part 26, Subpart I, and that site procedures shall describe performance objectives and implementing procedures.

The NRC staff's review of the fitness-for-duty program is found in Section 13.7 of this SER.

13.6.4.1.11 Physical Barriers

The following requirements are established in 10 CFR 73.55(e): "Each applicant shall identify and analyze site-specific conditions to determine the specific use, type, function, and placement of physical barriers needed to satisfy the physical protection program design requirements of 10 CFR 73.55(b). (1) The applicant shall: (i) Design, construct, install and maintain physical barriers as necessary to control access into facility areas for which access must be controlled or denied to satisfy the physical protection program design requirements of paragraph (b) of this section." The regulation 10 CFR 73.55(b)(3)(ii) states, "Provide defense-in-depth through the integration of systems, technologies, programs, equipment, supporting processes, and implementing procedures as needed to ensure the effectiveness of the physical protection program."

Section 11 of the PSP provides a general description of how the applicant has implemented its program for physical barriers, and that this implementation is in accordance with the performance objectives and requirements of 10 CFR 73.55(b).

OCA Barriers

Section 11.1 of the PSP describes Turkey Point Units 6 and 7 use of OCA barriers at the site.

Vehicle Barriers

PSP Subsections 11.2.1 and 11.2.2 provides for vehicle control measures to protect against the DBT of radiological sabotage. The staff has verified that such measures are in accordance with site-specific analysis. Furthermore, the staff has determined that these measures integrate systems, technologies, programs, supporting processes, and implementing procedures to provide defense-in-depth against the DBT land vehicle bomb assault. The staff has also determined that such measures provide for a vehicle barrier system at a stand-off distance adequate to protect personnel, equipment, and systems necessary to prevent significant core damage and spent fuel sabotage against the effects of such an assault. Furthermore, the staff confirmed that the applicant's PSP provides that the inspection, monitoring, and maintenance of the vehicle barrier system are included in facility procedures. In view of the above, the staff

concludes that the PSP identifies measures taken to provide high assurance that a land vehicle bomb assault can be defended against.

Accordingly, the staff concludes that the proposed vehicle control measures are consistent with the physical protection program design requirements of 10 CFR 73.55(b)(3)(ii) and 10 CFR 73.55(e)(10)(i).

Waterborne Threat Measures

The provisions of 10 CFR 73.55(e)(10)(ii) require the applicant to “[i]dentify areas from which a waterborne vehicle must be restricted, and where possible, in coordination with local, State, and Federal agencies having jurisdiction over waterway approaches, deploy buoys, markers, or other equipment. In accordance with the site-specific analysis, provide periodic surveillance and observation of waterway approaches and adjacent areas.”

Section 11.2.3 of the PSP describes that a site-specific analysis for a water-borne DBT has been conducted and documented. However, there is no waterborne access to Turkey Point Units 6 and 7.

Protected Area Barriers

The provisions of 10 CFR 73.55(e)(8)(i) require that the protected area perimeter must be protected by physical barriers that are designed and constructed to: (1) limit access to only those personnel, vehicles, and materials required to perform official duties, (2) channel personnel, vehicles, and materials to designated access control portals, and (3) be separated from any other barrier designated as a vital area physical barrier, unless otherwise identified in the PSP.

The descriptions of the protected area (PA) barrier are provided in the PSP Section 11.3. These descriptions meet the definitions of physical barriers and protected areas in 10 CFR 73.2 and requirements of 10 CFR 73.55(e)(8).

Section 11.3 of the PSP describes the extent to which the protected area barrier at the perimeter is separated from a vital area/island barrier. The security plan identifies where the PA barrier is not separated from a vital area barrier as required in 10 CFR 73.55(e)(8)(i)(c).

Section 11.3 of the PSP describes isolation zones. As required in 10 CFR 73.55(e)(7), the isolation zone is maintained in outdoor areas adjacent to the protected area perimeter barrier and is designed to ensure the ability to observe and assess activities on either side of the protected area perimeter.

These descriptions meet the definitions of physical barrier and PA in 10 CFR 73.2 and the requirements of 10 CFR 73.55(e)(8).

Vital Area Barriers

The provisions of 10 CFR 73.55(e)(9) require that “[v]ital equipment must be located only within vital areas, which must be located within a protected area so that access to vital equipment requires passage through at least two physical barriers, except as otherwise approved by the Commission and identified in the security plans.” In addition, 10 CFR 73.55(e)(5) requires that certain vital areas shall be bullet resisting.

Section 11.4 of the PSP describes that vital areas are restricted access areas surrounded by physical barriers with the capability to restrict access to only authorized individuals. All vital areas are constructed in accordance with established regulatory requirements. Section 11.4 also describes that the reactor control room, central alarm station (CAS) and the location within which the last access control function for access to the protected area is performed, must be bullet resisting.

The staff finds Section 11.4 describes that the reactor control room, CAS, SAS and the location within which the last access control function for access to the PA is performed must be bullet resisting. Accordingly, the staff finds all vital areas are constructed in accordance with established regulatory requirements.

Target Set Equipment

The provisions of 10 CFR 73.55(f) require the following:

The licensee shall document and maintain the process used to develop and identify target sets, to include the site-specific analyses and methodologies used to determine and group the target set equipment or elements. The licensee shall consider cyber attacks in the development and identification of target sets. Target set equipment or elements that are not contained within a protected or vital area must be identified and documented consistent with the requirements in § 73.55(f)(1) and be accounted for in the licensee's protective strategy. The licensee shall implement a process for the oversight of target set equipment and systems to ensure that changes to the configuration of the identified equipment and systems are considered in the licensee's protective strategy. Where appropriate, changes must be made to documented target sets.

Section 11.5 of the PSP describes that target set equipment or elements that are not contained within a protected or vital area are identified and accounted for in the site protective strategy.

The staff identified several RAIs relating to target sets for the purpose of reviewing the Westinghouse physical protection program. Westinghouse provided design details as background information to assist an applicant with the development of site-specific target set analyses. The staff evaluated the applicant's responses, and found them to be acceptable for the DC review of the AP1000 physical protection program. Westinghouse stated, in Technical Report TR-94, APP-GW-GLR-066, "AP1000 Safeguards Assessment Report," that target sets were created to aid in the development of the AP1000 physical security system, and that final target sets will be developed by the COL applicant prior to fuel onsite (inside PA).

The staff has reviewed the applicant's description in Sections 11.5 and 14.5 of the PSP, Section 7 of the SCP and information in Westinghouse TR-94 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in Sections 11.5 and 14.5 of the PSP, Section 7 of the SCP, and the information in Westinghouse TR-94 are consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in Sections 11.5 and 14.5 of the PSP and Section 7 of the SCP meets the requirements of 10 CFR 73.55(f)(1), (3), and (4), and is, therefore, acceptable. The target sets, target set analysis, and site protective strategy are in the facility implementing procedures, which were not subject to an NRC staff review as part of this COLA, and are, therefore, subject

to future NRC inspections in accordance with 10 CFR 73.55(c)(7)(iv) and 10 CFR Part 73, Appendix C, Section II.B.5(iii).

Delay Barriers

The provisions of 10 CFR 73.55(e)(3)(ii) require that physical barriers must “provide deterrence, delay, or support access control” to perform the required function of the applicant physical protection program. The PSP describes the use of delay barriers at Turkey Point Units 6 and 7.

Section 11.6 of the PSP includes a description of the use of Delay Barriers to meet requirement of 10 CFR 73.55(e).

The staff has reviewed the applicant’s description in PSP Sections 11, 11.1, 11.2, 11.2.1, 11.2.2, 11.2.3, and Sections 11.3 through 11.6 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant’s description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP provides reasonable assurance that the licensee will meet the requirements of 10 CFR 73.55(e), and are, therefore, acceptable.

The following portion of this technical evaluation section is reproduced from Section 13.6.4.1 of the VEGP SER:

13.6.4.1.12 Security Posts and Structures

The provisions of 10 CFR 73.55(e)(5) require that the reactor control room, the CAS, and the location within which the last access control function for access to the PA is performed, must be bullet-resisting.

Section 12 of the PSP describes that security posts and structures are qualified to a level commensurate with their application within the site protective strategy, and that these positions are constructed of bullet resisting materials.

The NRC staff has reviewed the applicant’s description in PSP Section 12 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant’s description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(e)(5), and is, therefore, acceptable.

13.6.4.1.13 Access Control Devices

It is stated in 10 CFR 73.55(g)(1) that, consistent with the function of each barrier or barrier system, the applicant shall control personnel, vehicle, and material access, as applicable, at each access control point in accordance with the physical protection program design requirements of 10 CFR 73.55(b).

The provisions of 10 CFR 73.55(g)(6) require control of access control devices as stated: “The licensee shall control all keys, locks, combinations, passwords

and related access control devices used to control access to protected areas, vital areas and security systems to reduce the probability of compromise.”

Types of Security-Related Access Control Devices

Section 13.1 of the PSP describes that the applicant uses security-related access control devices to control access to protected and vital areas and security systems.

Control and Accountability

Section 13.2.1 of the PSP describes the control of security related locks. Section 13.2.2 of the PSP describes the controls associated with the changes to and replacements of access control devices and the accountability and inventory control process, and the circumstances that require changes in security-related locks. The applicant uses facility procedures to produce, control, and recover keys, locks, and combinations for all areas and equipment, which serve to reduce the probability of compromise. The issue of access control devices is limited to individuals who have unescorted access authorization and require access to perform official duties and responsibilities. Keys and locks are accounted for through a key inventory control process as described in facility procedures.

The NRC staff has reviewed the applicant’s description in PSP Sections 13, 13.1, 13.2, 13.2.1, and 13.2.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant’s description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meet the requirements of 10 CFR 73.55(g)(1) and (6), and are, therefore, acceptable.

13.6.4.1.14 Access Requirements

Access Authorization and Fitness for Duty

The provisions of 10 CFR 73.55(b)(7) require the applicant to establish, maintain, and implement an access authorization program in accordance with 10 CFR 73.56 and to describe the program in the PSP. The provisions of 10 CFR Part 26 require the applicant to establish and maintain a FFD program.

Section 14.1 of the PSP describes that the access authorization program implements regulatory requirements utilizing the provisions in RG 5.66. The staff finds that RG 5.66, is an acceptable method for meeting the requirements of 10 CFR 73.55(b)(7).

The staff has reviewed the applicant’s description in PSP Section 14.1 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant’s description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP provides reasonable assurance that the licensee will meet the requirements of 10 CFR 73.55(b)(7), 10 CFR 73.56 and 10 CFR Part 26 and is, therefore, acceptable.

Insider Mitigation Program

The provisions of 10 CFR 73.55(b)(9) require that the applicant shall establish, maintain, and implement an insider mitigation program and shall describe the program in the PSP. The insider mitigation program must monitor the initial and continuing trustworthiness and reliability of individuals granted or retaining unescorted access authorization to a protected or vital area, and implement defense-in-depth methods to minimize the potential for an insider to impede, either directly or indirectly, the applicant's capability to prevent significant core damage and spent fuel sabotage. The insider mitigation program must include elements from: the access authorization program, the FFD program, the cyber security program and the physical protection program.

Section 14.2 of the PSP describes how the applicant will establish, maintain, and implement an insider mitigation program using the guidance in RG 5.77. The insider mitigation program requires elements from the access authorization program described in 10 CFR 73.56; FFD program described in 10 CFR Part 26; the cyber security program described in 10 CFR 73.54; and the physical security program described in 10 CFR 73.55. In addition, Section 14.2 describes the integration of the programs mentioned above to form a cohesive and effective insider mitigation program. The applicant addresses the observations for the detection of tampering. The staff finds that this approach is an acceptable method for meeting the requirements 10 CFR 73.55(b)(9).

The staff has reviewed the applicant's description in PSP Section 14.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP provides reasonable assurance that the licensee will meet the requirements of 10 CFR 73.55(b)(9) and is, therefore, acceptable.

Picture Badge Systems

Requirements for badges are stated in 10 CFR 73.55(g)(6)(ii). "The licensee shall implement a numbered photo identification badge system for all individuals authorized unescorted access to the protected area and vital areas." In addition, identification badges may be removed from the protected area under limited conditions and only by authorized personnel. Records of all badges shall be retained and shall include name and areas to which persons are granted unescorted access.

The provisions of 10 CFR 73.55(g)(7)(ii) require that individuals not employed by the applicant but who require frequent or extended unescorted access to the protected area and/or vital areas to perform duties and responsibilities required by the applicant at irregular or intermittent intervals, shall satisfy the access authorization requirements of 10 CFR 73.56 and 10 CFR Part 26 of this chapter, and shall be issued a nonemployee photo identification badge that is easily distinguished from other identification badges before being allowed unescorted access to the protected and vital areas. Nonemployee photo identification badges must visually reflect that the individual is a nonemployee and that no escort is required.

Section 14.3 of the PSP describes the site picture badge system, as follows: Identification badges will be displayed while individuals are inside the protected area or vital areas. When not in use, badges may be removed from the protected area by authorized holders, provided that a process exists to deactivate the badge upon exit and positively confirm the individual's true

identity and authorization for unescorted access prior to entry into the protected area. Records are maintained to include the name and areas to which unescorted access is granted of all individuals to whom photo identification badges have been issued.

The staff has reviewed the applicant's description in PSP Section 14.3 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP provides reasonable assurance that the licensee will meet the requirements of 10 CFR 73.55(g)(6)(ii) and (7)(ii) and is, therefore, acceptable.

Searches

The provisions of 10 CFR 73.55(h) require, in part, that applicants meet the objective to detect, deter, and prevent the introduction of firearms, explosives, incendiary devices, or other items, which could be used to commit radiological sabotage. To accomplish this, applicant's shall search individuals, vehicles, and materials consistent with the physical protection program design requirements in paragraph (b) of this section, and the function to be performed at each access control point or portal before granting access.

Section 14.4 of the PSP provides an overview description of the search process for vehicle, personnel and materials. The search process is conducted using security personnel, specifically trained nonsecurity personnel, and technology. Detailed discussions of actions to be taken in the event unauthorized materials are discovered are found in implementing procedures.

Vehicle Barrier Access Control Point

The provisions of 10 CFR 73.55(h)(2)(ii) through (v) provide the requirements for an applicant to search vehicles at the owner-controlled area and 10 CFR 73.55(h)(3) provides requirements for searches of personnel, vehicles and materials prior to entering the protected area.

Section 14.4.1 of the PSP describes the process for the search of personnel, vehicles and materials at predetermined locations prior to granting access to designated facility areas identified by the applicant as needed to satisfy the physical protection program. The applicant states that it has developed specific implementing procedures to address vehicle and materials searches at these locations. Hence the staff finds this acceptable.

PA Packages and Materials Search

Section 14.4.2 of the PSP describes the process for conducting searches of packages and materials for firearms, explosives, incendiary devices, or other items, which could be used to commit radiological sabotage using equipment capable of detecting these items or through visual and physical searches, or both, to ensure that all items are clearly identified before these items can enter the Turkey Point Units 6 and 7 protected area. Detailed requirements for conducting these searches are found in applicant implementing procedures and include the search and control of bulk materials and products. Applicant implementing procedures also discuss the control of packages and materials previously searched and tamper sealed by personnel trained in accordance with the T&QP.

PA Vehicle Search

Section 14.4.3 of the PSP describes the process for the search of vehicles for firearms, explosives, incendiary devices, or other items, which could be used to commit radiological sabotage using equipment capable of detecting these items or through visual and physical searches, or both, to ensure that all items are clearly identified at the protected area. Detailed requirements for conducting these searches are found in the applicant's implementing procedures. The applicant's implementing procedures also address the search methodologies for vehicles that must enter the protected area under emergency conditions.

PA Personnel Searches

Section 14.4.4 of the PSP describes the process for searches of all personnel requesting access into protected areas. The PSP describes the search for firearms, explosives, incendiary devices, or other items, which could be used to commit radiological sabotage using equipment capable of detecting these items or through visual and physical searches or both to ensure that all items are clearly identified prior to granting access into the protected area. All persons except official Federal, State, and LLEA personnel on official duty are subject to these searches upon entry to the protected area. Detailed discussions of observation and control measures are found in implementing procedures.

PA Access Controls

Section 14.4.5 of the PSP describes the process for controlling access at all points where personnel or vehicles could gain access into the applicant's protected area. The plan notes that principal personnel access to the protected area is through a lockable portal. Personnel are only permitted into the PA after positive ID verification, access authorization verification, and a search is performed per Section 14.4 of the PSP. Vehicles are controlled through positive control methods described in the facility procedures.

Escort and Visitor Requirements

The provisions of 10 CFR 73.55(g)(7) and (8) state in part, that the applicant may permit escorted access to protected and vital areas to individuals who have not been granted unescorted access in accordance with the requirements of 10 CFR 73.56 and 10 CFR Part 26 of this chapter. Regulations in 10 CFR 73.55(g)(8) discuss escort requirements. Applicants are required to implement procedures for processing, escorting and controlling visitors. Procedures shall address confirmation of identity of visitors, maintenance of a visitor control register, visitor badging and escort controls including, training, communications, and escort ratios.

Section 14.4.6 of the PSP describes the process for control of visitors. The PSP affirms that procedures address the identification, processing, and escorting of visitors and the maintenance of a visitor control register. Training requirements for escorting visitors includes responsibilities, communications and escort ratios. All escorts are trained to perform escort duties in accordance with site requirements. All visitors wear a badge that clearly indicates that an escort is required.

The staff has reviewed the applicant's description in PSP Sections 14.4, and 14.4.1 through 14.4.6 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800,

Section 13.6.1, the staff finds that the description provided in the PSP provides reasonable assurance that the licensee will meet the requirements of 10 CFR 73.55(h)(2), (h)(3), (g)(7), and (g)(8), and are, therefore, acceptable.

Vital Area Access Controls

The provisions of 10 CFR 73.55(g)(4) require that applicants control access into vital areas consistent with established access authorization lists. In response to a site-specific credible threat or other credible information, applicants shall implement a two-person (line-of-sight) rule for all personnel in vital areas so that no one individual is permitted access to a vital area.

The provisions of 10 CFR 73.56(j) require the applicant to establish, implement, and maintain a list of individuals who are authorized to have unescorted access to specific nuclear power plant vital areas during nonemergency conditions. The list must include only those individuals who have a continued need for access to those specific vital areas in order to perform their duties and responsibilities. The list must be approved by a cognizant applicant manager or supervisor who is responsible for directing the work activities of the individual who is granted unescorted access to each vital area, and updated and re-approved no less frequently than every 31 days.

Section 14.5 of the PSP describes vital areas and states that the applicant maintains vital areas locked and protected by an active intrusion alarm system. An access authorization system is established to limit unescorted access that is controlled by an access authorization list, which is reassessed and reapproved at least once every 31 days. Additional access control measures are described in the facility procedures.

The staff has reviewed the applicant's description in PSP Section 14.5 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP provides reasonable assurance that the licensee will meet the requirements of 10 CFR 73.55(g)(4) and is, therefore, acceptable.

The following portion of this technical evaluation section is reproduced from Section 13.6.4.1 of the VEGP SER:

13.6.4.1.15 Surveillance Observation and Monitoring

The provisions of 10 CFR 73.55(i)(1) require that the applicant establish and maintain intrusion detection systems that satisfy the design requirements of 10 CFR 73.55(b) and provide, at all times, the capability to detect and assess unauthorized persons and facilitate the effective implementation of the protective strategy.

Illumination

The provisions of 10 CFR 73.55(i)(6) require, in part, that all areas of the facility are provided with illumination necessary to satisfy the design requirements of 10 CFR 73.55(b) and implement the protective strategy. Specific requirements include providing a minimum illumination level of 0.2 foot-candles, measured horizontally at ground level, in the isolation zones and appropriate exterior areas within the PA. Alternatively, the applicant may augment the facility illumination

system by means of low-light technology to meet the requirements of this section or otherwise implement the protective strategy. The applicant shall describe in the security plans how the lighting requirements of this section are met and, if used, the type(s) and application of low-light technology.

Section 15.1 of the PSP describes that all isolation zones and appropriate exterior areas within the PA have lighting capabilities that provide illumination sufficient for the initiation of an adequate response to an attempted intrusion of the isolation zone, a PA, or a vital area. A discussion of the implementation of technology using fixed and non-fixed low light level cameras or alternative technological means is provided. The applicant has addressed the potential for loss of lighting and the compensatory actions that would be taken if that event were to occur.

Surveillance Systems

The provisions of 10 CFR 73.55(i)(1) require, in part, that the applicant implement, establish, and maintain intrusion detection and assessment, surveillance, observation and monitoring systems to satisfy the design requirements of 10 CFR 73.55(b), and of the applicant's OCA.

Section 15.2 of the PSP describes that surveillance is accomplished by human observation and technology. Surveillance systems include a variety of cameras, video display, and annunciation systems designed to assist the security organization in observing, detecting assessing alarms or unauthorized activities. Certain systems provide real-time and recorded play back of recorded video images. The specifics of surveillance systems are described in facility implementing procedures.

Intrusion Detection Equipment

Section 15.3 of the PSP describes the perimeter intrusion detection system, and the PA and vital area intrusion detection systems. These systems are capable of detecting attempted penetration of the PA perimeter barrier; are monitored with assessment equipment designed to satisfy the requirements of 10 CFR 73.55(i) and provide real-time and play-back/recorded video images of the detected activities before and after each alarm annunciation. The PSP describes how the applicant will meet regulatory requirements for redundancy, tamper indication and uninterruptable power supply.

Central Alarm Station (CAS) and Secondary Alarm Station (SAS) Operation

The provisions of 10 CFR 73.55(i)(4) provide requirements for alarm stations. It is required, in 10 CFR 73.55(i)(4)(i), that both alarm stations must be designed and equipped to ensure that a single act, in accordance with the DBT of radiological sabotage defined in 10 CFR 73.1, cannot disable both alarm stations. The applicant shall ensure the survivability of at least one alarm station to maintain the ability to perform the following functions: 1) detect and assess alarms; 2) initiate and coordinate an adequate response to an alarm; 3) summon offsite assistance; and 4) provide command and control. 10 CFR 73.55(i)(4)(iii) requires that alarm stations must be equal and redundant.

Section 15.4 of the PSP describes the functional operations of the CAS and the SAS. The PSP provides that the alarm stations are equipped, such that no single act will disable both alarm stations. The applicant's PSP provides that each alarm station is properly manned and that no activities are permitted that would interfere with the operator's ability to execute assigned duties and responsibilities.

Security Patrols

Owner Controlled Area (OCA) Surveillance and Response

The provisions of 10 CFR 73.55(e)(6) require that the applicant establish and maintain physical barriers in the OCA as needed to satisfy the physical protection program design requirements of 10 CFR 73.55(b). It is required, in 10 CFR 73.55(i)(5)(ii), in part, that the applicant provide continuous surveillance, observation and monitoring of the OCA and that these responsibilities may be performed by security personnel during continuous patrols, through the use of video technology, or by a combination of both.

Section 15.5.1 of the PSP describes the processes used to meet this requirement. The PSP discusses the process to be used and provides that details regarding the implementation of OCA surveillance techniques are found in facility procedures. The PSP provides a discussion regarding the implementation of manned and video options for patrolling and surveillance of the OCA.

Protected and Vital Area Patrols

The provisions of 10 CFR 73.55(i)(5)(iii) through (viii) require, in part, that armed patrols check unattended openings that intersect a security boundary, such as an underground pathways, check external areas of the PA and vital area portals, periodically inspect vital areas, conduct random patrols of accessible target set equipment, be trained to recognize obvious tampering and if detected, initiate an appropriate response in accordance with established plans and procedures.

Section 15.5.2 of the PSP describes the process employed by the applicant to meet the above requirements. The PSP describes the areas of the facility that will be patrolled and observed, as well as the frequency of these patrols and observations. The applicant has addressed the observations for the detection of tampering in Section 14.2 of the PSP and in the facility procedures.

The NRC staff has reviewed the applicant's description in PSP Sections 15, 15.1 through 15.4, 15.5.1, and 15.5.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(b) and (i), and are, therefore, acceptable.

13.6.4.1.16 Communications

The provisions of 10 CFR 73.55(j)(1) through (6) describe the requirements for establishment and maintenance of continuous communication capabilities with both onsite and offsite resources to ensure effective command and control during both normal and emergency situations. Alarm stations must be capable of calling for assistance, on-duty security force personnel must be capable of maintaining continuous communication with each alarm station and vehicle escorts, and personnel escorts must maintain timely communication with security personnel. Continuous communication capabilities must terminate in both alarm stations, between LLEA and the control room. Non-portable communications must remain operable from independence power sources. The applicant must identify areas where communications could be interrupted or not maintained.

Notifications (Security Contingency Event Notifications)

Section 16.1 of the PSP describes that the applicant have a process to ensure that continuous communications are established and maintained between the onsite security force staff and the offsite support agencies.

System Descriptions

Section 16.2 of the PSP describes the establishment and maintenance of the communications system. Detailed descriptions of security systems are included in the facility procedures. VEGP has access to both hard wired and alternate communications systems. Site security personnel are assigned communications devices with which to maintain continuous communications with the CAS and SAS. All personnel and vehicles are assigned communications resources with which to maintain continuous communications. Continuous communication protocols are available between the CAS, SAS and the control room.

The NRC staff has reviewed the applicant's description in PSP Sections 16, 16.1 and 16.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(j)(1) through (6), and are, therefore, acceptable.

13.6.4.1.17 Review, Evaluation and Audit of the Physical Security Program

The provisions of 10 CFR 73.55(m) require, in part, that each element of the physical protection program will be reviewed at least every 24 months. An initial review is required within 12 months after original plan implementation, or a change in personnel, procedures, equipment or facilities, which could have a potentially adverse affect on security, or as necessary based on site-specific analysis assessments, or other performance indicators. Reviews must be conducted by individuals independent of the security program and must include the plans, implementing procedures and local law enforcement commitments. Results of reviews shall be presented to senior management above the level of the security manager and findings must be entered in the site corrective action program.

Section 17 of the PSP describes that the physical security program is reviewed 12 months following initial implementation and at least every 24 months by individuals independent of both security program management and personnel who have a direct responsibility for implementation of the security program. The physical security program review includes, but is not limited to, an audit of the effectiveness of the physical security program, cyber security plans, implementing procedures, safety/security interface activities, the testing, maintenance, and calibration program, and response commitments by local, State, and Federal law enforcement authorities.

A review shall be conducted as necessary based upon site-specific analyses, assessments, or other performance indicators and as soon as reasonably practical, but no longer than 12 months, after changes occur in personnel, procedures, equipment, or facilities that potentially could adversely affect safety/security.

The results and recommendations of the physical security program review, management's finding on whether the physical security program is currently effective and any actions taken as a result of recommendations from prior program reviews are documented in a report to plant management and to appropriate corporate management at least one level higher than that having responsibility for the day-to-day plant operation. These reports are maintained in an auditable form and maintained for inspection.

Findings from the onsite physical security program reviews are entered into the facility corrective action program.

In RAI 13.6-36, the NRC staff requested that the applicant address the requirements of 10 CFR 73.58, "Safety/security requirements for nuclear power reactors." In its response dated May 14, 2010, the applicant stated that management controls and processes used to establish and maintain an effective interface between nuclear safety and physical security are addressed by administrative procedures. The applicant committed to revise VEGP COL FSAR Section 13.5.1 to include the safety/security interface implementation process in the list of procedural instructions provided in plant administrative procedures.

*On the basis of its review, the NRC staff finds that since the applicant will revise VEGP COL FSAR Section 13.5.1 to incorporate the requirements for safety/security interfaces, the response to RAI 13.6-36 meets the requirements of 10 CFR 73.58 and is, therefore, acceptable. The incorporation of changes to the VEGP COL FSAR Section 13.5.1 is being tracked as **Confirmatory Item 13.6-2**.*

Resolution of Standard Content Confirmatory Item 13.6-2

Confirmatory Item 13.6-2 is an applicant commitment to revise its FSAR Section 13.5 regarding the requirements of safety/security interfaces. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 13.6-2 is now closed.

In Revision 6, of Turkey Point Units 6 and 7, COL FSAR, Section 13.5.1, the applicant provided additional information for clarifications of how the applicant, once licensed, would analyze and

identify changes in the site-specific conditions related to the AP1000's structures, systems, and components (SSCs) (described in certain technical reports), resulting from changes made to the Turkey Point Units 6 and 7 COL between issuance of the COL and the security program implementation milestones provided in FSAR Table 13.4-201 to ensure that the security plan continues to meet 10 CFR 73.55(b)(4):

A process is in effect at the time of issuance of the combined license and was developed using NRC endorsed industry guidance. This process is used to manage safety/security interface while the security procedures and emergency plan implementing procedures are being developed and implemented.

The staff reviewed the applicant's description in PSP Section 17 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. As set forth above, the applicant's description in the FSAR Section 13.5.1 in Revision 6 and the PSP provides reasonable assurance that the licensee will meet the requirements of 10 CFR 73.55(b)(4), and 10 CFR 73.55(m), and therefore is acceptable.

13.6.4.1.18 Response Requirements

The provisions of 10 CFR 73.55(k) require, in part, that the applicant establish and maintain a properly trained, qualified, and equipped security force required to interdict and neutralize threats up to and including the DBT defined in 10 CFR 73.1, to prevent significant core damage and spent fuel sabotage. To meet this objective, the applicant must ensure that necessary equipment is in sufficient supply, in working condition, and readily available. The applicant must ensure training has been provided to all armed members of the security organization who will be available onsite to implement the applicant's protective strategy as described in the facility procedures and 10 CFR Part 73, Appendix C. The applicant must have facility procedures to reconstitute armed response personnel and have established working agreement(s) with LLEA. The applicant must have implemented a threat warning system to accommodate heightened security threats and coordination with NRC representatives.

Section 18 of the PSP describes an armed response team, responsibilities, training, and equipment, and requires an adequate number of armed response force personnel immediately available at all times to implement each site's protective strategy. The applicant ensures that training is conducted in accordance with the requirements of 10 CFR Part 73, Appendix B that will ensure implementation of the site protective strategy in accordance with 10 CFR Part 73, Appendix C. Procedures are in place to reconstitute the armed response personnel as are agreements with LLEA. Procedures are in place to manage the threat warning system.

In RAI 4899, Questions 13.06-23 and 13.06-24 the staff requested that the applicant clarify PSP, Section 18, which details the minimum number of armed responders continuously in the protected area. The staff requested the applicant explain how this number correlates with the expected number detailed in Westinghouse TR-94, AP1000 Safeguards Assessment Report.

In a letter dated September 6, 2011 (ADAMS Accession No. ML11251A165), the applicant provided an explanation of how they determined the minimum numbers of armed responders needed for the Turkey Point Units 6 and 7 Site. The applicant also provided a metric showing the staffing relationship between Westinghouse TR 94, AP1000 Safeguards Assessment Report, and staffing positions and responsibility for Turkey Point Site Units 6 and 7.

On the basis of its review, the staff finds the response to RAI 4899, Questions 13.06-23 and 13.06-24 to be acceptable. The applicant's metric provided the needed clarification on the minimum number of armed responders continuously in the protected area and the expected number detailed in Westinghouse TR-94.

The staff has reviewed the applicant's description in PSP Section 18 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP provides reasonable assurance that the licensee will meet the requirements of 10 CFR 73.55(k) and is, therefore, acceptable.

The following portion of this technical evaluation section is reproduced from Section 13.6.4.1 of the VEGP SER:

13.6.4.1.19 Special Situations Affecting Security

The provisions of 10 CFR 73.58 require that each operating nuclear power reactor applicant with a license issued under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities" or 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants" shall comply with the following requirements: the applicant shall assess and manage the potential for adverse effects on safety and security, including the site emergency plan, before implementing changes to plant configurations, facility conditions, or security; the scope of changes to be assessed and managed must include planned and emergent activities (such as, but not limited to, physical modifications, procedural changes, changes to operator actions or security assignments, maintenance activities, system reconfiguration, access modification or restrictions, and changes to the security plan and its implementation); where potential conflicts are identified, the applicant shall communicate them to appropriate personnel and take compensatory and/or mitigative actions to maintain safety and security under applicable Commission regulations, requirements, and license conditions.

Section 19 of the PSP includes requirements for assessments to manage increased risk of special situations affecting security.

Refueling/Major Maintenance

Section 19.1 of the PSP describes that, for refueling or major maintenance activities, the PSP describes that security procedures identify measures for implementation of actions prior to refueling or major maintenance activities. These measures include controls to ensure that a search is conducted prior to revitalizing an area, that protective barriers and alarms are fully operational, and post-maintenance performance testing to ensure operational readiness of equipment in accordance with 10 CFR 73.55(n)(8).

Construction and Maintenance

Section 19.2 of the PSP describes that during periods of construction and maintenance when temporary modifications are necessary, that the applicant will implement measures that provide for equivalency in the physical protective

measures and features impacted by the activities, such that physical protection measures are not degraded. The process for making such changes or modifications is included in the facility procedures.

The NRC staff has reviewed the applicant's description in PSP Sections 19, 19.1, and 19.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(n)(8) and 10 CFR 73.58, and are, therefore, acceptable.

13.6.4.1.20 Maintenance, Testing and Calibration

In accordance with 10 CFR 73.55(n), the applicant is required to establish, maintain, and implement a maintenance, testing, and calibration program to ensure that security systems and equipment, including secondary and uninterruptible power supplies, are tested for operability and performance at predetermined intervals, maintained in operable condition, and have the capability of performing their intended functions. The regulation requires that the applicant describe their maintenance testing and calibrations program in the PSP, and that the implementing procedures describe the details and intervals for conducting these activities. Applicant procedures must identify criteria for documenting deficiencies in the corrective action program and ensuring data protection in accordance with 10 CFR 73.21. The applicant must conduct periodic operability testing of the intrusion alarm system and must conduct performance testing in accordance with the PSP and implementing procedures. Communication equipment must be tested not less than daily, and search equipment must also be tested periodically. Procedures must be established for testing equipment located in hazardous areas, and procedures must be established for returning equipment to service after each repair.

Sections 20.1 through 20.6 of the PSP describe the maintenance, testing and calibration program for security-related equipment. Section 20.1 states that the applicant shall conduct intrusion detection testing in accordance with recommended testing procedures described in RG 5.44, "Perimeter Intrusion Alarm System". Each operational component required for the implementation of the security program is at a minimum, tested in accordance with 10 CFR 73.55(n), the PSP and implementing procedures.

The NRC staff has reviewed the applicant's description in PSP Section 20 and 20.1 through 20.6 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(n), and are, therefore, acceptable.

13.6.4.1.21 Compensatory Measures

The provisions of 10 CFR 73.55(o) require, in part, that the applicant shall identify criteria and measures to compensate for degraded or inoperable equipment, systems, and components to meet the requirements of this section. Compensatory measures must provide a level of protection that is equivalent to the protection that was provided by the degraded or inoperable, equipment, system, or components. Compensatory measures must be implemented within specific time frames necessary to meet the appropriate portions of 10 CFR 73.55(b) and described in the security plans.

Section 21 of the PSP identifies measures and criteria required to compensate for degraded or inoperable equipment, systems, and components in accordance with 10 CFR 73.55(o) to assure that the effectiveness of the physical protection system is not reduced by failure or other contingencies affecting the operation of the security-related equipment or structures. Sections 21.1 through 21.12 of the PSP address PA and vital area barriers, intrusion detection and alarm systems, lighting, fixed and non-fixed closed circuit television, play-back and recorded video systems, computer systems, access control devices, vehicle barrier systems, channeling barrier systems, and other security-related equipment.

The NRC staff has reviewed the applicant's description in PSP Sections 21 and 21.1 through 21.12, for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(o), and are, therefore, acceptable.

13.6.4.1.22 Records

The provisions of 10 CFR Part 26, 10 CFR 73.55(q), 10 CFR 73.56(k) and (o), 10 CFR Part 73, Appendix B, Section VI.H., Appendix C, Section II.C and 10 CFR 73.70, require that the applicant must retain and maintain all records required to be kept by the Commission regulations, orders, or license conditions until the Commission terminates the license for which the records were developed, and shall maintain superseded portions of these records for at least three years after the record is superseded, unless otherwise specified by the Commission. The applicant is required to keep records of contracts with any contracted security force that implements any portion of the onsite physical protection program for the duration of the contract. The applicant must make all records, required to be kept by the Commission, available to the Commission and the Commission may inspect, copy, retain and remove all such records, reports and documents, whether kept by the applicant or a contractor. Review and audit reports must be maintained and available for inspection for a period of three years.

Section 22.0 of the PSP addresses the requirements to maintain records. Sections 22.1 through 22.13 address each kind of record that the applicant will maintain and the duration of retention for each record. The following types of records are maintained in accordance with the above mention regulations: access authorization records; suitability, physical and psychological qualification records for security personnel; PA and vital area access control records; PA

visitor access records; PA vehicle access; vital area access transaction records; vitalization and de-vitalization records; vital area access list reviews; security plans and procedures; security patrols, inspections and tests; maintenance; CAS and SAS alarm annunciation and security response records; local law enforcement agency records; records of audits and reviews; access control devices; security training and qualification records; firearms testing and maintenance records; and engineering analysis for the vehicle barrier system.

The NRC staff has reviewed the applicant's description in PSP Sections 22 and 22.1 through 22.13 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(q), 10 CFR 73.55(o) and 10 CFR 73.70, and are, therefore, acceptable.

13.6.4.1.23 Digital Systems Security

Section 23 of the PSP addresses digital systems security. The applicant stated in its PSP that it has implemented the requirements of 10 CFR 73.54 and maintains a cyber security plan that describes how it has provided high assurance that safety, security, and emergency preparedness functions are protected against the DBT.

The NRC staff's review of the cyber security plan is found Section 13.8 of this SER.

13.6.4.1.24 Temporary Suspension of Security Measures

The provisions of 10 CFR 73.55(p) allow the applicant to "suspend implementation of affected requirements of this section under the following conditions: In accordance with 10 CFR 50.54(x) and 50.54(y) of this chapter, the licensee may suspend any security measures under this section in an emergency when this action is immediately needed to protect the public health and safety and no action consistent with license conditions and technical specifications that can provide adequate or equivalent protection is immediately apparent. This suspension of security measures must be approved as a minimum by a licensed senior operator before taking this action. During severe weather when the suspension of affected security measures is immediately needed to protect the personal health and safety of security force personnel and no other immediately apparent action consistent with the license conditions and technical specifications can provide adequate or equivalent protection. This suspension of security measures must be approved, as a minimum, by a licensed senior operator, with input from the security supervisor or manager, before taking this action."

Suspension of Security Measures in Accordance with 10 CFR 50.54(x) and (y)

Section 24.1 of the PSP addresses suspension of security measures in accordance with 10 CFR 50.54(x) and 10 CFR 50.54(y). Specifically, the plan provides a description of the conditions under which suspension is permissible,

the authority for suspension, and the requirements for reporting such a suspension.

Suspension of Security Measures during Severe Weather or Other Hazardous Conditions

As required in 10 CFR 73.55(p), suspension of security measures are reported and documented in accordance with the provisions of 10 CFR 73.71. This suspension of security measures must be approved, as a minimum, by a licensed senior operator, with input from the security supervisor or manager, before taking this action. Suspended security measures must be reinstated as soon as conditions permit.

Section 24.2 of the PSP provides that certain security measures may be temporarily suspended during circumstances such as imminent, severe or hazardous weather conditions, but only when such action is immediately needed to protect the personal health and safety of security force personnel and no other immediately apparent action consistent with the security measures can provide adequate or equivalent protection. Under the PSP, suspended security measures shall be restored as soon as practical.

The NRC staff has reviewed the applicant's description in PSP Sections 24, 24.1, and 24.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the PSP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the PSP meets the requirements of 10 CFR 73.55(p), and are, therefore, acceptable.

13.6.4.1.25 Appendix A Glossary of Terms and Acronyms

Appendix A, "Glossary of Terms and Acronyms," was reviewed and found to be consistent with the NRC endorsed NEI 03-12, Revision 6 template.

13.6.4.1.26 Conclusions on the Physical Security Plan

On the basis of the NRC staff's review described in Sections 13.6.4.1.1 through 13.6.4.1.25 of this SER, the PSP meets the requirements of 10 CFR 73.55(a) through (r). The target sets, Target Set Analysis and Site Protective Strategy are in the facility implementing procedures, which were not subject to NRC staff review as part of this COL application and are, therefore, subject to future NRC inspection in accordance with 10 CFR 73.55(c)(7)(iv) and 10 CFR Part 73, Appendix C, Section II.B.5(iii). The NRC staff concludes that complete and procedurally correct implementation of the PSP will provide high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety.

13.6.4.2 Appendix B Training and Qualification Plan

13.6.4.2.1 Introduction

The provisions of 10 CFR 73.55(c)(4) state that the applicant establish, maintain, implement, and follow a T&QP that describes how the criteria set forth in 10 CFR Part 73, Appendix B will be implemented.

The provisions of 10 CFR 73.55(d)(3) state that the applicant may not permit any individual to implement any part of the physical protection program unless the individual has been trained, equipped, and qualified to perform their assigned duties and responsibilities in accordance with 10 CFR Part 73, Appendix B and the T&QP. Non-security personnel may be assigned duties and responsibilities required to implement the physical protection program and shall:

- (i) Be trained through established applicant training programs to ensure each individual is trained, qualified, and periodically requalified to perform assigned duties.*
- (ii) Be properly equipped to perform assigned duties.*
- (iii) Possess the knowledge, skills, and abilities to include physical attributes, such as sight and hearing, required to perform their assigned duties and responsibilities.*

In addition, 10 CFR Part 73, Appendix B, Section VI.D.2(a) states armed and unarmed individuals shall be requalified at least annually in accordance with the requirements of the Commission-approved T&QP.

The T&QP describes that it is written to address the requirements found in 10 CFR Part 73, Appendix B, Section VI. The objective of the plan is to provide a mechanism to ensure that members of the security organization, and all others who have duties and responsibilities in implementing the security requirements and protective strategy, are properly trained, equipped and qualified. Deficiencies identified during the administration of T&QP requirements are documented in the site corrective action program.

The NRC staff has reviewed the introduction section in the T&QP and has determined that it includes all of the programmatic elements necessary to satisfy the requirements of 10 CFR 73.55 and 10 CFR Part 73, Appendix B, Section VI applicable to the T&QP. Additional section-by-section evaluations and discussions are found in the following paragraphs.

13.6.4.2.2 Employment Suitability and Qualification

The requirements for mental qualifications, documentation, and physical requalification for security personnel (applicant employee and contractor) are described in the following T&QP sections.

Suitability

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.1(a) require, in part, that before employment, or assignment to the security organization, an individual shall: (1) possess a high school diploma or pass an equivalent performance examination designed to measure basic mathematical, language, and reasoning skills, abilities, and knowledge required to perform security duties and responsibilities; (2) attained the age of 21 for an armed capacity or the age of 18 for an unarmed capacity; (3) not have any felony convictions that reflect on the individual's reliability; and (4) individuals in an armed capacity would not be disqualified from possessing or using firearms or ammunition in accordance with applicable State or Federal law, to include 18 U.S.C. 922. Applicants shall use information that has been obtained during the completion of the individual's background investigation for unescorted access to determine suitability. Satisfactory completion of a firearms background check for the individual under 10 CFR 73.19 of this part will also fulfill this requirement. The provisions of 10 CFR Part 73, Appendix B, Section VI.B.1(b) require the qualification of each individual to perform assigned duties and responsibilities must be documented by a qualified training instructor and attested to by a security supervisor.

Section 2.1 of the T&QP details the requirements of qualifications for employment in the security organization that follows the regulation in 10 CFR Part 73, Appendix B, Section VI.B.1(a).

Physical Qualifications

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.2 require, in part, that individuals whose duties and responsibilities are directly associated with the effective implementation of the Commission-approved security plans, applicant protective strategy, and implementing procedures, may not have any physical conditions that would adversely affect their performance of assigned security duties and responsibilities.

Section 2.2 of the T&QP details those individuals that are directly associated with implementation of the security plans. Protective strategy and procedures may not have any physical conditions that would adversely affect their performance of assigned security duties and responsibilities. All individuals that are found on the critical task matrix shall demonstrate the necessary physical qualifications prior to duty.

Physical Examination

It is stated in 10 CFR Part 73, Appendix B, Section VI.B.2(a)(2), that armed and unarmed individuals assigned security duties and responsibilities shall be subject to a physical examination designed to measure the individual's physical ability to perform assigned duties and responsibilities as identified in the Commission-approved security plans, applicant protective strategy, and implementing procedures.

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.2(a)(3) state, in part, that the physical examination must be administered by a licensed health professional with the final determination being made by a licensed physician to

verify the individual's physical capability to perform assigned duties and responsibilities.

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.2(b) through (e) provide the minimum requirements that individuals must meet, and include requirements for vision, hearing, review of existing medical conditions, and examination for potential addictions.

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.2(f) address medical examinations before returning to assigned duties following any incapacitation.

Section 2.3 of the T&QP describes the physical examinations for armed and unarmed individuals assigned security duties, as well as other individuals that implement parts of the physical protection program. Minimum requirements exist for physical examinations of vision, hearing, existing medical conditions, addiction or other physical requirements.

The NRC staff has reviewed the applicant's description in T&QP Sections 2.1, 2.2, and 2.3 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP meets the requirements of 10 CFR Part 73 Appendix B, Sections VI.B.1 and VI.B.2, and are, therefore, acceptable.

Medical Examinations and Physical Fitness Qualifications

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.4(a) require, in part, that armed members of the security organization shall be subject to a medical examination by a licensed physician, to determine the individual's fitness to participate in physical fitness tests, and that the applicant shall obtain and retain a written certification from the licensed physician that no medical conditions were disclosed by the medical examination that would preclude the individual's ability to participate in the physical fitness tests or meet the physical fitness attributes or objectives associated with assigned duties.

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.4(b) require, in part, that before assignment, armed members of the security organization shall demonstrate physical fitness for assigned duties and responsibilities by performing a practical physical fitness test. The physical fitness test must consider physical conditions such as strenuous activity, physical exertion, levels of stress, and exposure to the elements as they pertain to each individual's assigned security duties. The physical fitness qualification of each armed member of the security organization must be documented by a qualified training instructor and attested to by a security supervisor.

Section 2.4 of the T&QP is explicit in its requirements for medical examinations and physical qualifications.

The NRC staff has reviewed the applicant's description in T&QP Section 2.4 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP meets the requirements of 10 CFR Part 73, Appendix B, Section VI.B.4(a) and 10 CFR Part 73, Appendix B, Section VI.B.4(b), and is, therefore, acceptable.

Psychological Qualifications

General Psychological Qualifications

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.3(a) require, in part, that armed and unarmed individuals shall demonstrate the ability to apply good judgment, mental alertness, the capability to implement instructions and assigned tasks, and possess the acuity of senses and ability of expression sufficient to permit accurate communication by written, spoken, audible, visible, or other signals required by assigned duties and responsibilities.

Section 2.5.1 of the T&QP details that individuals whose security tasks and jobs directly associated with the effective implementation of the security plan and protective strategy shall demonstrate the qualities in 10 CFR Part 73, Appendix B, Section VI.B.3(a).

Professional Psychological Examination

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.3(b) require, in part, that a licensed psychologist, psychiatrist, or physician trained in part to identify emotional instability shall determine whether armed members of the security organization and alarm station operators in addition to meeting the requirement stated in paragraph (a) of this section, have no emotional instability that would interfere with the effective performance of assigned duties and responsibilities.

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.3(c) require that a person professionally trained to identify emotional instability shall determine whether unarmed individuals, in addition to meeting the requirement stated in paragraph (a) of this section, have no emotional instability that would interfere with the effective performance of assigned duties and responsibilities.

Section 2.5.2 of the T&QP provides for the administration of psychological and emotional determination that will be conducted by appropriately licensed and trained individuals.

The NRC staff has reviewed the applicant's description in T&QP Sections 2.5.1 and 2.5.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP meets the requirements of 10 CFR Part 73, Appendix B, Sections VI.B.3(a), (b) and (c), and are, therefore, acceptable.

Documentation

The provisions of 10 CFR Part 73, Appendix B, Section VI.H.1 require, in part, the retention of all reports, records, or other documentation required by Appendix B and 10 CFR 75.55(q).

Section 2.6 of the T&QP describes that qualified training instructors create the documentation of training activities and that security supervisors attest to these records as required. Records are retained in accordance with Section 22 of the PSP.

The NRC staff has reviewed the applicant's description in T&QP Section 2.6 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP meets the requirements of 10 CFR Part 73, Appendix B, Section VI.H.1 and is, therefore, acceptable.

Physical Regualification

The provisions of 10 CFR Part 73, Appendix B, Section VI.B.5 require that: (a) at least annually, armed and unarmed individuals shall be required to demonstrate the capability to meet the physical requirements of this appendix and the applicant's T&QP; and (b) the physical requalification of each armed and unarmed individual must be documented by a qualified training instructor and attested to by a security supervisor.

Section 2.7 of the T&QP describes that physical requalification is conducted at least annually, and documented as described in the PSP.

The NRC staff has reviewed the applicant's description in T&QP Section 2.7 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP meets the requirements of 10 CFR Part 73, Appendix B, Section VI.B.5 and is, therefore, acceptable.

13.6.4.2.3 Individual Training and Qualification

Duty Training

The provisions of 10 CFR Part 73, Appendix B, Section VI.C.1 provide for duty training and qualification requirements. The regulation states, in part, that all personnel who are assigned to perform any security-related duty or responsibility shall be trained and qualified to perform assigned duties and responsibilities to ensure that each individual possesses the minimum knowledge, skills, and abilities required to effectively carry out those assigned duties and responsibilities. These areas of training include performing assigned duties and responsibilities in accordance with the requirements of the T&QP and the PSP, and be trained and qualified in

the use of all equipment or devices required to effectively perform all assigned duties and responsibilities.

Section 3.1 of the T&QP details the requirements that individuals assigned duties must be trained in their duties, meet minimum qualifications, and be trained and qualified in all equipment or devices required to perform their duties.

The staff has reviewed the applicant's description in T&QP Sections 3.0 and 3.1 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.C.1, and is, therefore, acceptable.

On-the-job Training

The provisions of 10 CFR Part 73, Appendix B, Sections VI.C.2(a) through (c), provides requirements for on-the-job training. On-the-job training must include individual demonstration of the knowledge, skills and abilities provided during the training process. Individuals assigned contingency duties must complete a minimum of 40 hours of on-the-job training.

On-the-job training for contingency activities and drills must include, but is not limited to, hands-on application of knowledge, skills, and abilities related to: (1) response team duties, (2) use of force, (3) tactical movement, (4) cover and concealment, (5) defensive positions, (6) fields-of-fire, (7) re-deployment, (8) communications (primary and alternate), (9) use of assigned equipment, (10) target sets, (11) table top drills, (12) command and control duties, and (13) applicant's protective strategy.

The T&QP provides a comprehensive discussion of the applicant's approach to meeting the requirements for on-the-job training.

The staff has reviewed the applicant's description in T&QP Section 3.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Sections VI.C.2(a) through (c), and is, therefore, acceptable.

Critical Task Matrix

The provisions of 10 CFR Part 73, Appendix B, Section VI.C.1(b) require, in part, that each individual who is assigned duties and responsibilities identified in the Commission-approved security plans, licensee protective strategy, and implementing procedures shall, before assignment, demonstrate proficiencies in implementing the knowledge, skills and abilities to perform assigned duties.

The T&QP includes a critical task matrix as Table 1 of the T&QP. This matrix addresses the means through which each individual will demonstrate the required proficiencies. Tasks that individuals must perform are listed in RG 5.75.

The staff has reviewed the applicant's description in T&QP Section 3.3 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.C.1(b), and is, therefore, acceptable.

Initial Training and Qualification Requirements

The provisions of 10 CFR Part 73, Appendix B, Sections VI.C.1(a) through (b), provide the requirements for duty training.

The provisions of 10 CFR Part 73, Appendix B, Section VI.D.1 and (2), provide the requirements for demonstration of qualification.

Section 3.4 of the T&QP details that individuals are trained and qualified prior to performing security-related duties within a security organization and must meet the minimum qualifying standards in Sections 3.4.1 and 3.4.2.

Written Examination

The provisions of 10 CFR Part 73, Appendix B, Section VI.D.1(b)(1) provide that written exams must include those elements listed in the Commission-approved T&QP to demonstrate an acceptable understanding of assigned duties and responsibilities, to include the recognition of potential tampering involving both safety and security equipment and systems.

Subsection 3.4.1 of the T&QP describe the measures that are implemented by the applicant to meet the requirements in 10 CFR Part 73, Appendix B, Section VI.D.1(b)(1).

Hands on Performance Demonstration

The provisions of 10 CFR Part 73, Appendix B, Section VI.D.1(b)(2) require that armed and unarmed individuals shall demonstrate hands-on performance for assigned duties and responsibilities by performing a practical hands-on demonstration for required tasks. The hands-on demonstration must ensure that theory and associated learning objectives for each required task are considered and each individual demonstrates the knowledge, skills, and abilities required to effectively perform the task.

Section 3.4.2 of the T&QP describe the measures that are implemented by the applicant that meet the requirements in 10 CFR Part 73, Appendix B, Section VI.D.1(b)(2).

The staff has reviewed the applicant's description in T&QP Sections 3.4, 3.4.1, and 3.4.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Sections VI.C.1(b)(1) and D.1(b)(2), and is, therefore, acceptable.

Continuing Training and Qualification

The provisions of 10 CFR Part 73, Appendix B, Section VI.D.2 state, in part, that armed and unarmed individuals shall be re-qualified at least annually in accordance with the requirements of this appendix and the Commission-approved T&QP. The results of requalification must be documented by a qualified training instructor and attested by a security supervisor.

Section 3.5 of the T&QP provides discussion regarding the management of the requalification program to ensure that each individual is trained and qualified. In part, the applicant's plan provides that annual requalification may be completed up to 3 months before or 3 months after the scheduled date. However, the next annual training must be scheduled 12 months from the previously scheduled date rather than the date the training was actually completed.

The staff has reviewed the applicant's description in T&QP Section 3.5 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.D.2, and is, therefore, acceptable.

Annual Written Examination

The provisions of 10 CFR Part 73, Appendix B, Section VI.D.(b)(3), provide that armed individuals shall be administered an annual written exam that demonstrates the required knowledge, skills, and abilities to carry out assigned duties and responsibilities as an armed member of the security organization. The annual written exam must include those elements listed in the Commission-approved T&QP to demonstrate an acceptable understanding of assigned duties and responsibilities.

Section 3.5.1 of the T&QP provides that each individual will be tested, in part, with an annual written exam that, at a minimum, covers: the role of security personnel; use of deadly force; the requirements in 10 CFR 73.21; authority of private security personnel; power of arrest; search and seizure; offsite law enforcement response; tactics and tactical deployment and engagement.

The staff has reviewed the applicant's description in T&QP Section 3.5.1 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.D.1.(b)(3), and is, therefore, acceptable.

Demonstration of Knowledge Skills and Abilities

The provisions of 10 CFR Part 73, Appendix B, Sections VI, A., B., C., and D., (A.4, C.3(d), D.1(a), and D.1(b)(2)) state, in part, that an individual must demonstrate required knowledge, skills and abilities, to carry out assigned duties and responsibilities.

Section 3.5.2 of the T&QP provides that all knowledge, skills and abilities will be demonstrated in accordance with a systematic approach to training (SAT) program, similar to what is described in RG 5.75.

The staff has reviewed the applicant's description in T&QP Section 3.5.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Sections VI.A., B., C., and D. and is, therefore, acceptable.

Weapons Training and Qualification

General Firearms Training

The provisions of 10 CFR Part 73, Appendix B, Section VI.E, provide that armed members of the security organization shall be trained and qualified in accordance with the requirements of this appendix and the Commission-approved T&QP. Training must be conducted by certified firearms instructors who shall be recertified at least every 3 years. Applicants shall conduct annual firearms familiarization, and armed members of the security organization must participate in weapons range activities on a nominal 4-month period.

Section 3.6.1 of the T&QP addresses the requirements in 10 CFR Part 73, Appendix B, Sections VI.E.1(d)(1) through (11), and includes the requirements for training in the use of deadly force and participation in weapons range activities on a nominal four 4-month period. Each armed member of the security organization is trained and qualified by a certified firearms instructor for the use and maintenance of each assigned weapon to include but not limited to, marksmanship, assembly, disassembly, cleaning, storage, handling, clearing, loading, unloading, and reloading, for each assigned weapon.

The staff has reviewed the applicant's description in T&QP Section 3.6.1 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.E.1, and is, therefore, acceptable.

General Weapons Qualification

The provisions of 10 CFR Part 73, Appendix B, Section VI.F.1, Weapons Qualification and Requalification Program require that qualification firing must be accomplished in accordance with Commission requirements and the Commission-approved T&QP for assigned weapons. The results of weapons qualification and requalification must be documented and retained as a record.

Section 3.6.2 of the T&QP provides that all armed personnel are qualified and re-qualified with assigned weapons. All weapons qualification and re-qualification must be documented and retained as a record.

The staff has reviewed the applicant's description in T&QP Section 3.6.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.F.1, and is, therefore, acceptable.

Tactical Weapons Qualification

The provisions of 10 CFR Part 73, Appendix B, Section VI.F.2, require that the applicant conduct tactical weapons qualification. The applicant T&QP must describe the firearms used, the firearms qualification program, and other tactical training required to implement the Commission-approved security plans, applicant protective strategy, and implementing procedures. Applicant-developed tactical qualification and requalification courses must describe the performance criteria needed to include the site specific conditions (such as lighting, elevation, fields-of-fire) under which assigned personnel shall be required to carry out their assigned duties.

Section 3.6.3 of the T&QP provides that a tactical qualification course of fire is used to assess armed security force personnel in tactical situations to ensure they are able to demonstrate required tactical knowledge, skills and abilities remain proficient.

The staff has reviewed the applicant's description in T&QP Section 3.6.3 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.F.2 and is, therefore, acceptable.

Firearms Qualification Courses

The provisions of 10 CFR Part 73, Appendix B, Section VI.F.3, state, in part, that the applicant shall conduct the following qualification courses for each weapon used: (a) an annual daylight fire qualification course; and (b) an annual night fire qualification course.

Courses of Fire

The provisions of 10 CFR Part 73, Appendix B, Section VI.F.4, describe required courses of fire.

Section 3.6.4 of the T&QP provides a description of the firearms qualification courses used to ensure armed members of the security organization are properly trained and qualified. Courses of fire are used individually for handguns, shotguns and semiautomatic rifles, and enhanced weapons.

The staff has reviewed the applicant's description in T&QP Section 3.6.4 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.F.3, and 10 CFR Part 73, Appendix B, Section VI.F.4, and is, therefore, acceptable.

Firearms Requalification

The provisions of 10 CFR Part 73, Appendix B, Section VI.F.5, provide that armed members of the security organization shall be re-qualified for each assigned weapon at least annually in accordance with Commission requirements and the Commission-approved T&QP, and the results documented and retained as a record. Firearms requalification must be conducted using the courses of fire outlined in 10 CFR Part 73, Appendix B, Sections VI.F.2, VI.F.3, and VI.F.4.

Section 3.6.5 of the T&QP describes that armed members of the security organization re-qualify at least annually with each weapon assigned, using the courses of fire provided in the T&QP.

The staff has reviewed the applicant's description in T&QP Section 3.6.5 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.F.5, and is, therefore, acceptable.

Weapons, Personal Equipment and Maintenance

The provisions of 10 CFR Part 73, Appendix B, Section VI.G, provide the requirements for the maintenance of weapons and personal equipment. These requirements provide that the applicant shall provide armed personnel with weapons that are capable of performing the function stated in the Commission-approved security plans, applicant protective strategy, and implementing procedures. In addition, the applicant shall ensure that each individual is equipped or has ready access to all personal equipment or devices required for the effective implementation of the Commission-approved security plans, applicant protective strategy, and implementing procedures.

Section 3.7 of the T&QP describes that personnel are provided with weapons and personal equipment necessary to meet the plans and the protective strategy. The equipment provided is described in Section 9.0 of the PSP, and maintenance is performed as described in Section 20.0 of the PSP. The staff's review of Section 9, "Security Personnel Training" and Section 20, "Maintenance, Testing, and Calibration," of the PSP is in Subsections 13.6.4.1.9 and 13.6.4.1.20 of this SER.

The staff has reviewed the applicant's description in T&QP Section 3.7 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.G, and is, therefore, acceptable.

Documentation

The provisions of 10 CFR Part 73, Appendix B, Section VI.H, require that the applicant shall retain all reports, records, or other documentation required by this appendix in accordance with the requirements of 10 CFR 73.55(q). The applicant shall retain each individual's initial qualification record for three (3) years after termination of the individual's employment and shall retain each re-qualification record for three (3) years after it is superseded. The applicant shall document data and test results from each individual's suitability, physical, and psychological

qualification and shall retain this documentation as a record for three (3) years from the date of obtaining and recording these results.

Section 3.8 of the T&QP provides that records are retained in accordance with Section 22 "Records" of the PSP. PSP, Section 22.11 describes how the applicant will retain each individual's initial qualification record for three (3) years after termination of the individual's employment and shall retain each re-qualification record for three (3) years after it is superseded.

The staff has reviewed the applicant's description in T&QP Section 3.8 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix B, Section VI.H and is, therefore, acceptable.

The following portion of this technical evaluation section is reproduced from Section 13.6.4.2 of the VEGP SER:

13.6.4.2.4 Performance Evaluation Program

10 CFR Part 73, Appendix B, Section VI.C.3, Performance Evaluation Program

(a) Applicants shall develop, implement and maintain a performance evaluation program that is documented in procedures, which describes how the applicant will demonstrate and assess the effectiveness of their onsite physical protection program and protective strategy, including the capability of the armed response team to carry out their assigned duties and responsibilities during safeguards contingency events. The performance evaluation program and procedures shall be referenced in the applicant's T&QP.

(b) The performance evaluation program shall include procedures for the conduct of tactical response drills and force-on-force exercises designed to demonstrate and assess the effectiveness of the applicant's physical protection program, protective strategy and contingency event response by all individuals with responsibilities for implementing the SCP. The performance evaluation program must be designed to ensure, in part, that each member of each shift who is assigned duties and responsibilities required to implement the SCP and applicant protective strategy participates in at least one tactical response drill on a quarterly basis and one force-on-force exercise on an annual basis.

Section 4 of the T&QP details the performance evaluation program consistent with the requirements of 10 CFR Part 73, Appendix B, Sections VI.C.3(a) through (m). Additional details of the performance evaluation program are described in the facility procedures.

The NRC staff has reviewed the applicant's description in T&QP Section 4 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in

the T&QP meets the requirements of 10 CFR Part 73, Appendix B, Section VI.C.3 and is, therefore, acceptable.

13.6.4.2.5 Definitions

The provisions of 10 CFR Part 73, Appendix B, Section VI.J state, in part, that terms defined in 10 CFR Part 50, 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," and 10 CFR Part 73 have the same meaning when used in this appendix. Definitions are found in the PSP, Appendix A, "Glossary of Terms and Acronyms." [On the basis of its review, the NRC staff finds that the definitions sections of the PSP meet the requirements of 10 CFR 73.2, and are, therefore, acceptable.]

Included in this section of the T&QP is the Critical Task Matrix, which is considered SGI and has not been included in this SER.

The NRC staff has reviewed the applicant's description in T&QP of the Critical Task Matrix tasks for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the T&QP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the T&QP meets the requirements of 10 CFR Part 73, Appendix B, and are, therefore, acceptable.

13.6.4.2.6 Conclusion on the Training and Qualification Plan

On the basis of the NRC staff's review described in Sections 13.6.4.2.1 through 13.6.4.2.5 of this SER, the T&QP meets the requirements of 10 CFR Part 73, Appendix B. The target sets, Target Set Analysis and Site Protective Strategy are in the facility implementing procedures, which were not subject to NRC staff review as part of this COL application and are, therefore, subject to future NRC inspection in accordance with 10 CFR 73.55(c)(7)(iv) and 10 CFR Part 73, Appendix C, Section II.B.5(iii). The NRC staff concludes that complete and procedurally correct implementation will provide high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety.

13.6.4.3 Appendix C Safeguards Contingency Plan

13.6.4.3.1 Background Information

This category of information identifies the perceived dangers and incidents that the plan addresses and a general description of how the response is organized.

Purpose of the Safeguards Contingency Plan

The provisions of 10 CFR Part 73, Appendix C, Section II.B.1.b state that the applicant should discuss general goals, objectives and operational concepts underlying the implementation of the SCP.

Section 1.1 of the SCP describes the purpose and goals of the SCP, including guidance to security and management for contingency events.

Scope of the Safeguards Contingency Plan

The provisions of 10 CFR Part 73, Appendix C, Section II.B.1.c delineate the types of incidents that should be covered by the applicant in the SCP, how the onsite response effort is organized and coordinated to effectively respond to a safeguards contingency event and how the onsite response for safeguards contingency events has been integrated into other site emergency response procedures.

Section 1.2 of the SCP details the scope of the SCP to analyze and define decisions and actions of security force personnel, as well as facility operations personnel, for achieving and maintaining safe shutdown.

Perceived Danger

The provisions of 10 CFR Part 73, Appendix C, Section II.B.1 require that, consistent with the DBT specified in 10 CFR 73.1(a)(1), the applicant shall identify and describe the perceived dangers, threats, and incidents against which the SCP is designed to protect.

Section 1.3 of the SCP outlines the threats used to design the physical protection systems.

The applicant adequately addresses perceived danger, provides a purpose of the plan, and describes the scope of the plan.

Definitions

Section 1.4 of the SCP describes that a list of terms and their definitions used in describing operational and technical aspects of the approved SCP as required by 10 CFR Part 73, Appendix C, Section II.B.1.d is found in Appendix A of the PSP.

The NRC staff has reviewed the applicant's description in SCP Sections 1, 1.1, 1.2, 1.3, and 1.4 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the SCP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the SCP meets the requirements of 10 CFR Part 73, Appendix C, Section II.B and are, therefore, acceptable.

13.6.4.3.2 Generic Planning Base

As required in 10 CFR Part 73, Appendix C, Section II.B.2, this section of the plan defines the criteria for initiation and termination of responses to security events, to include the specific decisions, actions, and supporting information needed to respond to each type of incident covered by the approved SCP.

Situations Not Covered by the Contingency Plan

Section 2.1 of the SCP details the general types of conditions that are not covered in the plan.

Situations Covered by the Contingency Plan

The provisions of 10 CFR Part 73, Appendix C, Section II.B.2.a require, in part, that the plan identify those events that will be used for signaling the beginning or aggravation of a safeguards contingency according to how they are perceived initially by the applicant's personnel. Applicants shall ensure detection of unauthorized activities and shall respond to all alarms or other indications signaling a security event, such as penetration of a PA, vital area, or unauthorized barrier penetration (vehicle or personnel); tampering, bomb threats, or other threat warnings—either verbal, such as telephoned threats, or implied, such as escalating civil disturbances.

The provisions of 10 CFR Part 73, Appendix C, Section II.B.2.b require, in part, that the plan define the specific objective to be accomplished relative to each identified safeguards contingency event. The objective may be to obtain a level of awareness about the nature and severity of the safeguards contingency to prepare for further responses; to establish a level of response preparedness; or to successfully nullify or reduce any adverse safeguards consequences arising from the contingency.

The provisions of 10 CFR Part 73, Appendix C, Section II.B.2.c require, in part, that the applicant identify the data, criteria, procedures, mechanisms and logistical support necessary to achieve the objectives identified.

Section 2.2 of the SCP describes in detail the specific situations covered by the SCP, including objectives and information required for each.

The NRC staff has reviewed the applicant's description in SCP Sections 2, 2.1 and 2.2 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the SCP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the SCP meets the requirements of 10 CFR Part 73, Appendix C Section II.B.2 and are, therefore, acceptable.

13.6.4.3.3 Responsibility Matrix

The provisions of 10 CFR Part 73, Appendix C, Section II.B.4, state that this category of information consists of the detailed identification of responsibilities and specific actions to be taken by the applicant's organizations and/or personnel in response to safeguards contingency events. To achieve this result the applicant must address the following.

- The provisions of 10 CFR Part 73, Appendix C, Section II.B.4.a, require, in part, that the applicant develop site procedures that consist of matrixes detailing the organization and/or personnel responsible for decisions and actions associated with specific

responses to safeguards contingency events. The responsibility matrix and procedures must be referenced in the applicant's SCP.

- The provisions of 10 CFR Part 73, Appendix C, Section II.B.4.b, require, in part, that the responsibility matrix procedures shall be based on the events outlined in the applicant's generic planning base and include specific objectives to be accomplished, description of responsibilities for decisions and actions for each event, and overall description of response actions each responding entity.
- The provisions of 10 CFR Part 73, Appendix C, Section II.B.4.c, require, in part, that responsibilities are to be assigned in a manner that precludes conflict of duties and responsibilities that would prevent the execution of the SCP and emergency response plans.
- The provisions of 10 CFR Part 73, Appendix C, Section II.B.4.d, require, in part, that the applicant ensure that predetermined actions can be completed under the postulated conditions.

Section 3 of the SCP includes the responsibility matrix, as required by Appendix C, Section II.B.4a. The responsibility matrix integrates the response capabilities of the security organization (described in Section 4 of the SCP) with the background information relating to decision/actions and organizational structure (described in Section 1 of the SCP), as required by Appendix C, Section II.B.4a. The responsibility matrix provides an overall description of the response actions and their interrelationships, as required by Appendix C, Section II.B.4b. Responsibilities and actions have been predetermined to the maximum extent possible and assigned to specific entities to preclude conflicts that would interfere with or prevent the implementation of the SCP or the ability to protect against the DBT of radiological sabotage as required by Appendix C, Section II.B.4c. The applicant has described how it will ensure that predetermined actions can be completed under the postulated conditions as required by Appendix C, Section II.B.4.d.

The staff has reviewed the applicant's description in SCP Section 3 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the SCP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the SCP meets the requirements of 10 CFR Part 73, Appendix C, Section II.B.4, and is, therefore, acceptable.

13.6.4.3.4 Licensee Planning Base

The provisions of 10 CFR Part 73, Appendix C, Section II.B.3, require, in part, that the applicant planning base include factors affecting the SCP specific for each facility.

Licensee Organization

The provisions of 10 CFR Part 73, Appendix C, Section II.B.3.a, require in part, that the SCP describe the organization's chain of command and delegation of authority during safeguards contingency events, to include a general description of how command and control functions will be coordinated and maintained.

Duties/Communication Protocols

Section 4.1.1 of the SCP details the duties and communications protocols of each member of the security organization responsible for implementing any portion of the applicant's protective strategy, which will allow for coordination and maintenance of command and control functions as required by Appendix C, Section II.B.3.a.

Security Chain of Command/Delegation of Authority

Section 4.1.2 of the SCP details the chain of command and delegation of authority during normal operations is discussed in the PSP. The chain of command and delegation of authority during contingency events is also described in the responsibility matrix portions of the SCP. The chain of command and delegation of authority during normal operations is discussed in the PSP. Accordingly, the staff concludes that the applicant has described the chain of command and delegation of authority during contingency events as required by Appendix C, Section II.B.3.a.

Physical Layout

The provisions of 10 CFR Part 73, Appendix C, Section II.B.3(b), require, in part, that the SCP include a site map depicting the physical structures located on the site, including onsite independent spent fuel storage installations, and a description of the structures depicted on the map. Plans must also include a description and map of the site in relation to nearby towns, transportation routes (e.g., rail, water, and roads), pipelines, airports, hazardous material facilities, and pertinent environmental features that may have an effect upon coordination of response activities. Descriptions and maps must indicate main and alternate entry routes for law enforcement or other offsite response and support agencies and the location for marshaling and coordinating response activities.

Section 4.2 of the SCP references Section 1.1 of the PSP for layouts of the OCA, PA, vital areas, site maps, and descriptions of site features. The staff confirmed that these layouts, maps, and descriptions include the detailed information required by Appendix C, Section II.B.3.b, and described above.

Safeguards Systems

The provisions of 10 CFR Part 73, Appendix C, Section II.B.3.c, require, in part, that the SCP include a description of the physical security systems that support and influence how the applicant will respond to an event in accordance with the DBT described in 10 CFR 73.1(a). The description must begin with onsite physical protection measures implemented at the outermost perimeter, and must move inward through those measures implemented to protect target set equipment.

Section 4.3 of the SCP describes that safeguards systems are described in PSP Sections 9, 11, 12, 13, 15 and 16, and in facility implementing procedures/documents. Section 8 of the SCP describes how physical security systems will be used to respond to a threat at the site, as required by Appendix C, Section II.B.3.c. As further required by Appendix C, Section II.B.3.c, the SCP description begins with physical protection measures proposed at the outermost facility perimeter, and moves inward through those measures proposed to protect target set equipment..

Law Enforcement Assistance

The provisions of 10 CFR Part 73, Appendix C, Section II.B.3.d, require in part, that the applicant provide a listing of available law enforcement agencies and a general description of their response capabilities and their criteria for response and a discussion of working agreements or arrangements for communicating with these agencies.

Section 4.4 of the SCP states in detail the role of LLEA in the site protective strategy. In accordance with Appendix C, Section II.B.3.d, these details include LLEA response capabilities, LLEA criteria for response, and the working agreements or arrangements for communicating with these LLEAs. Additional details regarding LLEA are included in Section 8 of the PSP and Section 5.6 of the SCP.

Policy Constraints and Assumptions

The provisions of 10 CFR Part 73, Appendix C, Section II.B.3.e, require in part, that the SCP include a discussion of State laws, local ordinances, and company policies and practices that govern applicant response to incidents and must include, but is not limited to, the following: 1) use of deadly force; 2) recall of off-duty employees; 3) site jurisdictional boundaries; and 4) use of enhanced weapons, if applicable.

Section 4.5 of the SCP details the site security policies, including the use of deadly force and authority to request offsite assistance, as required by Appendix C, Section II.B.3.e.

Administrative and Logistical Considerations

The provisions of 10 CFR Part 73, Appendix C, Section II.B.3.f, require in part, that the applicant provide descriptions of applicant practices, which influence how the security organization responds to a safeguards contingency event to include, but is not limited to, a description of the procedures that will be used for ensuring that equipment needed to facilitate response will be readily accessible, in good working order, and in sufficient supply.

Section 4.6 of the SCP outlines administrative duties of the security manager, security shift team leader, facility procedures and administrative forms.

The staff has reviewed the applicant's description in SCP Sections 4, 4.1, 4.1.1, 4.1.2, and 4.2 through 4.6 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the SCP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the SCP meets the requirements of 10 CFR Part 73, Appendix C, Section II.B.3 and is, therefore, acceptable.

13.6.4.3.5 Response Capabilities

This section outlines the response by the applicant to threats to the facility. As set forth below, the applicant describes in details how they protect against the DBT with onsite and offsite organizations, in accordance with the regulation of 10 CFR 50.54(p)(1) and (hh)(1), 10 CFR 73.55(k), 10 CFR Part 73, Appendix B, Section VI and 10 CFR Part 73, Appendix C, Section II.B.3. In addition, Appendix C, "Introduction," states, in part, it is important to note that an applicant's SCP is intended to be complementary to any emergency plans developed pursuant to Appendix E "Emergency Planning and Preparedness for Production and Utilization

Facilities,” to 10 CFR Part 50 and 10 CFR 52.79 “Contents of Applications; Technical Information and Final Safety Analysis Report.”

Response to Threats

Section 5.1 of the SCP describes how the protective strategy is designed to defend the facility against all aspects of the DBT. Each organization has defined roles and responsibilities.

Armed Response Team

Section 5.2 of the SCP notes individuals from the Responsibility Matrix and their role in the site protective strategy. This section also notes the minimum number of individuals and their contingency equipment for implementation of the protective strategy. The applicant described the armed response team consistent with 10 CFR 73.55(k)(4), (5), (6), and (7), 10 CFR Part 73, Appendix B, Section VI, and 10 CFR Part 73, Appendix C, Section II.B.3.

Supplemental Security Officer

Section 5.3 of the SCP details the role of supplemental security officers in the site protective strategy. The applicant described the use of supplemental security officers, consistent with the requirements in 10 CFR 73.55(k)(4).

Facility Operations Response

Section 5.4 of the SCP details the role of operations personnel in the site protective strategy, including responsibilities, strategies, and conditions for operator actions as discussed in 10 CFR 50.54(hh)(l).

Emergency Plan Response

Section 5.5 of the SCP notes the integration of the Emergency Plan with the site's protective strategy, and gives some examples of how the Emergency Plan can influence the protective strategy as discussed in 10 CFR 73.55(b)(11).

Local Law Enforcement Agencies (LLEA)

Section 5.6 of the SCP documents the current agreements with applicable LLEA, and therefore meets the requirements of 10 CFR 73.55(k)(9) and 10 CFR Part 73, Appendix C, Section II.B.3.d, and lists the LLEAs that will respond to the site as a part of the protective strategy. Details on the response of the LLEA are located in Section 8 of the PSP. Furthermore, Section 5.6 provides a general description of the LLEA response capability and meets the corresponding portions of 10 CFR 73.55(k)(9).

State Response Agencies

Section 5.7 of the SCP documents the current agreements with applicable LLEA, and therefore meets the requirements of 10 CFR 73.55(k)(9) and 10 CFR Part 73, Appendix C, Section II.B.3.d and lists the State response agencies that will respond to the site as a part of the protective strategy. Furthermore, Section 5.7 provides a general description of the LLEA response capability and meets the corresponding portions of 10 CFR 73.55(k)(9).

Federal Response Agencies

Section 5.8 of the SCP documents the current agreements with applicable LLEA, and therefore meets the requirements of 10 CFR 73.55(k)(9) and 10 CFR Part 73, Appendix C, Section II.B.3.d and lists the Federal response agencies that will respond to the site as a part of the protective strategy. Furthermore, Section 5.7 provides a general description of the LLEA response capability and meets the corresponding portions of 10 CFR 73.55(k)(9).

Response to ISFSI Events

Section 5.9 is not applicable for Turkey Point Units 6 and 7 since there is no ISFSI associated with this application.

The staff has reviewed the applicant's description in SCP Sections 5.0 through 5.9 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the SCP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the SCP meets the requirements of 10 CFR 50.54(p)(1) and (hh), 10 CFR 73.55(k), 10 CFR Part 73, Appendix B, Section VI, and 10 CFR Part 73, Appendix C, Section II.B.3, and is, therefore, acceptable. In addition, Appendix C, "Introduction" states, in part, that it is important to note that an applicant's SCP is intended to be complementary to any emergency plans developed pursuant to Appendix E to 10 CFR Part 50 and 10 CFR 52.17.

The following portion of this technical evaluation section is reproduced from Section 13.6.4.3 of the VEGP SER:

13.6.4.3.6 Defense-In-Depth

Section 6 of the SCP lists site physical security characteristics, programs, and the strategy elements that illustrate the defense-in-depth nature of the site protective strategy as required in 10 CFR 73.55(b)(3).

The NRC staff has reviewed the applicant's description in SCP Section 6 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the SCP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the SCP meets the requirements of 10 CFR 73.55(b)(3) and is, therefore, acceptable.

13.6.4.3.7 Primary Security Functions

Section 7 of the SCP details the primary security functions of the site, and their roles in the site protective strategy. It also notes the development of target sets, and their function in the development of the site's protective strategy.

The NRC staff has reviewed the applicant's description in SCP Section 7 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the SCP is consistent with the acceptance criteria in

NUREG-0800, Section 13.6.1, the staff finds that the description provided in the SCP meets the requirements of 10 CFR 10 CFR 73.55(b) and is, therefore, acceptable.

13.6.4.3.8 Protective Strategy

The provisions of 10 CFR Part 73, Appendix C, Section II.B.3.c(v), require that applicants develop, implement, and maintain a written protective strategy that shall: (1) be designed to meet the performance objectives of 10 CFR 73.55(a) through (k), (2) identify predetermined actions, areas of responsibilities, and timelines for the deployment of armed personnel, (3) include measures that limit the exposure of security personnel to possible attack, (4) include a description of the physical security systems and measures that provide defense-in-depth, (5) describe the specific structure and responsibilities of the armed response organization, and (6) provide a command and control structure.

Section 8 of the SCP describes the site protective strategy.

The staff has reviewed the applicant's description in SCP Section 8 for the implementation of the site-specific physical protection program in accordance with Commission regulations and NUREG-0800 acceptance criteria. Because the applicant's description in the SCP is consistent with the acceptance criteria in NUREG-0800, Section 13.6.1, the staff finds that the description provided in the SCP provides reasonable assurance that the licensee will meet the requirements of 10 CFR Part 73, Appendix C, Section II.B.3.c(v) and is, therefore, acceptable.

The following portion of this technical evaluation section is reproduced from Section 13.6.4.3 of the VEGP SER:

13.6.4.3.9 Conclusions on the Safeguards Contingency Plan

On the basis of the NRC staff's review described in Sections 13.6.4.3.1 through 13.6.4.3.8 of this SER, the SCP meets the requirements of 10 CFR Part 73, Appendix C, in accordance with the DBT of radiological sabotage as stated in 10 CFR 73.1. The target sets, Target Set Analysis and Site Protective Strategy are in the facility implementing procedures, which were not subject to NRC staff review as part of this COL application and are, therefore, subject to future NRC inspection in accordance with 10 CFR 73.55(c)(7)(iv) and 10 CFR Part 73, Appendix C, Section II.B.5(iii). The NRC staff concludes that complete and procedurally correct implementation of the SCP will provide high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety.

13.6.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff finds the following license condition acceptable:

- License Condition (13-7) - No later than 12 months after issuance of the COL, FPL shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the operational programs listed in FSAR Table 13.4-201, including the associated estimated date for initial loading of fuel. The schedule shall be updated every 6 months

until 12 months before scheduled fuel loading, and every month thereafter until all the operational programs listed in FSAR Table 13.4-201 have been fully implemented.

13.6.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable based on the applicable regulations specified in Section 13.6.4 of this SER. The staff based its conclusion on the following:

- STD COL 13.6-1, as related to the physical protection program, is acceptable based on the following discussion. The staff's review of the Turkey Point Units 6 and 7 PSP, T&QP, and SCP has focused on ensuring the necessary programmatic elements are included in these plans to provide high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety.
- As described in this section, the staff has determined that these plans include the necessary programmatic elements that, when effectively implemented, will provide the required high assurance. The burden to effectively implement these plans remains with the applicant. Effective implementation is dependent on the procedures and practices the applicant develops to satisfy the programmatic elements of its PSP, T&QP, and SCP. The target set analysis and site protective strategy are in facility implementing procedures which were not subject to NRC staff review as part of this COLA and are therefore subject to future NRC inspection in accordance with 10 CFR 73.55(c)(7)(iv) and 10 CFR Part 73, Appendix C, Section II.B.5(iii). As provided by Section 3 of the applicant's PSP, a performance evaluation program will be implemented that periodically tests and evaluates the effectiveness of the overall protective strategy. This program provides that deficiencies be corrected. In addition, NRC inspectors will conduct periodic force-on-force exercises that will test the effectiveness of the applicant's protective strategy. Based on the results of the applicant's own testing and evaluation, the NRC's baseline inspections and force-on-force exercises, enhancements to the applicant's PSP, T&QP, and SCP may be required to ensure the overall protective strategy can be effectively implemented. As such, staff approval of the applicant's PSP, T&QP, and SCP is limited to the programmatic elements necessary to provide the required high assurance as stated above. Should deficiencies be identified with the programmatic elements of these plans as a result of the periodic applicant or NRC conducted drills or exercises that test the effectiveness of the overall protective strategy, the applicant shall correct the plans to address these deficiencies in a timely manner and to notify the NRC of these plan changes in accordance with the requirements of 10 CFR 50.54(p) or 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit."

The COL applicant's security plan information is withheld from public disclosure in accordance with the provisions of 10 CFR 73.21.

13.6.A Site-Specific ITAAC for Physical Security

13.6.A.1 Introduction

Part 10, "Proposed License Conditions and ITAAC," Appendix B, "Inspections, Tests, Analysis, and Acceptance Criteria" of the Turkey Point Units 6 and 7 COLA describes the license conditions for the plant's physical protection systems or features to provide physical protection of the site-specific protective strategy and elements of a site security program. The COLA incorporates by reference Tier 1 Section 2.6.9 of the AP1000 DCD, including plant layout and configurations of barriers, and lists ITAAC related to the site-specific design for achieving detection, assessment, communications, delay, and response for physical protection against potential acts of radiological sabotage and theft of special nuclear material.

The design bases or supporting security analyses and assumptions related to the design descriptions of security-related features incorporated by reference from the AP1000 DCD are in Westinghouse TR-94. Descriptions of site-specific security structures, programs and contingency measures are in the Turkey Point Units 6 and 7 PSP, which includes the site PSP, T&QP and the SCP.

13.6.A.2 Summary of Application

Section 14.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8 incorporates by reference Section 14.3 of the AP1000 DCD, Revision 19. Part 10, Revision 8 of the Turkey Point Units 6 and 7 COLA incorporates by reference DCD Tier 1 Section 2.6.9, which includes the physical security-inspections, tests, analyses, and acceptance criteria (PS-ITAC) that are within the scope of the AP1000 standard design. Site-specific PS-ITAC that are outside the scope of AP1000 DCD Tier 1 Section 2.6.9 are provided in Table 2.6.9-2 of Appendix B to Part 10 of the Turkey Point Units 6 and 7 COLA.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 14.3, the applicant provided the following:

Supplemental Information

- STD SUP 14.3-1

The applicant provided supplemental information related to physical security in STD SUP 14.3-1 in PTN COL FSAR Section 14.3.2.3.2.

License Condition

- Part 10, License Condition 1

The applicant provided a license condition in Part 10 of the Turkey Point Units 6 and 7 COLA, Revision 6, which will incorporate the ITAAC identified in the tables in Appendix B. The staff evaluates this license condition in Chapter 1 of this SER.

13.6.A.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations are given in 10 CFR Part 73. The regulation includes specific security and performance requirements that, when adequately implemented, are designed to protect nuclear power reactors against acts of radiological sabotage, prevent the theft or diversion of special nuclear material, and protect safeguards information against unauthorized release.

The provisions of 10 CFR 52.80, Subpart A, require that information submitted for a COL include the proposed ITAAC that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the ITAAC are met, the facility has been constructed and will operate in conformity with the COL, the provisions of the Atomic Energy Act, and the NRC's regulations.

The Turkey Point Units 6 and 7 design descriptions, commitments, and acceptance criteria for the security features, including the plant's layout and determination of vital equipment and areas, for a certified design are based on physical protection systems or hardware provided for meeting requirements of the following Commission regulations:

- 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities" 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants" 10 CFR 73.1(a)(1), "Radiological Sabotage"
- 10 CFR 73.55, "Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage," Appendix B, "General Criteria for Security Personnel"; Appendix C, "Nuclear Power Plant Safeguards Contingency Plans"; Appendix G, "Reportable Safeguards Events"; and Appendix H, "Weapons Qualification Criteria"
- 10 CFR Part 74, "Material control and accounting of special nuclear material"
- 10 CFR 100.21(f), "Non-Seismic Siting Criteria"

Regulatory requirements and acceptance criteria related to physical protection systems or hardware are identified in Section 14.3.12 of NUREG-0800.

Regulatory guidance documents that are applicable to this evaluation are:

- RG 1.91, "Evaluations of Explosions Postulated to Occur at Transportation Routes Near Nuclear Power Plants," Revision 1
- RG 1.206, "Combined License Applications for Nuclear Power Plants"
- RG 4.7, "General Site Suitability Criteria for Nuclear Power Stations," Revision 2
- RG 5.7, "Entry/Exit Control for Protected Areas, Vital Areas, and Material Access Areas," Revision 1
- RG 5.12, "General Use of Locks in the Protection and Control of Facilities and Special Nuclear Materials"
- RG 5.44, "Perimeter Intrusion Alarm Systems," Revision 3

- RG 5.62, "Reporting of Safeguards Events," Revision 1
- RG 5.65, "Vital Area Access Controls, Protection of Physical Protection System Equipment and Key and Lock Controls"
- RG 5.66, "Access Authorization Program for Nuclear Power Plants"
- Information Notice 86-83, "Underground Pathways into Protected Areas, Vital Areas, and Controlled Access Areas," September 19, 1986
- Regulatory Information Summary (RIS) 2005-04, "Guidance on the Protection of Unattended Openings that Intersect a Security Boundary or Area," April 14, 2005. (Exempt from public disclosure in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding.")

The COL applicant is required to describe commitments for establishing and maintaining a physical protection system (engineered and administrative controls), organization, programs, and procedures for implementing a site-specific strategy that, if adequately implemented, provide high assurance for protection of the plant against the DBT. The site-specific physical protection system described must be reliable and available and implement the concept of defense-in-depth protection in order to provide a high assurance of protection. The security operational programs and the physical protection system are required to meet the specific performance requirements of 10 CFR Part 26; 10 CFR 73.54, "Protection of Digital Computer and Communication Systems and Networks"; 10 CFR 73.55; 10 CFR 73.56, "Personnel access authorization requirements for nuclear power plants"; 10 CFR 73.57, "Requirements for criminal history records checks of individuals granted unescorted access to a nuclear power facility or access to Safeguards Information"; and 10 CFR 73.58. Physical protection hardware within the scope of the AP1000 design is addressed in the AP1000 DCD.

13.6.A.4 Technical Evaluation

The staff reviewed Section 14.3 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COLA represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to ITAAC for physical security. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COLAs. To ensure that the staff's findings on standard content that were documented in the SER for the reference COLA (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COLA, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COLA, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COLA. This standard content material is identified in this SER by use of italicized, double-indented formatting. The staff confirmed that the November 15, 2010, FPL letter L-2010-258 (ADAMS Accession No. ML103210407) contained the same technical information provided in the June 11, 2010, VEGP letter discussed in the standard content material below.

The following portion of this technical evaluation section is reproduced from Section 13.6.A.4 of the VEGP SER:

Supplemental Information

- *STD SUP 14.3-1*

STD SUP 14.3-1 adds the following after DCD Section 14.3.2.2 as new Section 14.3.2.3.2:

Generic PS-ITAAC have been developed in a coordinated effort between the NRC and the Nuclear Energy Institute (NEI) as outlined in Appendix C.II.I-C of Regulatory Guide 1.206. These generic ITAAC have been tailored to the AP1000 design and site-specific security requirements.

In Part 10, Appendix B of the VEGP Units 3 and 4 COL application, SNC describes the ITAAC for the plant's physical protection systems or features to provide physical protection of the site-specific protective strategy and elements of a site security program. The COL application incorporates by reference Tier 1 Section 2.6.9 of the AP1000 DCD, including plant layout and configurations of barriers, and listed ITAAC related to the site-specific design for achieving detection, assessment, communications, delay, and response for physical protection against potential acts of radiological sabotage and theft of special nuclear material. DCD Tier 1 Section 2.6.9 includes the physical security ITAAC that are in the scope of the AP1000 standard design. Site-specific physical security ITAAC that are outside the scope of AP1000 DCD Tier 1 Section 2.6.9 are provided in Table 2.6.9-2 of Appendix B to Part 10 of the VEGP COL application.

The NRC staff's evaluation of the PS-ITAAC (STD SUP 14.2-1) is documented in the Sections 13.6.A.4.1 through 13.6.A.4.3 of this SER.

13.6.A.4.1 Detection and Assessment Hardware

The applicant submitted the following ITAAC for detection and assessment hardware in their letter dated June 11, 2010, "Response to Request for Additional Information Letter No. 047, Supplement 2, Physical Security Inspections, Tests,

Analyses, and Acceptance Criteria,” This letter was used to complete the evaluation below.

1. *The external walls, doors, ceiling, and floors in the location within which the last access control function for access to the protected area is performed are bullet resistant to at least Underwriters Laboratory Ballistic Standard 752, Level 4. (Item 6 in Appendix A to Section 14.3.12 of NUREG-0800.)*
2. *Physical barriers for the protected area perimeter are not part of vital area barriers. (Item 2.a in Appendix A to Section 14.3.12 of NUREG-0800.)*
3.
 - a) *Isolation zones exist in outdoor areas adjacent to the physical barrier at the perimeter of the protected area that allows 20 feet of observation on either side of the barrier. (Item 3.a in Appendix A to Section 14.3.12 of NUREG-0800.)*
 - b) *Where permanent buildings do not allow a 20-foot observation distance on the inside of the protected area, the building walls are immediately adjacent to, or an integral part of, the protected area barrier. (Item 3.c in Appendix A to Section 14.3.12 of NUREG-0800.) The isolation zones are monitored with intrusion detection equipment that provides the capability to detect and assess unauthorized persons. (Item 3.b in Appendix A to Section 14.3.12 of NUREG-0800.)*
4. *The intrusion detection and assessment equipment at the protected area perimeter:*
 - a) *Detects penetration or attempted penetration of the protected area barrier and concurrently alarms in both the Central Alarm Station and Secondary Alarm Station. (Item 4.a in Appendix A to Section 14.3.12 of NUREG-0800.)*
 - b) *The intrusion detection and assessment equipment at the protected area perimeter remains operable from an uninterruptible power supply in the event of the loss of normal power. (Item 4.c in Appendix A to Section 14.3.12 of NUREG-0800.)*
6. *An access control system with numbered picture badges is installed for use by individuals who are authorized access to protected areas without escort. (Item 9 in Appendix A to Section 14.3.12 of NUREG-0800.)*
8.
 - a) *Penetrations through the protected area barrier are secured and monitored. (Item 2.b in Appendix A to Section 14.3.12 of NUREG-0800.)*

- b) *Unattended openings (such as underground pathways) that intersect the protected area boundary or vital area boundary will be protected by a physical barrier and monitored by intrusion detection equipment or provided surveillance at a frequency sufficient to detect exploitation. (Item 2.c in Appendix A to Section 14.3.12 of NUREG-0800.)*

On the basis of its review the NRC staff determined that the applicant has adequately revised Table 2.6.9-2 for Part 10 to the VEGP COL application PS-ITAAC items 2(a), 2(b), 2 (c), 3(a), 3(b), 3(c), 4(a), 4(c), 6(partially), and 9 identified in Appendix A to Section 14.3.12 of NUREG-0800.

The VEGP COL application references the AP1000 DCD, which addressed NUREG-0800, Section 14.3.12 PS-ITAAC 4(b), 5, 6(partially), 10, 11(a), 11(b), 11(c) and 14. The staff has determined that PS-ITAAC 6, described in NUREG-0800, Section 14.3.12 has been fully addressed between the VEGP submission and the AP1000 DCD.

In a supplemental response to RAI 14.3.12-1, the applicant stated:

The information contained in SRP ITAAC number 11(d) is redundant to existing ITAAC in the AP1000 Design Certification Document (DCD). AP1000 DCD security ITAAC numbers 1, 4, 5(a), 5(b), 5(c), 13(a), 13(b), 13(c), and 15(b) demonstrate that the central and secondary alarm stations are equal and redundant, by being constructed, located, protected, and equipped to the standards for the central alarm station.

In RAI SRP 14.3.12-NSIR-7, Revision 1, Westinghouse stated:

No corresponding ITAAC has been provided for SRP 14.3.12 ITAAC number 11(d). The information contained in SRP ITAAC number 11(d) is redundant to existing ITAACs. AP1000 security ITAAC numbers 1, 4, 5(a), 5(b), 5(c), 13, and 15(b) demonstrate that the central and secondary alarm stations are constructed, located, protected, and equipped to the standards for the central alarm station.

On the basis of its review, the NRC staff determined that the applicant has adequately shown that NUREG-0800, Section 14.3.12 detection and assessment hardware ITAAC 11(d) is addressed.

13.6.A.4.2 Delay or Barrier Design

The applicant submitted the following ITAAC for Delay or Barrier Design in their "Response to Request for Additional Information Letter No. 047, Supplement 2, Physical Security Inspections, Tests, Analyses, and Acceptance Criteria," Dated June 11, 2010. This letter was used to complete the evaluation below.

5. *Access control points are established to:*

- a) *Control personnel and vehicle access into the protected area. (Item 8.a in Appendix A to Section 14.3.12 of NUREG-0800.)*

- b) Detect firearms, explosives, and incendiary devices at the protected area personnel access points. (Item 8.b in Appendix A to Section 14.3.12 of NUREG-0800.)*
- 7. Access to vital equipment physical barriers requires passage through the protected area perimeter barrier. (Item 1.b in Appendix A to Section 14.3.12 of NUREG-0800.)*

On the basis of its review, the NRC staff determined that the applicant has adequately addressed NUREG-0800, Section 14.3.12 delay or barrier design PS-ITAAC 1(b)(partially), 8(a) and 8(b).

The VEGP COL application references the AP1000 DCD, which addressed NUREG-0800, Section 14.3.12 PS-ITAAC 1(a), 1(b)(partially), 7, 13(a) and 13(b). The staff has determined that PS-ITAAC 1(b) described in NUREG-0800, Section 14.3.12 has been fully addressed between the VEGP submission and the AP1000 DCD.

13.6.A.4.3 Systems, Hardware, or Features Facilitating Security Response and Neutralization

The applicant submitted the following ITAAC for Systems, Hardware, or Features Facilitating Security Response and Neutralization in their "Response to Request for Additional Information Letter No. 047, Supplement 2, Physical Security Inspections, Tests, Analyses, and Acceptance Criteria," Dated June 11, 2010. This letter was used to complete the evaluation below.

- 9. Emergency exits through the protected area perimeter are alarmed and secured with locking devices to allow for emergency egress. (Item 15 in Appendix A to Section 14.3.12 of NUREG-0800.)*

On the basis of its review, the NRC staff determined that the applicant has adequately addressed NUREG-0800, Section 14.3.12 delay or barrier design PS-ITAAC 15(partially).

The VEGP COL application references the AP1000 DCD, which addressed NUREG-0800, Section 14.3.12 PS-ITAAC 12, 15(partially) 16(a), 16(b) and 16(c). The staff has determined that PS-ITAAC 15 described in NUREG-0800, Section 14.3.12 has been fully addressed between the VEGP submission and the AP1000 DCD.

On the basis of its review, the staff finds that since the applicant revised Turkey Point Units 6 and 7 COL FSAR Part 10 to incorporate the requirements for PS-ITAAC, the response to VEGP RAI 14.03.12- 1, 2 and 3 has adequately addressed NUREG-0800, Section 14.3.12, and is therefore, acceptable.

13.6.A.5 Post-Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff proposes to include the following ITAAC for physical security:

- The licensee shall perform and satisfy the ITAAC defined in Table 13.6A-1, "Site Specific Physical Security."

13.6.A.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in Turkey Point Units 6 and 7 COL FSAR and the additional information received in the November 15, 2010, FPL letter L-2010-258 (ADAMS Accession No. ML103210407) is acceptable based on the applicable regulations specified in Section 13.6.A.4 of this SER. The staff based its conclusion on the following:

- STD SUP 14.3-1, as related to PS-ITAAC, is acceptable based on the following discussion. The staff finds that the applicant adequately describes the physical security systems or provides or facilitates the implementation of the site-specific protective strategy and security programs. The applicant adequately describes the site-specific PS-ITAAC for meeting the requirements of 10 CFR 73.55 and provides the technical bases for establishing a PS-ITAAC for the protection against acts of radiological sabotage and theft of special nuclear material. The applicant includes systems and features as stated in Turkey Point Units 6 and 7 COL FSAR Chapter 13 and referenced TRs. The applicant has provided adequate descriptions of objectives, prerequisites, test methods, data required, and acceptance criteria for security related ITAAC for the approval of the Turkey Point Units 6 and 7 COL.

Table 13.6A-1: Site-Specific Physical Security Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, and Analyses	Acceptance Criteria
1. The external walls, doors, ceiling, and floors in the location where the last access control function for access to the protected area is performed are bullet- resistant to at least Underwriters Laboratory Ballistic Standard 752, level 4.	Type test, analysis, or a combination of type test and analysis will be performed for the external walls, doors, ceilings, and floors in the location within which the last access control function for access to the protected area is performed.	The external walls, doors, ceilings, and floors in the location where the last access control function for access to the protected area is performed are bullet- resistant to at least Underwriters Laboratory Ballistic Standard 752, level 4.
2. Physical barriers for the protected area perimeter are not part of vital area barriers.	An inspection of the protected area perimeter barrier will be performed.	Physical barriers at the perimeter of the protected area are separated from any other barrier designated as a vital area barrier.

Table 13.6A-1: Site-Specific Physical Security Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, and Analyses	Acceptance Criteria
<p>3.</p> <p>a) Isolation zones exist in outdoor areas adjacent to the physical barrier at the perimeter of the protected area that allows 20 feet of observation on either side of the barrier. Where permanent buildings do not allow a 20-foot observation distance on the inside of the protected area, the building walls are immediately adjacent to, or an integral part of, the protected area barrier.</p> <p>b) The isolation zones are monitored with intrusion detection equipment that provides the capability to detect and assess unauthorized persons.</p>	<p>Inspections will be performed of the isolation zones in outdoor areas adjacent to the physical barrier at the perimeter of the protected area.</p> <p>Inspections will be performed of the intrusion detection equipment within the isolation zones.</p>	<p>Isolation zones exist in outdoor areas adjacent to the physical barrier at the perimeter of the protected area and allow 20 feet of observation and assessment of the activities of people on either side of the barrier. Where permanent buildings do not allow a 20-foot observation and assessment distance on the inside of the protected area, the building walls are immediately adjacent to, or an integral part of, the protected area barrier and the 20-foot observation and assessment distance does not apply.</p> <p>The isolation zones are equipped with intrusion detection equipment that provides the capability to detect and assess unauthorized persons.</p>

Table 13.6A-1: Site-Specific Physical Security Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, and Analyses	Acceptance Criteria
<p>4. The intrusion detection and assessment equipment at the protected area perimeter:</p> <ul style="list-style-type: none"> a) detects penetration or attempted penetration of the protected area barrier and concurrently alarms in both the central alarm station and secondary alarm station, and b) remains operable from an uninterruptible power supply in the event of the loss of normal power. 	<p>Tests, inspections or a combination of tests and inspections of the intrusion detection and assessment equipment at the protected area perimeter and its uninterruptible power supply will be performed.</p>	<p>The intrusion detection and assessment equipment at the protected area perimeter:</p> <ul style="list-style-type: none"> a) detects penetration or attempted penetration of the protected area barrier and concurrently alarms in the central alarm station and secondary alarm station, and b) remains operable from an uninterruptible power supply in the event of the loss of normal power.
<p>5. Access control points are established to:</p> <ul style="list-style-type: none"> a) control personnel and vehicle access into the protected area. b) detect firearms, explosives, and incendiary devices at the protected area personnel access points. 	<p>Tests, inspections, or combination of tests and inspections of installed systems and equipment at the access control points to the protected area will be performed.</p>	<p>The access control points for the protected area:</p> <ul style="list-style-type: none"> a) are configured to control personnel and vehicle access. b) include detection equipment that is capable of detecting firearms, incendiary devices, and explosives at the protected area personnel access points.

Table 13.6A-1: Site-Specific Physical Security Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, and Analyses	Acceptance Criteria
6. An access control system with numbered picture badges is installed for use by individuals who are authorized access to protected areas and vital areas without escort.	A test of the access control system with numbered picture badges will be performed.	The access authorization system with numbered picture badges can identify and authorize protected area and vital area access only to those personnel with unescorted access authorization.
7. Access to vital equipment physical barriers requires passage through the protected area perimeter barrier.	Inspection will be performed to confirm that access to vital equipment physical barriers requires passage through the protected area perimeter barrier.	Vital equipment is located within a protected area such that access to vital equipment physical barriers requires passage through the protected area perimeter barrier.
8. a) Penetrations through the protected area barrier are secured and monitored. b) Unattended openings (such as underground pathways) that intersect the protected area boundary or vital area boundary will be protected by a physical barrier and monitored by intrusion detection equipment or provided surveillance at a frequency sufficient to detect exploitation.	Inspections will be performed of penetrations through the protected area barrier. Inspections will be performed of unattended openings that intersect the protected area boundary or vital area boundary.	Penetrations and openings through the protected area barrier are secured and monitored. Unattended openings (such as underground pathways) that intersect the protected area boundary or vital area boundary are protected by a physical barrier and monitored by intrusion detection equipment or provided surveillance at a frequency sufficient to detect exploitation.

Table 13.6A-1: Site-Specific Physical Security Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, and Analyses	Acceptance Criteria
9. Emergency exits through the protected area perimeter are alarmed and secured with locking devices to allow for emergency egress.	Tests, inspections, or a combination of tests and inspections of emergency exits through the protected area perimeter will be performed.	Emergency exits through the protected area perimeter are alarmed and secured by locking devices that allow prompt egress during an emergency.

13.7 Fitness for Duty

13.7.1 Introduction

Pursuant to 10 CFR 52.79(a)(44), COLAs must include a description of the fitness for duty (FFD) program required by 10 CFR Part 26 and its implementation. The FFD program is designed to provide reasonable assurance that: (1) individuals are trustworthy and reliable as demonstrated by the avoidance of substance abuse; (2) individuals are not under the influence of any substance, legal or illegal, or mentally or physically impaired from any cause, which in any way adversely affects their ability to safely and competently perform their duties; (3) measures are established and implemented for the early detection of individuals who are not fit to perform their duties; (4) the construction site is free from the presence and effects of illegal drugs and alcohol; (5) the work places are free from the presence and effects of illegal drugs and alcohol; and, (6) the effects of fatigue and degraded alertness on an individual's ability to safely and competently perform his or her duties are managed commensurate with maintaining public health and safety.

13.7.2 Summary of Application

Turkey Point Units 6 and 7 COL FSAR Section 13.7 is a new section added after Section 13.6 of the AP1000 DCD. The references that are currently in AP1000 DCD Section 13.7 have been redistributed to other Turkey Point Units 6 and 7 COL FSAR sections. There is no information associated with the FFD program incorporated by reference from the AP1000 DCD.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 13.7, Revision 8, the applicant provided the following:

Supplemental Information

- STD SUP 13.7-1

The applicant provided standard supplemental information in Turkey Point Units 6 and 7 COL FSAR Section 13.7 describing the FFD program for both the construction phase and the operating phase of the units. The construction phase program will be consistent with NEI 06-06, "Fitness for Duty Program Guidance for New Nuclear Power Plant Construction Sites," and the

construction phase program will be implemented prior to onsite construction of safety- and security-related SSCs. The operations phase program will be consistent with 10 CFR Part 26.

License Conditions

- Part 10, License Condition 6

The applicant proposed a license condition to provide a schedule to support the NRC's inspection of operational programs included in the Turkey Point Units 6 and 7 COL FSAR Table 13.4-201 including the FFD program.

13.7.3 Regulatory Basis

The applicable regulatory requirements for STD SUP 13.7-1 are as follows:

- 10 CFR Part 26, "Fitness for duty programs"
- 10 CFR 52.79(a)(44)

Regulatory guidance for FFD programs is included in RG 1.206.

13.7.4 Technical Evaluation

The staff reviewed Section 13.7 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, to ensure that the COLA represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application addresses the required information relating to the FFD program.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COLAs. To ensure that the staff's findings on standard content that were documented in the SER for the reference COLA (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7, COLA, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7, COL FSAR (and other parts of the COLA, as applicable) resulting from RAIs.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and has verified that the Turkey Point Units 6 and 7 application incorporates the standard content information included in the Vogtle application. Accordingly, the staff finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COLA. This standard content material is identified in this SER by use of italicized, double-indented formatting. Instead of confirming that all responses to RAIs identified in the corresponding standard content evaluation were endorsed by the Turkey Point Units 6 and 7, applicant (which is a typical step when comparing the two applications), the staff provides its evaluation of similar RAIs issued to Turkey Point Units 6 and 7, following the standard content material. The one confirmatory item in the standard content

material retains the number assigned in the VEGP SER, and is also addressed following the standard content material.

The following portion of this technical evaluation section is reproduced from Section 13.7.4 of the VEGP SER:

Supplemental Information

- STD SUP 13.7-1

The applicant provided a new Section 13.7 in the VEGP COL FSAR describing the FFD program. STD SUP 13.7-1 added the following text to Section 13.7:

The Fitness for Duty (FFD) Program (Program) is implemented and maintained in two phases; the construction phase program and the operating phase program. The construction and operations phase programs are implemented as identified in [FSAR] Table 13.4-201.

The construction phase program is consistent with NEI 06-06 ([FSAR] Reference 201). The workforce population subject to random testing during construction is determined on a weekly basis by averaging the total number of active construction badges over each preceding seven-day period. The random selection from each week's workforce population is identified by a standard computer-generated random number generator using this number of active badges as the range of numbers considered in the weekly random testing selection.

The operations phase program is consistent with 10 CFR Part 26.

The staff notes that Reference 201 in the above text refers to Revision 4 of NEI 06-06.

The NRC staff's review of STD SUP 13.7-1 included the following: (1) the adequacy of the FFD program for the construction phase; (2) the adequacy of the FFD program for the operations phase; and (3) the implementation schedule proposed by the applicant for both the construction phase and operations phase FFD operational programs.

The NRC staff issued three RAIs to obtain further clarification on the applicant's FFD Program. The first two RAIs discussed below are associated with the resolution of STD SUP 13.7-1.

In RAI 13.6-33, the staff asked how the applicant intends to update its FFD program for the construction phase. NEI 06-06 provides examples of the FFD program that is required and, if this guidance is endorsed by the NRC, will provide an acceptable method of complying with the NRC's regulations. If the NRC endorses NEI 06-06, does the applicant intend to update its FFD program for the construction phase to comply with NEI 06-06? If future revisions to NEI 06-06 are endorsed by the NRC, does the applicant intend to update its FFD

program for the construction phase to comply with certain clarifications, additions, and exceptions in these future, endorsed revisions, as necessary?

The applicant replied that it submitted an FFD Program for NRC approval as part of the Limited Work Authorization (LWA) request, and that the program is now being implemented as part of the construction activities. If NEI 06-06 is endorsed by the NRC, SNC plans to transition to a program that follows the guidance in NEI 06-06. The COL application currently commits to NEI 06-06, Revision 4, and will be changed in a future revision to commit to NEI 06-06, Revision 5. The applicant will evaluate substantial changes in subsequent revisions to NEI 06-06 and modify the construction phase FFD program to incorporate those substantial changes determined to be appropriate.

The applicant's response to RAI 13.6-33, as well as its supplemental response, revises Section 13.7 to address the issues discussed above. The relevant portion of the proposed revised text, to be included in a future revision of the VEGP COL FSAR, is included below:

The Fitness for Duty Program (FFD) is implemented and maintained in multiple and progressive phases dependent on the activities, duties, or access afforded to certain individuals at the construction site. In general, two different FFD programs will be implemented: a construction FFD program and an operations FFD program. The construction and operations phase programs are illustrated in [FSAR] Table 13.4-201.

The construction FFD program is consistent with NEI 06-06 ([FSAR] Reference 201). NEI 06-06 applies to persons constructing or directing the construction of safety- and security-related structures, systems, or components performed onsite where the new reactor will be installed and operated. Management and oversight personnel, as further described in NEI 06-06, and security personnel prior to the receipt of special nuclear material in the form of fuel assemblies (with certain exceptions) will be subject to the operations FFD program that meets the requirements of 10 CFR Part 26, Subparts A through H, N, and O. At the establishment of a protected area, all persons who are granted unescorted access will meet the requirements of an operations FFD program. Prior to issuance of a Combined License, the construction FFD program at a new reactor construction site for those subject to Subpart K will be reviewed and revised as necessary should substantial revisions occur to either NEI 06-06 following NRC endorsement or the requirements of 10 CFR Part 26.

The staff notes that Reference 201 in the above text refers to Revision 5 of NEI 06-06.

In RAI 13.6-34, the staff asked the applicant to: (1) describe how FSAR Table 13.4-201, Item 15, related to the security operational program, comports with 10 CFR 26.3, "Scope," and 10 CFR 26.4, and the guidance provided in the

NRC's letter to NEI dated December 2, 2009, entitled "Status of U.S. Nuclear Regulatory Commission Review and Endorsement of NEI 06-06, 'Fitness for Duty Program Guidance for New Nuclear Power Plant Construction Sites,'" and (2) provide site-specific information to clearly and sufficiently describe the applicant's FFD program. This information would include, but is not limited to, any deviations or exceptions to the requirements of 10 CFR Part 26 as further described in NEI 06-06.

The applicant stated that the response to RAI 13.6-33 provided the changes to the COL application that will describe the FFD program required by 10 CFR Part 26. Site-specific information is also provided in that response to clarify which program will be used to cover the various classifications of workers that must be covered in accordance with 10 CFR Part 26. The applicant's response to RAI 13.6-35 (below) revises FSAR Table 13.4-201, Item 20 to address the guidance provided in the NRC's December 2, 2009 letter. The proposed revision to Item 20 of FSAR Table 13.4-201, to be included in a future revision of the VEGP COL FSAR, is included below:

Item	Program Title	Program Source (required by)	FSAR Section	Implementation Milestone	Requirements
20.	Fitness for Duty (FFD) Program for Construction (workers and first-line supervisors)	10 CFR 26.4(f)	13.7	Prior to initiating 10 CFR Part 26 construction activities	10 CFR Part 26, Subpart K
	FFD Program for Construction (management and oversight personnel)	10 CFR 26.4(e)	13.7	Prior to initiating 10 CFR Part 26 construction activities	10 CFR Part 26, Subparts A - H, N, and O
	FFD Program for Security Personnel	10 CFR 26.4(e)(1)	13.7	Prior to initiating 10 CFR Part 26 construction activities	10 CFR Part 26, Subparts A - H, N, and O
		10 CFR 26.4(a)(5) or 26.4(e)(1)		Prior to the earlier of: A. Licensee's receipt of SNM in the form of fuel assemblies, or B. Establishment of a protected area, or C. The 10 CFR 52.103(g) finding	10 CFR Part 26, Subparts A - I, N, and O
	FFD Program for FFD Program personnel	10 CFR 26.4(g)	13.7	Prior to initiating 10 CFR Part 26 construction activities	10 CFR Part 26, Subparts A, B, D - H, N, O, and C per licensee's discretion

Item	Program Title	Program Source (required by)	FSAR Section	Implementation Milestone	Requirements
	FFD Program for persons required to physically report to the Technical Support Center (TSC) or Emergency Operations Facility (EOF)	10 CFR 26.4(c)	13.7	Prior to the conduct of the first full-participation emergency preparedness exercise under 10 CFR Part 50, App. E, Section F.2.a	10 CFR Part 26, Subparts A - I, N, and O, except for §§ 26.205 – 209
	FFD Program for Operation	10 CFR 26.4(a) and (b)	13.7	Prior to the earlier of: A. Establishment of a protected area, or B. The 10 CFR 52.103(g) finding	10 CFR Part 26, Subparts A - I, N, and O, except for individuals listed in § 26.4(b), who are not subject to §§ 26.205 – 209

In its December 2, 2009, letter to NEI, the NRC stated that during the review and approval process for NEI 06-06, the applicant should provide the following statements in its application:

- *NEI 06-06, Revision 5 was used in the development of the construction site FFD program.*
- *The applicant will review and revise its construction site FFD program as necessary to ensure that it comports with the NRC-endorsed version of NEI 06-06.*
- *If the NRC staff's review of NEI 06-06 results in substantive changes to the most recent, docketed FFD program description provided by the applicant, the applicant must amend its application to reflect the changes.*

The applicant's proposed revisions to FSAR Section 13.7 satisfactorily address the three items described above. The December 2, 2009, letter also provided implementation milestones for consideration by applicants. The staff confirmed that the proposed revisions to FSAR Table 13.4-201, Item 20, include all of the implementation milestones in the December 2, 2009, letter.

*Therefore, based on the staff's acceptance of the proposed revisions to FSAR Section 13.7 and to FSAR Table 13.4-201, Item 20, as noted above, the NRC staff concludes that the applicant has satisfactorily addressed STD SUP 13.7-1 by providing sufficient information on the FFD program for both the construction phase and the operating phase of the units. The inclusion of this information in a future revision of the VEGP COL FSAR is **Confirmatory Item 13.7-1**.*

Resolution of VEGP Site-Specific Confirmatory Item 13.7-1

Confirmatory Item 13.7-1 is an applicant commitment to revise its FSAR Section 13.7 and Table 13.4-201 regarding the FFD program for the construction phase and the operating phase of the units. The staff verified that the VEGP

COL FSAR was appropriately revised. As a result, Confirmatory Item 13.7-1 is now closed.

License Conditions

In RAI 13.6-35, the staff asked the applicant if proposed License Condition 3, A.1, and G.7, described in Part 10 of the COL application comports with FSAR Table 13.4-201, Item 15, which itemizes the aspects of the security operational program.

The staff further evaluated the need for License Condition 3, A.1 and G.7, for the VEGP COL application and determined it was not needed because the implementation milestones for FFD are governed by 10 CFR Part 26. The staff communicated this information to SNC, which then submitted Supplement 1 to its response to this RAI, removing this license condition for FFD.

- Part 10, License Condition 6

The applicant proposed a license condition in Part 10 of the VEGP COL application to provide a schedule to support the NRC's inspection of operational programs, including the FFD program.

The proposed license condition is consistent with the policy established in SECY 05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," for operational programs and is acceptable.

Evaluation of Turkey Point Units 6 and 7 RAIs

The staff issued RAI 6279, Question 13.07-1 to the applicant.

The staff evaluation of the applicant's response provided in letter dated February 21, 2012, related to the FFD program (ADAMS Accession No. ML12053A347) is as follows:

NRC RAI Number: 6279, Question 13.07-1

Under 10 CFR 52.79(a)(44), the applicant's FSAR must contain a description of the fitness for duty (FFD) program and its implementation required by 10 CFR Part 26. Provide site-specific information to clearly and sufficiently describe your FFD program in terms of the scope and level of detail in order for the staff to evaluate and determine a reasonable assurance finding of acceptability. This information may include, but is not limited to any condition in which the applicant intends to deviate from or take exception to the requirements of 10 CFR Part 26 as further described in NEI 06-06, "Fitness for Duty Program Guidance for New Nuclear Power Plant Construction Sites" or as endorsed by the NRC. Regulatory Basis: 10 CFR 52.79(a)(44).

FPL RESPONSE:

COLA Part 2, Section 13.7 will be revised to provide site-specific fitness for duty information.

ASSOCIATED COLA REVISIONS:

COLA Part 2, Section 13.7, Fitness for Duty, will be revised in a future COLA revision by adding the following text (with an LMA [left margin annotation] of PTN SUP 13.7-1):

“The FFD program for the construction site, as defined in NEI 06-06, will be administered under an FPL-approved EPC contractor program. The 10 CFR Part 26, requirements are implemented for the construction site area based on the descriptions provided in Table 13.4-201.

- Construction Workers & First Line Supervisors (EPC contractor employees and subcontractors) are covered by the FPL-approved EPC contractor FFD Program (elements Subpart K).
- FPL employees and FPL subcontractor's construction management and oversight personnel are covered by the Turkey Point Units 3 & 4 Operations FFD Program and the EPC contractor's employees and subcontractor construction management and oversight personnel are covered by the FPL-approved EPC contractor FFD Program (elements Subpart A - H, N, and O).
- FPL security personnel are covered by the Turkey Point Units 3 & 4 Operations FFD Program and the EPC contractor's security personnel are covered by the FPL approved EPC contractor FFD Program (elements Subpart A - H, N, and O). This coverage is applicable from the start of construction activities to the earlier of (1) the receipt of SNM in the form of fuel assemblies, (2) the establishment of a protected area, or (3) the 10 CFR 52.103(g) finding.
- FPL FFD Program personnel are covered by the Turkey Point Units 3 & 4 Operations FFD Program and the EPC contractor's FFD Program personnel are covered by the FPL-approved EPC contractor FFD Program (elements Subpart A, B, D - H, N, O, and C per licensee's discretion).
- FPL security personnel protecting fuel assemblies, or the established protected area, or the facility following the 10 CFR 52.103(g) finding are covered by the Turkey Point Units 3 & 4 Operations FFD Program (elements Subpart A - I, N, and O).
- Personnel required to physically report to the Technical Support Center (TSC) or Emergency Operations Facility (EOF) when that requirement is in effect are covered by the Turkey Point Units 3 & 4 FFD Program (elements Subpart A - I, N, and O, except for § 26.205 - 209).”

In response to RAI 6279, Question 13.07-1, FPL stated that FSAR Table 13.4-201 will be revised to provide site-specific fitness for duty information. The inclusion of the information provided in the RAI responses in a future revision of the FPL COL FSAR was identified as part

of **Confirmatory Item 13.7-1**, which is discussed in the standard content portion of this safety evaluation above.

Resolution of Turkey Point Site-Specific Confirmatory Item 13.7-1

Confirmatory Item 13.7-1 is an applicant commitment to revise its FSAR Section 13.7 and Table 13.4-201 regarding the FFD program for the construction phase and the operating phase of the units. The staff verified that the Turkey Point Units 6 and 7 COL FSAR, Revision 5 was appropriately revised. As a result, Confirmatory Item 13.7-1 is now closed.

13.7.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff finds substance of the requirements of License Condition (13-7) acceptable, and the substance of those requirements will be included in the license in a more general condition that covers the implementation of all programs:

- License Condition (13-7) - No later than 12 months after issuance of the COL, FPL shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the operational programs listed in FSAR Table 13.4-201, including the associated estimated date for initial loading of fuel. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until all the operational programs listed in FSAR Table 13.4-201 have been fully implemented.

13.7.6 Conclusion

The staff reviewed FSAR Section 13.7 along with the applicant's proposed revision of this section. The staff's review confirmed that the applicant's proposed revision to Section 13.7 has adequately addressed the required information relating to the FFD, and for the reasons set forth above, the staff finds it acceptable. The FFD portion of the FSAR, Section 13.7, is consistent with the requirements of 10 CFR Part 26 and 10 CFR 52.79(a)(44).

13.8 Cyber Security

Section 13.8 does not exist in either the AP-1000 DCD or the Turkey Point Units 6 and 7 COL FSAR. The NRC staff has added this section to the SER in order to address specific issues regarding the Turkey Point Units 6 and 7 cyber security. General description of the cyber security program, including combined license information item associated with cyber security, is part of the discussion in Section 13.6, "Physical Security," of the Turkey Point Units 6 and 7 FSAR and the AP1000 DCD.

13.8.1 Introduction

In Revision 3 of the Turkey Point Units 6 and 7 application dated December 16, 2011 (ADAMS Accession No. ML11361A102), Florida Power & Light Company provided Revision 1 of the Cyber Security Plan (CSP) for Turkey Point Units 6 and 7 in Part 9 of the application. The CSP applies to all critical digital assets (CDAs) used for Turkey Point Units 6 and 7 operation. In the submittal, the applicant describes how the requirements of 10 CFR 73.54 will be implemented to protect digital computer and communications systems and networks associated with the

following functions from those cyber attacks, up to and including the design-basis threat (DBT) described in 10 CFR 73.1. The scope of 10 CFR 73.54 includes CDAs associated with the following:

- safety-related and important-to-safety functions
- security functions
- emergency preparedness functions, including offsite communications
- support systems and equipment which, if compromised, would adversely impact safety, security, or emergency preparedness functions

13.8.2 Summary of Application

The applicant addresses cyber security in Section 13.6 of the Turkey Point Units 6 and 7 COL FSAR. Section 13.6 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 13.6 of the AP1000 DCD, Revision 19. The applicant's CSP includes deviations from RG 5.71, "Cyber Security Programs for Nuclear Facilities." As set forth below, the staff has evaluated these deviations.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 13.6, the applicant provides the following:

AP1000 COL Information Item

- STD COL 13.6-5

The applicant provided additional information in STD COL 13.6-5 to address COL Information Item 13.6-5, which provides information related to the cyber security program.

License Conditions

- Part 10, License Condition 3, Item G.10

The applicant proposed a license condition in Part 10 of the Turkey Point Units 6 and 7 COL application requiring the applicant to implement the cyber security program prior to initial fuel load.

- Part 10, License Condition 6

The applicant proposed a license condition in Part 10 of the Turkey Point Units 6 and 7 COL application to require implementation of operational programs included in Turkey Point Units 6 and 7 COL FSAR Table 13.4-201 including the cyber security program, in accordance with designated milestones, which would provide a schedule to support the NRC's inspection of these programs.

13.8.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

The applicable regulatory requirements for cyber security are as follows:

- 10 CFR 73.1, "Purpose and scope"
- 10 CFR 73.54, "Protection of digital computer and communication systems and networks"
- 10 CFR 73.55, "Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage," paragraphs (a)(1), (b)(8), and (m)
- 10 CFR 73.58, "Safety/security interface requirements for nuclear power reactors"
- 10 CFR Part 73, "Physical protection of plants and materials," Appendix G, "Reportable Safeguards Events"

The applicable regulatory guidance for cyber security is RG 5.71.

13.8.4 Technical Evaluation

The staff reviewed Section 13.6 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COLA represents the complete scope of information relating to this review topic.¹ The staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to cyber security. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

The staff's review of the Turkey Point Units 6 and 7 CSP has focused on ensuring that the necessary programmatic elements are included in this plan to provide high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety. The staff reviewed the Turkey Point Units 6 and 7 CSP to assure the necessary programmatic elements that, when effectively implemented, will provide the required high assurance of adequate protection of the common defense and security and public health and safety. Effective implementation is dependent on the procedures and practices the applicant develops to satisfy the programmatic elements of its CSP. The facility implementing procedures are subject to future NRC inspection.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COLAs. To ensure that the staff's findings on standard content that were documented in the SER for the reference COLA (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COLA, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COLA, as applicable) resulting from RAIs.
- The staff confirmed that the Turkey Point Units 6 and 7 CSP provided in Part 9, Revision 3 of the application on December 16, 2011, was identical to the June 14, 2010, VEGP submittal transmitting its CSP, with the only exceptions being to the title of the units and the identification of the position charged with oversight of the program.

- The staff verified that the site-specific differences were not relevant.

Accordingly, the staff has completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COLA. This finding included verifying that the difference in the position charged with oversight of the program (the Vice President Fleet Support at Turkey Point and Vice President of Nuclear Operations Support at VEGP) does not affect the staff's conclusions regarding the applicant's CSP. This standard content material is identified in this SER by use of italicized, double-indented formatting. The one confirmatory item in the standard content material retains the number assigned in the VEGP SER.

The following portion of this technical evaluation section is reproduced from Section 13.8.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 13.6-5*

The NRC staff reviewed STD COL 13.6-5 related to COL Information Item 13.6-5, which identifies the need for a COL applicant to address cyber security. STD COL 13.6-5 supplemented Section 13.6 of the VEGP COL FSAR by stating the following text is to be added after Section 13.6 of the VEGP ESP SSAR:

The Cyber Security Plan is submitted to the Nuclear Regulatory Commission as a separate licensing document to fulfill the requirements contained in 10 CFR 52.79(a)(36) and 10 CFR 73.54. The Cyber Security Plan will be maintained in accordance with the requirements of 10 CFR 52.98. The Plan is withheld from public disclosure pursuant to 10 CFR 2.390.

Section 13.6 of the VEGP COL FSAR also refers to FSAR Table 13.4-201, "Operational Programs Required by NRC Regulations," as providing the milestone for implementing the cyber security program.

The VEGP applicant submitted Revision 0 of its CSP in a letter dated June 14, 2010, to demonstrate that the cyber security program will provide high assurance that digital computer and communication systems and networks are adequately protected against cyber attacks, up to and including the DBT as described in 10 CFR 73.1. The CSP has been withheld from public disclosure pursuant to 10 CFR 2.390(d) (1). In its review of this plan, the NRC staff used the guidance in RG 5.71 to determine if the regulatory requirements described in Section 13.8.3 of this SER are satisfied.

The applicant described the cyber security program based on 10 CFR 73.54, including the audit of the effectiveness of the cyber security program as required by 10 CFR 73.55(m), submittal of CSPs and the establishment, maintenance and implementation of a cyber security program required by 10 CFR 73.55(a) (1) and 10 CFR 73.55(b)(8) and reporting requirements in 10 CFR Part 73, Appendix G. The implementation milestones for this program are included in VEGP COL FSAR Table 13.4-201.

As detailed in the remainder of this SER section, the CSP has been reviewed by the NRC staff for format and content utilizing the NRC CSP template in RG 5.71, and found to include all features considered essential for such a program, and is acceptable. In particular, it has been found to comply with the Commission's regulations including 10 CFR 73.54, 10 CFR 73.55(a)(1), 10 CFR 73.55(b)(8), 10 CFR 73.55(m), and 10 CFR Part 73, Appendix G and conforms to the NRC CSP template set forth in RG 5.71.

*The applicant has committed to incorporate this CSP into a future revision of the VEGP COL application to address NRC requirements in 10 CFR 73.54. This action will be tracked as **Confirmatory Item 13.8-1**.*

Resolution of VEGP Site-specific Confirmatory Item 13.8-1

Confirmatory Item 13.8-1 is an applicant commitment to include the CSP into a future revision of the VEGP COL application. The staff verified that the VEGP COL application was appropriately revised. As a result, Confirmatory Item 13.8-1 is now closed.

13.8.4.1 Establishment of Cyber Security Program

The VEGP CSP describes how SNC will establish a cyber security program to achieve high assurance that the VEGP digital computer and communication systems and networks associated with safety, security, and emergency preparedness, including offsite communications and support systems and equipment which if compromised would adversely impact safety, security and/or emergency preparedness (SSEP) functions, and their digital assets, hereafter defined as CDAs, are adequately protected against cyber attacks up to and including the DBT. RG 5.71 provides a method that the staff considers acceptable for complying with this regulation. SNC complies with the requirements of 10 CFR 73.54 by providing a CSP that follows the template in Appendix A of RG 5.71, except as noted in Attachment A, "Vogtle Electric Generating Plant Units 3 and 4 Cyber Security Plan Deviations from Regulatory Guide RG 5.71." The VEGP CSP included:

Within the scope of the NRC's cyber security rule at 10 CFR 73.54, systems or equipment that perform important to safety functions include structures, systems, and components (SSCs) in the balance of plant (BOP) that could directly or indirectly affect reactivity at a nuclear power plant and could result in an unplanned reactor shutdown or transient. Additionally, these SSCs are under the licensee's control and include electrical distribution equipment out to the first inter-tie with the offsite distribution system.

The VEGP CSP included a deviation from the guidance to clarify that systems or equipment that perform important-to-safety functions include SSCs in the balance of plant (BOP) that could directly or indirectly affect reactivity and could result in an unplanned reactor shutdown or transient. This deviation is consistent with Commission policy.

The NRC staff reviewed the VEGP CSP against the template in RG 5.71 and the staff requirements memorandum (SRM), CMWCO-10-0001, "Regulation of Cyber Security at Nuclear Power Plants," dated October 21, 2010.

The applicant states in the VEGP CSP that its security program complies with 10 CFR 73.54 by:

- (1) establishing and implementing defensive strategies consistent with the defensive model, described in Section 3.1.5, including the security controls described in Sections 3.1, 3.2, and 3.3.*
- (2) Maintaining the program, as described in Section 4.*

Based on the above review, the NRC staff finds that establishment of a cyber security program described in Section 1 of the VEGP CSP is acceptable.

The following SER Sections 13.8.4.2 through 13.8.4.23 correlate to specific sections in Appendix A to RG 5.71. These SER sections use the same headings as the corresponding Appendix A sections, and include the Appendix A numbering system in the titles. SER Section 13.8.4.24 addresses each of the deviations identified in the applicant's CSP.

13.8.4.2 Security Assessment and Authorization (Section A.3.1.1 of Appendix A to RG 5.71)

Section 3.1.1 of the VEGP CSP states that the following will be reviewed every 24 months:

- A formal documented security planning, assessment, and authorization policy that describes the purpose, scope, roles, responsibilities, management commitments, and coordination among departments and the implementation of the security program and the controls applied in accordance with Section 3.1.6*
- A formal documented procedure to facilitate the implementation of the cyber security program and the security assessment*

The NRC staff reviewed the above and found that evaluation of the program elements every 24 months is not consistent with Section C.3.1.1 of RG 5.71. The time period between evaluations is 12 months longer than the time period provided in brackets in RG 5.71. However, this 24-month time period conforms to 10 CFR 73.54(g), requiring the applicant to review the cyber security program as a component of the physical security program in accordance with the requirements of 10 CFR 73.55(m), including the periodicity requirements. The requirement of 10 CFR 73.55(m) is that at minimum the applicant review each element of the physical protection program at least every 24 months.

Based on the above review, the NRC staff finds that the security assessment and authorization described in Section 3.1.1 of the VEGP CSP is acceptable.

13.8.4.3 Cyber Security Team (Section A.3.1.2 of Appendix A to RG 5.71)

Section 3.1.2 of the VEGP CSP states that a cyber security team, composed of individuals with broad knowledge, will be established and maintained and that the broad knowledge of the team will include the following areas:

- Information and digital system technology; this includes cyber security, software development, offsite communications, computer system administration, computer engineering, and computer networking.*
- Nuclear facility operations, engineering, and safety; this includes overall facility operations and plant technical specification compliance.*
- Physical security and emergency preparedness; this includes the site's physical security and emergency preparedness systems and programs.*

This section of the VEGP CSP also enumerates the roles and responsibilities of the cyber security team. Aside from the deviations discussed below, this section of the VEGP CSP conforms to the CSP template wording provided in Section A.3.1.2 of RG 5.71.

The VEGP CSP includes several deviations from the text of RG 5.71:

- 1) The first deviation clarifies that the cyber security team (CST) will be responsible for “overseeing” preparation of documentation of cyber security controls and that, in fact, non-team members (such as vendor personnel) may perform some of these actions, under the supervision of the CST. This clarification is acceptable to the staff since the responsibility to ensure compliance with 10 CFR 73.54 remains with the CST.*
- 2) The second deviation changes the CST responsibility from “assuring the retention” of assessment documentation to “establishing the retention policy” for assessment documentation. Again, the deviation is acceptable to the staff since the responsibility to ensure compliance with 10 CFR 73.54 remains with the CST.*
- 3) The third and final deviation seeks to change the basis for CST determinations being made in a free and objective manner. The RG 5.71 wording states that the CST should be free to make determinations that are not constrained by “operational goals.” The deviation changes the respective sentence to say “...by business goals.” Again, the deviation is acceptable to the staff since it maintains the same objective of keeping financial considerations out of decision making regarding cyber security.*

Based on the above review, the NRC staff finds that the CST described in Section 3.1.2 of the VEGP CSP is acceptable.

13.8.4.4 Identification of Critical Digital Assets (Section A.3.1.3 of Appendix A to RG 5.71)

Section 3.1.3 of the VEGP CSP states that to identify the critical systems (CSs) at VEGP, the CST identified and documented plant systems, equipment, communication systems, and networks that are associated with the SSEP functions described in 10 CFR 73.54(a)(1), as well as the support systems associated with these SSEP functions in accordance with the approved plant licensing basis.

The VEGP CSP also states that the CST identified and documented CDAs that have a direct, supporting, or indirect role in the proper functioning of CSs.

The steps outlined in the VEGP CSP essentially match the corresponding steps described in RG 5.71 for this same activity. The only difference between the corresponding section in RG 5.71 and the VEGP CSP is the addition of the modifying phrase: "...and defined in the approved plant licensing basis."

10 CFR 73.54(a)(1) requires that the licensee protect digital computer and communication systems and networks associated with: (i) safety-related and important-to-safety functions; (ii) security functions; (iii) emergency preparedness functions, including offsite communications; and (iv) support systems and equipment which, if compromised, would adversely impact SSEP functions.

This deviation is acceptable because SNC proposes to use its licensing basis to identify CSs that are associated with SSEP functions, as 10 CFR 73.54 requires. This statement includes the first step in RG 5.71 to analyze digital computer and communication systems and networks to determine if they include CDAs.

Based on the above review, the NRC staff finds the applicant's proposal, described in Section 3.1.3 of the VEGP CSP, to use 10 CFR 73.54(a) (1) and its licensing basis to identify CDAs to be acceptable.

13.8.4.5 Reviews and Validation Testing (Section A.3.1.4 of Appendix A to RG 5.71)

Section 3.1.4 of the VEGP CSP states that the VEGP CST will be responsible for conducting a review, performing validation activities, and for each CDA, the CST determined:

- its direct and indirect connectivity pathways*
- infrastructure interdependencies*
- the application of defensive strategies, including defensive models, security controls, and other defensive measures*

The CSP also requires that the CST validate the above activities through comprehensive walkdowns, which include a range of activities that conform to those activities specified in RG 5.71 for this purpose.

The requirements, processes and procedures described in this section of the VEGP CSP conform to, and encompass all of the same specifications, outlined in the comparable section of RG 5.71.

Based on the above review, the NRC staff finds that reviews and validation testing described in Section 3.1.4 of the VEGP CSP is acceptable.

13.8.4.6 Defense-In-Depth Protective Strategies (Section A.3.1.5 of Appendix A to RG 5.71)

Section 3.1.5 of the VEGP CSP states that the defensive strategy consists of the defensive model described in Section C.3.2 of RG 5.71, and the detailed defensive architecture of Appendix C, Section 6, defense-in-depth controls in Appendix C, Section 7, and security controls applied in accordance with Section 3.1.6 of the VEGP CSP with one deviation to its defensive architecture. The VEGP defensive architecture, including the deviation is consistent with the security model described in RG 5.71, which provides for isolation of safety-related and security CDAs.

Based on the above review, the NRC staff finds that the defense-in-depth protective strategies described in Section 3.1.5 of the VEGP CSP are acceptable.

13.8.4.7 Application of Security Controls (Section A.3.1.6 of Appendix A to RG 5.71)

Section 3.1.6 of the VEGP CSP states that VEGP Units 3 and 4 established defense-in-depth protective strategies by applying and documenting the following:

- the defensive model described in Section 3.2 of RG 5.71 (discussed in SER Section 13.8.4.6)*
- the physical and administrative security controls established by the VEGP Units 3 and 4 Physical Security Program and physical barriers, such as locked doors, locked cabinets, and locating CDAs in the VEGP Units 3 and 4 protected area or vital areas, which are part of the overall security controls used to protect CDAs from attacks*
- verification of the effectiveness of the implemented operational and management controls described in Appendix C to RG 5.71 and implemented alternatives to the Appendix C controls for each CDA*
- the technical controls described in Appendix B to RG 5.71 and the operational and management controls described in Appendix C to RG 5.71, consistent with the process described below*

The VEGP CSP deviates from RG 5.71, Section C.3.3 Security Controls and Appendix A.3.1.6, by stating that when a control from Appendices B and C of RG 5.71 is not implemented, the licensee will implement alternate control(s) that “do not provide less protection than the corresponding” control in the appendix.

This deviation is consistent with the method used in RG 5.71, which states that controls should provide equal or better protection.

The VEGP CSP also deviates from RG 5.71 by stating that when a control can be proved to be unnecessary, the applicant will perform an analysis demonstrating that the control is not necessary, and will provide a documented justification. Although RG 5.71 specifically calls for an attack vector analysis, and the VEGP CSP does not specifically commit to performing an attack vector analysis, the VEGP CSP does commit to justifying the non-applicability of a control by demonstrating that the attack vector does not exist. This provides for the same outcome as RG 5.71.

Based on the above review, the NRC staff finds that the application of security controls described in Section 3.1.6 of the VEGP CSP is acceptable.

13.8.4.8 Incorporating the Cyber Security Program into the Physical Protection Program (Section A.3.2 of Appendix A to RG 5.71)

Section 3.2 of the VEGP CSP states that the licensee will provide the management interfaces necessary to appropriately coordinate physical and cyber security activities, as follows:

- establish an organization that is responsible for cyber security and is independent from operations*
- document physical and cyber security interdependencies*
- develop policies and procedures to coordinate management of physical and cyber security controls*
- incorporate unified policies and procedures to secure CDAs from attacks up to and including the DBT*
- coordinate acquisition of physical or cyber security services, training, devices, and equipment*
- coordinate interdependent physical and cyber security activities and training with physical and cyber security personnel*
- integrate and coordinate incident response capabilities with physical and cyber incident response personnel*
- train senior management regarding the needs of both disciplines*
- periodically exercise the entire security organization using realistic scenarios combining both physical and cyber simulated attacks*

The VEGP CSP deviates from RG 5.71 by not creating a unified security organization. The commitment to provide for appropriate management interfaces to coordinate the physical and cyber security organizations provides for a level of integration equivalent to a unified organization.

Based on the above review, the NRC staff finds that the incorporation of the cyber security program into the physical protection program described in Section 3.2 of the VEGP CSP is acceptable.

13.8.4.9 Policies and Implementing Procedures (Section A.3.3 of Appendix A to RG 5.71)

Section 3.3 of the VEGP CSP states that the licensee will develop policies and procedures to address the security controls in Appendices B and C to RG 5.71 and review and approve issues and uses, and revise the same according to Section 4 of the CSP. The CSP will also establish specific responsibilities for the positions described in Section 10.10 of Appendix C to RG 5.71, with the following deviation.

The CSP states that this will occur “in accordance with the security control application process in Section 3.1.6 of this Plan.” This process requires the applicant to justify and demonstrate that any deviation from the controls in RG 5.71 provide no less protection than the corresponding control in Appendices B and C; therefore, the VEGP CSP will require the same level of protection as the corresponding commitment in RG 5.71.

Based on the above review, the NRC staff finds that the policies and implementing procedures described in Section 3.3 of the VEGP CSP are acceptable.

13.8.4.10 Maintaining the Cyber Security Program (Section A.4 of Appendix A to RG 5.71)

Section 4 of the VEGP CSP states that the applicant will establish the programmatic elements necessary to maintain security throughout the life cycle of the CDAs, and that the applicant has implemented these elements. For new assets, SNC commits to follow the process described in Section 4.2.

Section 4 of the VEGP CSP is nearly identical to Section C.4 of RG 5.71, with the deviation of replacing the bracketed text [Licensee/Applicant] with VEGP Units 3 and 4, and by including the caveat that the operational and management controls are applied following the process described in Section 3.1.6. The process described in Section 3.1.6 allows the licensee/applicant to not apply a control if it can demonstrate that the control is not necessary by justifying that the attack vector associated with the control does not exist. This approach is consistent with the method used in RG 5.71, and does not reduce the protection to the plant.

Based on the above review, the NRC staff finds that the maintenance of the cyber security program described in Section 4 of the VEGP CSP is acceptable.

13.8.4.11 Continuous Monitoring and Assessment (Section A.4.1 of Appendix A to RG 5.71)

Section 4.1 of the VEGP CSP states that the licensee will continue to monitor security controls for effectiveness; will ensure that they remain in place

throughout the life cycle of the CDA; and will verify that rogue assets are not connected to the infrastructure.

The VEGP CSP includes a single deviation from Section A.4.1 of RG 5.71. The RG states that “[Licensee/Applicant] continuously monitors security controls consistent with Appendix C to RG 5.71,” whereas the VEGP CSP states that “VEGP Units 3 and 4 continues to monitor security controls consistent with Appendix C to RG 5.71.”

This deviation is consistent with the method in RG 5.71, which calls for periodic assessments, which is consistent with the statement “continues to monitor.”

Based on the above review, the NRC staff finds that the ongoing monitoring and assessment described in Section 4.1 of the VEGP CSP is acceptable.

13.8.4.12 Periodic Assessment of Security Controls (Section A.4.1.1 of Appendix A to RG 5.71)

Section 4.1.1 of the VEGP CSP states that the licensee will periodically assess that security controls implemented for each CDA remain robust, resilient, and effective in place throughout the life cycle, at least every 24 months.

The NRC staff reviewed the above and found that this period of assessment is not consistent with RG 5.71. The time period between evaluations is 12 months longer than the time period provided in RG 5.71. However, this 24-month time period conforms to 10 CFR 73.54(g) requiring the licensee/applicant to review the cyber security program as a component of the physical security program in accordance with the requirements of 10 CFR 73.55(m), including the periodicity requirements. The requirements of 10 CFR 73.55(m) are that, at a minimum, the licensee/applicant review each element of the physical protection program, which includes the cyber security program, at least every 24 months.

Furthermore, the VEGP CSP states that controls will be reviewed according to the requirements of the security controls if that period of review occurs more often. This is also consistent with the method provided in RG 5.71.

Based on the above review, the NRC staff finds that the periodic assessment of security controls described in Section 4.1.1 of the VEGP CSP is acceptable.

13.8.4.13 Effectiveness Analysis (Section A.4.1.2 of Appendix A to RG 5.71)

Section 4.1.2 of the VEGP CSP states that the licensee will monitor and measure the effectiveness of the cyber security program and its security controls to ensure that both are implemented correctly, operating as intended, and continuing to provide high assurance that CDAs are protected against cyber attacks. The licensee commits to verifying the effectiveness of the security controls every 24 months, or in accordance with the specific requirements of the implemented security controls, whichever is more frequent.

The NRC staff reviewed the above and found that this period of verification is inconsistent with RG 5.71. The time period between evaluations is 12 months

longer than the time period provided in RG 5.71. However, this 24-month time period conforms to 10 CFR 73.54(g) requiring the applicant to review the cyber security program as a component of the physical security program in accordance with the requirements of 10 CFR 73.55(m), including the periodicity requirements. The requirements of 10 CFR 73.55(m) are that, at a minimum, the applicant review each element of the physical protection program, which includes the cyber security program, at least every 24 months.

Furthermore, the VEGP CSP states that verification will also occur according to the requirements of the security controls if that period of verification occurs more often. This is also consistent with the method provided in RG 5.71.

Based on the above review, the NRC staff finds that the effectiveness analysis described in Section 4.1.2 of the VEGP CSP is acceptable.

13.8.4.14 Vulnerability Assessments and Scans (Section A.4.1.3 of Appendix A to RG 5.71)

Section 4.1.3 of the VEGP CSP states vulnerability assessments will be performed as specified in the security controls in Appendices B and C of RG 5.71 to identify new vulnerabilities that have the potential to impact the effectiveness of the cyber security program and the security of the CDAs. The applicant also commits to address vulnerabilities that could cause CDAs to become compromised or could have an adverse impact on SSEP functions. Section 13.1 of Appendix C of RG 5.71 provides that vulnerability assessments should occur no less frequently than once a quarter, at random intervals, and when new potential vulnerabilities are reported and identified.

Section A.4.1.3 of RG 5.71 states that vulnerability assessments will occur no less frequently than quarterly, whereas the VEGP CSP states that this will occur, “as specified in the implemented security controls in Appendices B and C to RG 5.71 and implemented alternatives to the Appendices B and C controls.” The process SNC has committed to in Section 3.1.6 of the VEGP CSP requires SNC, if it does not implement the controls in Appendices B and C, to demonstrate that an alternate control does not provide less protection than the corresponding control in Appendices B and C.

Therefore, if SNC does not implement the security control in Section 13.1, or deviates from the requirement for a quarterly vulnerability assessment, it will ensure that this deviation does not provide less protection than performing quarterly vulnerability assessments, and will provide an analysis that demonstrates that the attack vector does not exist and will document this justification for inspection.

Based on the above review, the NRC staff finds that the vulnerability assessments and scans described in Section 4.1.3 of the VEGP CSP are acceptable.

13.8.4.15 Change Control (Section A.4.2 of Appendix A to RG 5.71)

Section 4.2 of the VEGP CSP states that the licensee will systematically plan, approve, test, and document changes to the environment of the CDAs, the addition of CDAs to the environment, and changes to existing CDAs in a manner that provides a high level of assurance that the SSEP functions are protected from cyber attacks. The CSP also commits that the program establish that changes made to CDAs use the design control and configuration management procedures or other procedural processes to ensure that the existing security controls are effective and that any pathway that can be exploited to compromise a CDA is protected from cyber attacks.

The VEGP CSP does not deviate from Section A.4.2 of RG 5.71.

Based on the above review, the NRC staff finds that the change control process described in Section 4.2 of the VEGP CSP is acceptable.

13.8.4.16 Configuration Management (Section A.4.2.1 of Appendix A to RG 5.71)

Section 4.2.1 of the VEGP CSP states that the licensee will implement and document a change management process as described in Section 4.2 of the VEGP CSP. Further, it commits to implement and document the applied configuration management controls described in Appendix C, Section 11 to RG 5.71 following the process described in Section 3.1.6 of the CSP.

The VEGP CSP does not specifically commit to apply the security controls in Section 11 of Appendix C of RG 5.71; however, it does commit to apply the process in Section 3.1.6 of the CSP. The commitment in Section 4.2.1 is consistent with Section A.4.2.2 of RG 5.71 as the applicant has committed, if it does not implement the security controls in Section 11 of RG 5.71, either to implement alternative controls that do not provide less protection than what is in Section 11, or to demonstrate that this control is unnecessary by demonstrating that the attack vectors associated with Section 11 to Appendix C of RG 5.71 do not exist for VEGP.

Based on the above review, the NRC staff finds that the configuration management process described in Section 4.2.1 of the VEGP CSP is acceptable.

13.8.4.17 Security Impact Analysis of Changes and Environment (Section A.4.2.2 of Appendix A to RG 5.71)

Section 4.2.2 of the VEGP CSP states that the applicant will perform a security impact analysis in accordance with Section 4.1.2 before implementing a design or configuration change to a CDA or, when changes to the environment occur, to manage potential risks introduced by the changes. The CSP also commits to evaluate, document, and incorporate into the security impact analysis safety and security interdependencies of other CDAs or systems, as well as updates, and documents the following:

- *the location of the CDA and connected assets*

- connectivity pathways (direct and indirect)
- infrastructure interdependencies
- application of defensive strategies, including defensive models, security controls, and others
- defensive strategy measures
- plant-wide physical and cyber security policies and procedures that secure CDAs from a cyber attack, including attack mitigation and incident response and recovery

The VEGP CSP commits to perform these impact analyses as part of the change approval process to assess the impacts of the changes on the security posture of CDAs and security controls, as described in Section 4.1.2 of the VEGP CSP, and to address any identified gaps to protect CDAs from cyber attack, up to and including the DBT as described in Section 4.2.6.

Finally, Section 4.2.2 states that the licensee will manage CDAs for the cyber security of SSEP functions through an ongoing evaluation of threats and vulnerabilities and implementation of each of the applied security controls provided in Appendix B or C of RG 5.71 and implement alternatives to the Appendices B and C controls during all phases of the life cycle. Additionally, SNC has established and documented procedures for screening, evaluating, mitigating, and dispositioning threat and vulnerability notifications received from credible sources. Dispositioning includes implementation of security controls to mitigate newly reported or discovered threats and vulnerabilities.

The language in Section 4.2.2 of the VEGP CSP is identical to that in Section A.4.2.2 of RG 5.71 and includes no deviations.

Based on the above review, the NRC staff finds that the security impact analysis of changes and environment described in Section 4.2.2 of the VEGP CSP is acceptable.

13.8.4.18 Security Reassessment and Authorization (Section A.4.2.3 of Appendix A to RG 5.71)

Section 4.2.3 of the VEGP CSP states that the licensee will have implemented, documented, and maintained a process that ensures that modifications to CDAs are evaluated before implementation so that security controls remain effective and that any pathway that can be exploited to compromise the modified CDA is addressed to protect CDAs and SSEP functions from cyber attacks. This section further states that the VEGP cyber security program establishes that additions and modifications are evaluated, using a proven and accepted method, before implementation to provide high assurance of adequate protection against cyber attacks, up to and including DBTs, using the process described in Section 4.1.2 of the VEGP CSP.

The licensee also commits to disseminate, review, and update the following when a CDA modification is conducted:

- *a formal, documented security assessment and authorization policy, which addresses the purpose, scope, roles, responsibilities, management commitment, coordination among entities, and compliance to reflect all modifications or additions*
- *a formal, documented procedure to facilitate the implementation of the security reassessment and authorization policy and associated controls*

The VEGP CSP does not deviate from Section A.4.2.3 of RG 5.71.

Based on the above review, the NRC staff finds that the security reassessment and authorization described in Section 4.2.3 of the VEGP CSP is acceptable.

13.8.4.19 Updating Cyber Security Practices (Section A.4.2.4 of Appendix A to RG 5.71)

Section 4.2.4 of the VEGP CSP states that the licensee reviews, updates and modifies cyber security policies, procedures, practices, existing cyber security controls, detailed descriptions of network architecture (including logical and physical diagrams), information on security devices, and any other information associated with the state of the cyber security program or the applied security controls provided in Appendices B and C to RG 5.71 and implemented alternatives to the Appendices B and C controls when changes occur to CDAs or the environment.

This information includes the following:

- *plant- and corporate-wide information on the policies, procedures, and current practices related to cyber security*
- *detailed network architectures and diagrams*
- *configuration information on security devices or CDAs*
- *new plant- or corporate-wide cyber security defensive strategies or security controls being developed and policies, procedures, practices, and technologies related to their deployment*
- *the site's physical and operational security program*
- *cyber security requirements for vendors and contractors*
- *identified potential pathways for attacks*
- *recent cyber security studies or audits (to gain insight into areas of potential vulnerabilities); and identified infrastructure support systems (e.g., electrical power; heating, ventilation, and air conditioning;*

communications; fire suppression) whose failure or manipulation could impact the proper functioning of CSs

The VEGP CSP does not deviate from Section A.4.2.4 of RG 5.71.

Based on the above review, the NRC staff finds that updating of cyber security practices described in Section 4.2.4 of the VEGP CSP is acceptable.

13.8.4.20 Review and Validation Testing of a Modification or Addition of a Critical Digital Asset (Section A.4.2.5 of Appendix A to RG 5.71)

The VEGP CSP Section 4.2.5 states the licensee will conduct and document the results of reviews and validation tests of each CDA modification and addition using the process described in Section 3.1.4 of the VEGP CSP.

The VEGP CSP does not deviate from Section A.4.2.5 of RG 5.71.

Based on the above review, the NRC staff finds that the Review and Validation Testing of Modifications or Additions of a Critical Digital Asset described in Section 4.2.5 of VEGP CSP is acceptable.

13.8.4.21 Application of Security Controls Associated with a Modification or Addition (Section A.4.2.6 of Appendix A to RG 5.71)

Section 4.2.6 of the VEGP CSP states that when new CDAs are introduced into the environment of VEGP, the licensee:

- deploys the CDA into the appropriate level of the defensive model described in Section 3.1.5 of this plan;*
- applies the technical controls identified in Appendix B to RG 5.71 and the operational and management controls described in Appendix C to RG 5.71 in a manner consistent with the process described in Section 3.1.6 of this plan*
- confirms that the implemented operational and management controls described in Appendix C to RG 5.71, and implemented alternatives to the Appendix C controls, are effective for the CDA*

The plan also commits that when CDAs are modified, the licensee:

- verifies that the CDA is deployed into the proper level of the defensive model described in Section 3.1.5 of this plan*
- performs a security impact analysis, as described in Section 4.2.2 of this plan*
- verifies that the technical controls identified in Appendix B to RG 5.71 and the operational and management controls described in Appendix C to RG 5.71 are addressed in a manner consistent with the process described in Section 3.1.6 of this plan*

- *verifies that the applied security controls discussed above are implemented effectively, consistent with the process described in Section 4.1.2 of this plan*
- *confirms that the implemented operational and management controls discussed in Appendix C to RG 5.71 and implemented alternatives to the Appendix C controls are effective for the CDA*

The VEGP CSP deviates from Section 4.2.6 of RG 5.71 by modifying the phrase “applies the technical controls identified in Appendix B to RG 5.71 in a manner consistent with the process described in Section 3.2 of RG 5.71,” to read “applies the technical controls identified in Appendix B to RG 5.71 and the operational and management controls described in Appendix C to RG 5.71 in a manner consistent with the process described in Section 3.1.6 of this plan.” This is consistent with RG 5.71 as the VEGP CSP commits to following the process in Section 3.1.6 of the VEGP CSP, which requires that controls are applied, an alternative that provides equivalent protection is provided, or the licensee demonstrates that the control is not necessary.

The VEGP CSP also deviates from Section A.4.2.6 of RG 5.71 with the modification of this phrase, “verifies that the security controls discussed above are implemented effectively, consistent with the process described in Section 4.1.2 of this plan” to read “verifies that the applied security controls discussed above are implemented effectively, consistent with the process described in Section 4.1.2 of this plan.”

This deviation is consistent with the method used in RG 5.71. RG 5.71 assumes that all the controls in Appendices B and C will be applied; whereas, the VEGP CSP commits that if a control is not applied, there will be no reduction in protection as compared to the corresponding control. This method is also captured in RG 5.71 and, therefore, the VEGP CSP is consistent with RG 5.71.

Based on the above review, the NRC staff finds that the application of security controls associated with a modification or addition described in Section 4.2.6 of the VEGP CSP is acceptable.

13.8.4.22 Cyber Security Program Review (Section A.4.3 of Appendix A to RG 5.71)

Section 4.3 of the VEGP CSP states that the applicant has established the necessary measures and governing procedures to implement periodic reviews of applicable program elements, in accordance with the requirements of 10 CFR 73.55(m). Specifically, the VEGP CSP calls for a review of the program’s effectiveness at least every 24 months. In addition, reviews are to be conducted as follows:

- *within 12 months following initial implementation of the program*
- *as necessary, based upon site-specific analyses, assessments, or other performance indicators*

- *as soon as reasonably practical, but no longer than 12 months after changes occur in personnel, procedures, equipment, or facilities that potentially could adversely affect cyber security*
- *by individuals independent of those personnel responsible for program management, and any individual who has direct responsibility for implementing the program*

This deviates from RG 5.71 in the specific wording, but includes the same commitments. Specifically, RG 5.71 states that the licensee reviews the program's effectiveness at least every 24 months. In addition, reviews are conducted as follows:

- *within 12 months of the initial implementation of the program*
- *within 12 months of a change to personnel, procedures, equipment, or facilities that potentially could adversely affect security*
- *as necessary based upon site-specific analyses, assessments, or other performance indicators*
- *by individuals independent of those personnel responsible for program implementation and management*

Based on the above review, the NRC staff finds that the cyber security program review described in Section 4.3 of the VEGP CSP is acceptable.

13.8.4.23 Document Control and Records Retention and Handling (Section A.5 of Appendix A to RG 5.71)

Section 5 of the VEGP CSP states the necessary measures and governing procedures to ensure that sufficient records of items and activities affecting cyber security are developed, reviewed, approved, issued, used, and revised to reflect completed work. VEGP will retain records and supporting technical documentation required to satisfy the requirements of 10 CFR 73.54 and 10 CFR 73.55, "Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors against Radiological Sabotage," until the NRC terminates the facility's operating license. Records are retained to document access history, as well as to discover the source of cyber attacks or other security-related incidents affecting CDAs or SSEP functions, or both. VEGP Units 3 and 4 will retain superseded portions of these records for at least three years after the record is superseded, unless otherwise specified by the NRC.

This deviates from RG 5.71 by not specifically detailing the types of records, but instead describes that records will be retained to document access history and information needed to discover the source of cyber attacks and incidents. This is consistent with what is included in RG 5.71, Section 5, and includes all the performance-based characteristics and commitments of that section.

Based on the above review, the NRC staff finds that the document control and records retention handling described in Section 5 of the VEGP CSP is acceptable.

13.8.4.24 Deviations Taken to RG 5.71, Sections C.1 Through C.5

The VEGP CSP states that the plan deviates from Regulatory Positions C.1 through C.5 of RG 5.71, as noted in Attachment A to the CSP. It also deviates from Section A.1 of Appendix A of RG 5.71. For that reason, the staff considers that the full evaluation of the CSP must include a review of the deviations taken to those sections of RG 5.71 as listed in the VEGP CSP. This section of the SER lists those 69 specific deviations and their evaluated security impact. The following deviations were provided in a table, as part of Attachment A to the CSP.

13.8.4.24.1 RG 5.71, Section C.2, fourth paragraph, first sentence (page 8)

SNC added the term “adequately” to the phrase “...systems and equipment are protected from cyber attack.” Since 10 CFR 73.54 specifically makes that same statement, the staff found no reason to object to that clarification. The objective is to provide adequate protection to the identified CDAs.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.2 RG 5.71, Section C.2, fourth paragraph, twelfth bullet, third sub-bullet (page 8)

SNC clarifies that its overall design is based on the Westinghouse AP1000 design and states that the AP1000 DCD commits to Revision 1 of RG 1.152, “Criteria for Digital Computers in Safety Systems of Nuclear Power Plants.” Since the applicant is required to have a cyber security program that meets the performance objectives outlined in 10 CFR 73.54 and is not obliged to achieve that requirement exclusively through the example provided by RG 5.71, this clarification, in and of itself, was not considered by the staff as deviating from the requirements established by the rule.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.3 RG 5.71, Section C.2, fifteenth bullet (page 8)

The deviation states that the required policies and procedures have not yet been written, reviewed, and approved, and, thus, are not currently available for inspection and review.

The NRC requires that these policies and procedures be completed and available for review by the completion of the CSP implementation schedule proposed by the applicant, since CSP inspections would not occur until that time. The requirements of 10 CFR 73.55(a)(4) and proposed License Condition 6 provide the necessary controls associated with developing the required policies and procedures of the CSP.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.4 RG 5.71, Section C.3, Figure 1 (Page 10)

The deviation changes the arrows on the left side of Figure 1 from “Continuous Monitoring” to “Ongoing Monitoring.”

The NRC intended monitoring to occur periodically, and when required, based on certain inputs into the process. SNC states that “continuous” might imply that monitoring was perpetual and not event driven. This was not the staff’s intent with the term “continuous.” The staff accepts the use of the term “ongoing” to better reflect the intent of this diagram.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.5 RG 5.71, Section C.3, third paragraph, first sentence (Page 10)

The VEGP CSP changes the statement, “An acceptable method to establish a cyber security program at a facility is by performing the following, (1) analyze the digital computer and communication systems and networks, ...” to “An acceptable method to establish a cyber security program at a facility is by performing the following: (1) identify critical systems and critical digital assets as described in Section C.3.1.3, (2) analyze the digital computer and communication systems and networks...”

This deviation is acceptable because SNC proposes to use its licensing basis to identify CSs that are associated with SSEP functions, as 10 CFR 73.54 requires. This statement includes the first step in RG 5.71 to analyze digital computer and communication systems and networks to determine if they include CDAs.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.6 RG 5.71, Section C.3.1, first paragraph, first sentence (page 11)

The VEGP CSP changes the statement, “Consistent with the requirements of 10 CFR 73.54(b)(1), a licensee must conduct a site-specific analysis of digital computer and communication systems and networks to identify CDAs, which are those assets that, if compromised, could adversely impact the SSEP functions of nuclear facilities.” to “Consistent with the requirements of 10 CFR 73.54(b)(1), a licensee must conduct a site-specific analysis of digital computer and communication systems and networks to identify CDAs, which are those assets that, if compromised, could adversely impact the CSs of nuclear facilities.”

SNC defines a CS as:

An analog or digital technology-based system in or outside of the plant that performs or is associated with a safety-related, important-to-safety, security, or emergency preparedness

function. These critical systems include, but are not limited to, plant systems, equipment, communication systems, networks, offsite communications, or support systems or equipment, that perform or are associated with a safety-related, important-to-safety, security, or emergency preparedness function as defined by the approved plant licensing basis.

This definition ties CSs to SSEP functions; therefore, the change is consistent with the method used in RG 5.71, as this means that CSs are all those assets associated with SSEP functions, and, therefore, could adversely impact those SSEP functions.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.7 RG 5.71, Section C.3.1, first paragraph, second bullet (page 11)

The VEGP CSP includes a deviation to correct an editorial omission in RG 5.71. Page 11 of RG 5.71 states that:

An acceptable method for identifying and documenting CDAs is as follows:

- *obtain authorization for security assessment*
- *define roles and responsibilities cyber personnel and form the cyber security team*
- *identify and document CDAs at the facility*
- *review and validate configurations of CDAs*

The VEGP CSP corrects the second bullet to read:

- *define roles and responsibilities of cyber personnel and form the cyber security team*

This deviation which supplies the omitted “of” is consistent with the intent of the referenced bullet.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.8 RG 5.71, Section C.3.1.2, third paragraph, second bullet (page 13)

The VEGP CSP changes the second bullet on Page 13 of RG 5.71 from:

documenting all key observations, analyses, and findings during the assessment process so that this information can be used as a basis for applying security controls;

to:

documenting all key observations, analyses, and findings during the assessment process so that this information can be used as a basis for addressing security controls;

This deviation is acceptable because RG 5.71 allows a licensee to address, as opposed to apply, security controls if it follows the process in Appendix A, Section 3.1.6 of RG 5.71, which is to apply the control, apply an alternative that provides no less protection than the corresponding security control, or to demonstrate that the control is not necessary because the attack vector, root cause, or vulnerability associated with the control does not exist.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.9 RG 5.71, Section C.3.1.2, third paragraph, sixth bullet (page 13)

The VEGP CSP changes the sixth bullet on Page 13 from:

- preparing documentation and overseeing implementation of the cyber security controls provided in Appendices B and C to this guide, documenting the basis for not implementing certain cyber security controls provided in Appendix B, or documenting the basis for the implementation of alternate or compensating measures in lieu of any cyber security controls provided in Appendix B; and*

to:

- overseeing documentation and implementation of the cyber security controls provided in Appendices B and C to this guide, documenting the basis for not implementing certain cyber security controls provided in Appendix B and C, or documenting the basis for the implementation of alternate or compensating measures in lieu of any cyber security controls provided in Appendix B and C; and*

This deviation is acceptable because overseeing the documentation and implementation of security controls by qualified personnel is an approved method. Further, the extension of this method in Appendix C is also acceptable as the licensee has committed to follow the process in Appendix A, Section 3.1.6 of RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.10 RG 5.71, Section C.3.1.2, third paragraph, seventh bullet (page 13)

The VEGP CSP includes a deviation from RG 5.71 that changes bullet 7 from:

assuring the retention of all assessment documentation, including notes and supporting information, in accordance with 10 CFR 73.54(h) and the record retention and handling requirements specified in Section C.5 of this guide.

to:

establishing the retention policy of all assessment documentation, including notes and supporting information, in accordance with 10 CFR 73.54(h) and the record retention and handling requirements specified in Section C.5 of this guide.

This deviation is acceptable as the licensee has committed to establish the retention policy. Although this may be done by a different team, and not the CST, it is consistent with the intent of RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.11 RG 5.71, Section C.3.1.2, fourth paragraph, first sentence (page 13)

The VEGP CSP deviates from RG 5.71 by changing this sentence:

The licensee's CST needs to have the authority to conduct an objective assessment, make determinations that are not constrained by operational goals (e.g., cost),

to:

The licensee's CST needs to have the authority to conduct an objective assessment, make determinations that are not constrained by business goals (e.g., cost),

This deviation is acceptable because the intent of this statement in RG 5.71 is to ensure that cost is not used as a factor in making determinations about the adequacy of security controls, vulnerabilities, identifying CSs and CDAs, and carrying out other assessment functions of the CST.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.12 RG 5.71, Section C.3.1.3, second paragraph (page 14)

The VEGP CSP deviates from RG 5.71 by changing the identification process from CDAs to CSs. This deviation is acceptable because the VEGP CSP commits to continue identifying CSs by identifying digital computers, networks, communication systems and support systems that perform and are associated with SSEP functions, as well as support systems and equipment that, if compromised, would adversely impact the plant's SSEP functions.

This is consistent with the process in RG 5.71, which identifies CDAs through the same process. The licensee further describes CDAs as a CS or part of a CS; therefore, the use of the term CS as opposed to CDA is also consistent with the method used in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.13 RG 5.71, Section C.3.1.3, fifth paragraph, first sentence (page 15)

The VEGP CSP deviates from RG 5.71 by making an editorial correction to RG 5.71. This involves changing:

With the identification of the all the CSs ...

to:

With the identification of all the CSs ...

This change is acceptable because it accomplishes the intent of this phrase in RG 5.71 eliminating the unnecessary “the.”

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.14 RG 5.71, Section C.3.1.3, fifth paragraph, second sentence (page 15)

The VEGP CSP deviates from RG 5.71 by changing the following statement from:

A CDA may be a component of a CS ...

to:

A CDA may be a complete CS or component of a CS, ...

This deviation is acceptable because this statement is true. A CDA may be a complete CS and the deviation does not change the level of protection provided by the method outlined in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.15 RG 5.71, Section C.3.1.3, fifth paragraph, fifth sentence (page 15)

The VEGP CSP deviates from RG 5.71 by including additional documentation to help identify CSs and CDAs. Specifically VEGP includes “other licensing basis” documents to identify CSs and CDAs.

This deviation is in line with the intent of using existing documentation to identify CSs and CDAs. This section of RG 5.71 describes “helpful information sources for identifying CSs and CDAs” and is not an exhaustive list, nor is it the only method SNC has committed to use to identify CSs and CDAs. Specifically, SNC has committed to identify all digital computers, networks and communication systems associated with SSEP functions, which is what 10 CFR 73.54 requires.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.16 RG 5.71, Section C.3.1.3, eighth paragraph, first bullet
(page 16)**

The VEGP CSP deviates from RG 5.71 by stating that CDAs may be an entire CS. As previously discussed in Section 13.8.4.24.14 of this SER, it is true that a CDA may be an entire CS; therefore, this definition does not adversely impact either the method used in RG 5.71 or the protection that RG 5.71 provides.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.17 RG 5.71, Section C.3.1.3, eighth paragraph, second bullet
(page 16)**

The VEGP CSP deviates from RG 5.71 by stating that CDAs may be an entire CS. As previously discussed in Sections 13.8.4.24.14 and 13.8.4.24.16 of this SER, it is true that a CDA may be an entire CS; therefore, this definition does not adversely impact either the method used in RG 5.71 or the protection that RG 5.71 provides.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.18 RG 5.71, Section C.3.2, first paragraph, first sentence
(page 18)**

The VEGP CSP deviates from RG 5.71 by providing an editorial correction to RG 5.71. Specifically, the VEGP CSP changes the following sentence from:

As stated in 10 CFR 73.54(c)(2), the licensee must design its cyber security program to apply and maintain integrate defense-in-depth protective strategies to ensure the capability to detect, prevent, respond to, mitigate, and recover from cyber attacks.

to:

As stated in 10 CFR 73.54(c)(2), the licensee must design its cyber security program to apply and maintain integrated defense-in-depth protective strategies to ensure the capability to

detect, prevent, respond to, mitigate, and recover from cyber attacks.

This deviation captures the intent of this sentence in RG 5.71 by correcting “integrate” to “integrated.”

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.19 RG 5.71, Section C.3.2, second paragraph, fourth sentence (page 18)

The VEGP CSP deviates from RG 5.71 by pointing to an editorial error in RG 5.71. Specifically, the VEGP CSP changes the following sentence from:

Therefore, defense-in-depth is achieved not only by implementing multiple security boundaries, but also by instituting and maintaining a robust program of security controls that assess, protect, respond, prevent, detect, and mitigates an attack on a CDA and with recovery.

to:

Therefore, defense-in-depth is achieved not only by implementing multiple security boundaries, but also by instituting and maintaining a robust program of security controls that assess, protect, respond, prevent, detect, and mitigate an attack on a CDA and with recovery.

This deviation captures the intent of this sentence in RG 5.71 by correcting “mitigates” to “mitigate.” Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.20 RG 5.71, Section C.3.2, third paragraph, first sentence (page 18)

The VEGP CSP deviates from RG 5.71 by pointing to an editorial error in RG 5.71. Specifically, the VEGP CSP changes the following sentence from:

For example, if a failure in prevention were to occur (e.g., a violation of policy) or if protection mechanisms were to be bypassed (e.g., by a new virus that is not yet identified as a cyber attack), mechanisms would still in place to detect and respond to an unauthorized alteration in an impacted CDA, mitigate the impacts of this alteration, and recover normal operations of the impacted CDA before an adverse impact.

to:

For example, if a failure in prevention were to occur (e.g., a violation of policy) or if protection mechanisms were to be

bypassed (e.g., by a new virus that is not yet identified as a cyber attack), mechanisms would still be in place to detect and respond to an unauthorized alteration in an impacted CDA, mitigate the impacts of this alteration, and recover normal operations of the impacted CDA before an adverse impact.

This is acceptable because the change to add the word “be” to the phrase “would still be in place to detect” captures the intent of this sentence by supplying the “be” omitted from RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.21 RG 5.71, Section C.3.2.1, Figure 5 (Page 19)

The VEGP CSP includes a defensive architecture, which deviates from the example provided in RG 5.71. The proposed architecture is acceptable because it provides defense-in-depth, communication isolation for safety and security systems, and multiple nondeterministic boundaries for nonsafety/nonsecurity CDAs. This provides adequate protection for CDAs and ensures that appropriate isolation and boundary protection exists for all CDAs where appropriate.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.22 RG 5.71, Section C.3.2.1, third paragraph (page 19)

The VEGP CSP deviates from RG 5.71 by modifying the characteristics of an acceptable defensive architecture by stating that the architecture includes CSs and CDAs configured in accordance with Section 5 of Appendix B, and Sections 6 and 7 of Appendix C in accordance with the security control application process described in Section 3.3. As previously discussed in Section 13.8.4.24.9 of this SER, the use of the security control application process to address controls is consistent with RG 5.71.

SNC has committed to apply the security control, demonstrate that alternative controls provide no less protection than the corresponding control, or demonstrate through analysis that the attack vector the control addresses does not exist; therefore, the control is not necessary.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.23 RG 5.71, Section C.3.2.1, third paragraph, first bullet (page 19)

The VEGP CSP deviates from RG 5.71 by modifying the example defensive architecture to match the architecture to be used in the AP1000. This deviation is acceptable because it provides the appropriate isolation of safety and security CDAs, and adequate boundaries for nonsafety/nonsecurity CDAs.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.24 RG 5.71, Section C.3.2.1, third paragraph, second bullet (page 19)

The VEGP CSP deviates from RG 5.71 by modifying the example defensive architecture to match the architecture to be used in the AP1000. As previously discussed in Section 13.8.4.6, this deviation is acceptable because it provides the appropriate isolation of safety and security CDAs, and adequate boundaries for nonsafety/nonsecurity CDAs. This is consistent with the defensive model in RG 5.71, as the VEGP defensive architecture provides boundaries for safety systems that are deterministic.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.25 RG 5.71, Section C.3.2.1, third paragraph, third bullet (page 19)

The VEGP CSP deviates from RG 5.71 regarding communications from digital assets at lower security levels to digital assets at higher security levels. This deviation is acceptable because the defensive architecture prevents specific communication from lower security levels to specific higher security levels. This is consistent with the defensive model in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.26 RG 5.71, Section C.3.2.1, third paragraph, new second bullet (page 19)

The VEGP CSP deviates from RG 5.71 regarding remote access. This is consistent with the guidance in Section C.7 of RG 5.71, which also states that remote access to CDAs at the highest level be prevented.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.27 RG 5.71, Section C.3.2.1, third paragraph, new sixth bullet (page 19)

The VEGP CSP deviates from RG 5.71 by including in its defensive architecture a statement from Section C.7 of RG 5.71 for validating data (software updates, new firmware, etc.) using a method at or above the level of security the CDA that will have data transferred to it. This concept is already acceptable in RG 5.71 and is also included in the defensive architecture, although in a different section of the document. This is consistent with the method used in RG 5.71 and does not adversely impact the protection provided.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.28 RG 5.71, Section C.3.2.1, third paragraph, seventh bullet
(page 19)**

The VEGP CSP deviates from RG 5.71 by changing the commitment to eliminate applications, services and protocols not necessary to support the design-basis function of the CDAs to eliminate, disable, or render these inoperable. This is consistent with the method in RG 5.71, because in some cases these elements cannot be eliminated, but rather may have to be disabled or otherwise rendered inoperable. In each case, the result is the same. The asset is only configured to perform its design-based function and nothing more, which produces no less protection than the method in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.29 RG 5.71, Section C.3.2.1, third paragraph, eighth bullet
(page 19)**

The VEGP CSP deviates from RG 5.71 by eliminating the requirement to configure CDAs and boundary protection systems in accordance with Section 5 of Appendix B and Sections 6 and 7 of Appendix C. However, the VEGP CSP does commit to this in the preamble statement as described in Section 13.8.4.24.22 of this SER. Therefore, the VEGP CSP provides the same commitment to perform this as does RG 5.71, albeit in a different part of the same section.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.30 RG 5.71, Section C.3.2.1, fourth paragraph (page 19)

The VEGP CSP deviates from RG 5.71 by deleting the paragraph that commits to applying the security controls. However, the VEGP security plan commits, in Section 3.1.6, to address these controls and is, therefore, consistent with the method used in RG 5.71. The deleted paragraph is, therefore, unnecessary in the VEGP CSP to achieve the same commitment.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.31 RG 5.71, Section C.3.2.1, Prior to fifth paragraph (page 19)

The VEGP CSP deviates from the RG 5.71 defensive architecture. The VEGP architecture is described in Section 13.8.4.6 of this SER.

Based on the review and assessment in Section 13.8.4.6, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.32 RG 5.71, Section C.3.3, first paragraph, second sentence
(page 20)**

The VEGP CSP deviates from RG 5.71 by changing the following sentence:

A cyber compromise of CDAs would adversely impact nuclear facilities' SSEP functions that are necessary for protecting public health and safety.

to:

A cyber compromise of CDAs could adversely impact nuclear facilities' SSEP functions that are necessary for protecting public health and safety.

This deviation is consistent with the intent of RG 5.71, which implies that a compromise could lead to adverse impact and possible radiological sabotage. The intent of the paragraph is to establish the impact that could occur if a CDA were compromised. The security controls are designed around worst case scenarios, and the change in the VEGP CSP from "would" to "could" maintains this logic.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.33 RG 5.71, Section C.3.3, third paragraph, fourth sentence
(page 20)**

The VEGP CSP deviates from RG 5.71 by making an editorial correction to RG 5.71. This involves changing the statement:

Thus to provide high assurance that CDAs are protected from cyber attacks, potential cyber risks of these CDAs must be addressed known potential cyber risks.

to:

Thus to provide high assurance that CDAs are protected from cyber attacks, potential cyber risks of these CDAs must be addressed for known potential cyber risks.

This is acceptable because the change captures the intent of this sentence by supplying the "for" omitted from RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.34 RG 5.71, Section C.3.3, third paragraph, first sentence
(page 20)**

The VEGP CSP deviates from RG 5.71 by adding Appendix C to the list of controls that may be addressed using the method in Section 3.1.6 of Appendix A. This is consistent with the intent of RG 5.71, which assumes that all the controls in Appendix C can be implemented as written. However, if the controls can be addressed to demonstrate that an alternative control provides no less protection than the comparable control in Appendix C, or that the control is not necessary by demonstrating that the attack vector does not exist, this would meet the intent of RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.35 RG 5.71, Section C.3.3, third paragraph, first bullet (page 20)

The VEGP CSP deviates from RG 5.71 by adding Appendix C to the list of controls that may be addressed using the method in Section 3.1.6 of Appendix A. This is consistent with the intent of RG 5.71, which assumes that all the controls in Appendix C can be implemented as written. However, if the controls can be addressed to demonstrate that an alternative control provides no less protection than the comparable control in Appendix C, or that the control is not necessary by demonstrating that the attack vector does not exist, this would meet the intent of RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.36 RG 5.71, Section C.3.3, third paragraph, second bullet
(page 20)**

The VEGP CSP deviates from RG 5.71 by stating that alternative controls will not provide equal or better protection to the corresponding control, but rather that they will not provide less protection than the corresponding control. This is consistent with the method used in RG 5.71; providing an alternative that does not provide less protection, and does not adversely impact the security program. Therefore, this change in commitment will provide an adequate level of protection and is consistent with the method used in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.37 RG 5.71, Section C.3.3, third paragraph, second bullet, second
sub-bullet (page 20)**

The VEGP CSP deviates from RG 5.71 by changing the statement:

*performing and documenting the attack vector and attack tree
analyses of the CDA and alternative countermeasures to confirm*

that the countermeasures provide the same or greater protection as the corresponding security control in Appendix B.

to:

performing and documenting an attack vector and attack tree analysis of the CDA and alternative countermeasures to confirm countermeasures provide no decrease in the effectiveness of protection as compared to the corresponding security control identified in Appendix B or C.

This deviation is acceptable because whether the licensee performs a single analysis or multiple analyses, the method is comparable provided that it will demonstrate that there is no decrease in protection. Further, the modification of the second part of the sentence is also acceptable because the intent of this method in RG 5.71 is to ensure that alternative controls do not provide less protection than the corresponding control. Therefore, a commitment to ensure that alternatives do not provide less protection produces a comparable level of protection as stating that the alternatives provide equal or better protection. Finally, the addition of the Appendix C controls to this method is acceptable because the licensee has committed to apply the control, apply an alternative that provides no less protection than the comparable control or not to apply the control and demonstrate that the attack vector does not exist.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.38 RG 5.71, Section C.3.3, third paragraph, second bullet, third sub-bullet (page 20)

The VEGP CSP deviates from RG 5.71 in a similar manner to deviations in Section 13.8.4.24.37 of this SER by changing the commitment to implement alternative countermeasures that provide at least the same degree of protection as the corresponding security control in Appendix B, to implementing alternative controls to provide no decrease in the effectiveness of protection as compared to the corresponding security control identified in Appendices B and C of RG 5.71.

This method is consistent with the method in RG 5.71 as it also meets the criteria for the performance based characteristics of 10 CFR 73.54. As long as the implemented alternative control does not provide less protection than the corresponding control in RG 5.71, the intent of this section of RG 5.71 has been met. Alternative controls are considered to be adequate only if they provide equivalent protection, and the VEGP CSP commits to that minimum standard.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.39 RG 5.71, Section C.3.3, third paragraph, third bullet (page 20)

The VEGP CSP deviates from RG 5.71 by not stating that SNC will specifically perform an attack vector and attack tree analysis to demonstrate that one of the

specific security controls is not necessary. SNC does commit to performing an analysis to demonstrate that the attack vector does not exist (i.e., is not applicable), thereby obviating the need for a specific security control.

This method is consistent with the method in RG 5.71 as it commits to demonstrating a conclusion, specifically, that the attack vector does not exist. If the licensee can demonstrate this, and not use an attack vector or attack tree analysis, the results are still the same and, therefore, the method would produce a result that does not provide less protection than the method in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.40 RG 5.71, Section C.3.3, fourth paragraph, second sentence (page 20)

The VEGP CSP deviates from RG 5.71 by making an editorial correction to RG 5.71. This involves changing the statement:

When a security control is determined to have an adverse affect, alternate controls should be used by the licensee to protect the CDA from cyber attack up to and including the DBT consistent with the process described above.

to:

When a security control is determined to have an adverse effect, alternate controls should be used by the licensee to protect the CDA from cyber attack up to and including the DBT consistent with the process described above.

This is acceptable because the change captures the intent of this sentence in RG 5.71, by correcting “affect” to “effect.”

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.41 RG 5.71, Section C.3.3, fifth paragraph, second sentence (page 21)

The VEGP CSP deviates from RG 5.71 by making an editorial correction to RG 5.71. This involves changing the statement:

If these effectiveness or vulnerability analyses identify a gap in the cyber security program, the licensee may need to implement additional security measures and controls not provided in Appendixes B and C.

to:

If these effectiveness or vulnerability analyses identify a gap in the cyber security program, the licensee may need to implement additional security measures and controls not provided in Appendices B and C.

This change is acceptable because it captures the intent of this sentence in RG 5.71, by correcting “Appendixes” to “Appendices.”

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.42 RG 5.71, Sections C.3.3.1.1 through C.3.3.1.5, first paragraph and last bullet (pages 21 and 22)

The VEGP CSP deviates from RG 5.71 by stating that it will not apply all of the security controls in RG 5.71, but rather will address them. The VEGP CSP already commits to the RG 5.71 process, which is:

- 1) applying controls;*
- 2) applying an alternative control that does not provide less protection than the corresponding control; or*
- 3) not applying a control, but demonstrating that the corresponding attack vector does not exist.*

The intent of RG 5.71 is to address the controls in Appendices B and C. This can be accomplished in accordance with Section 3.1.6 of Appendix A, to which SNC has committed.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.43 RG 5.71, Section C.3.3.1.1, first paragraph, second bullet, fourth sub-bullet (page 21)

The VEGP CSP deviates from RG 5.71 by committing to audit CDAs at an interval defined for the CDA, or within 5 days following revocation of an individual’s unescorted access, due to a lack of trustworthiness or reliability, or as soon as reasonably practical upon changes in personnel. Although this method uses a different frequency than the method in RG 5.71, which calls for annual assessments, or assessments immediately upon changes in personnel, this frequency does meet the requirements of 10 CFR 73.55(m), which allows the licensee to define these intervals based on its own assessments of need.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.44 RG 5.71, Sections C.3.3.2.1 through C.3.3.2.5, first paragraph and last bullet (pages 23 and 24)

The VEGP CSP deviates from RG 5.71 in a fashion similar to the deviation cited in Section 13.8.4.24.42 of this SER by committing not to apply the controls, but rather to address them. As previously stated, this deviation is consistent with the method in RG 5.71, and also meets the intent of the RG, provided that the licensee follows the process in Section 3.1.6 of Appendix A, to which SNC has committed.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.45 RG 5.71, Sections C.3.3.2.6 through C.3.3.2.9, first paragraph and last bullet (pages 24-26)

The VEGP CSP deviates from RG 5.71 in a fashion similar to the deviation cited in Sections 13.8.4.24.42 and 13.8.4.24.44 of this SER by committing to apply the controls, but rather to address them. As previously stated, this deviation is consistent with the method in RG 5.71, and also meets the intent of the RG, provided that the licensee follows the process in Section 3.1.6 of Appendix A, to which SNC has committed.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.46 RG 5.71, Section C.3.3.2.9, first paragraph, first bullet (page 25)

The VEGP CSP deviates from RG 5.71 by making an editorial correction to RG 5.71. This involves changing the first bullet:

- *develop, disseminate, and annually review and update the configuration management policy and program which defines the purpose of the nuclear facility's configuration management policy, scope, roles, requirements, responsibilities, and management commitments necessary to provide, with high assurance, that (1) when a modification to a CDA does not reduce the existing security and (2) any unauthorized or inadvertent modification of a CDA is prevented.*

to:

- *develop, disseminate, and annually review and update the configuration management policy and program which defines the purpose of the nuclear facility's configuration management policy, scope, roles, requirements, responsibilities, and management commitments necessary to provide, with high assurance, that (1) a modification to a CDA does not reduce the existing security and (2) any unauthorized or inadvertent modification of a CDA is prevented.*

This is acceptable because it captures the intent of this sentence in RG 5.71, by striking the word “when” after “(1).” This editorial mistake will be corrected in a future revision.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.47 RG 5.71, Section C.3.3.3.1, first paragraph and last bullet (page 26)

The VEGP CSP deviates from RG 5.71 in a fashion similar to the deviations cited in Sections 13.8.4.24.42, 13.8.4.24.44 and 13.8.4.24.45 of this SER, and by committing not to apply the controls, but rather to address them. As previously stated, this deviation is consistent with the method in RG 5.71, and also meets the intent of RG 5.71, provided that the licensee follows the process in Section 3.1.6 of Appendix A, to which SNC has committed.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.48 RG 5.71, Section C.3.3.3.1, second paragraph (page 26)

The VEGP CSP deviates from RG 5.71 by committing to Revision 1 of RG 1.152 and not Revision 2 of RG 1.152 as stated in RG 5.71. The results of the NRC staff’s technical evaluation of the digital instrumentation and controls design of the AP1000 are documented in Chapter 7 of NUREG-1793 and its supplements. SNC’s use of the defensive architecture as discussed in Section 13.8.4.6 is acceptable to the staff.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.49 RG 5.71, Section C.3.3.3.2, first paragraph, second sentence (page 26)

The VEGP CSP deviates from RG 5.71 by committing to provide adequate protection of high assurance against cyber attacks. Although this commitment is worded differently than the commitment provided in RG 5.71, it does meet the requirement of 10 CFR 73.54(a), which states that licensees “shall provide high assurance that digital computer and communication systems and networks are adequately protected against cyber attacks, up to and including the design basis threat as described in 10 CFR 73.1.”

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.50 RG 5.71, Section C.3.4, second paragraph, first sentence (page 26)

The VEGP CSP deviates from RG 5.71 as described in Section 13.8.4.8 of this SER by committing not to integrate management of physical and cyber security,

but rather to provide the management interfaces necessary to appropriately coordinate the physical and cyber security activities. The VEGP CSP includes a commitment to establish an organization that is responsible for cyber security and is independent of operations. The combination of an independent organization responsible for cyber security, and management coordination between physical and cyber security meets the requirements of the rule and does not provide less protection than the method described in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.51 RG 5.71, Section C.3.4, second paragraph, first bullet (page 27)

The VEGP CSP deviates from RG 5.71 as also described in Section 13.8.4.8 of this SER by committing not to form a unified security organization, but rather to establish a cyber security organization that is responsible for cyber security and is independent from operations. The combination of an independent organization responsible for cyber security, and management coordination as described in Section 13.8.4.24.50 of this SER between physical and cyber security meets the requirements of the rule, and does not provide less protection than the method described in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.52 RG 5.71, Section C.4, first paragraph, first sentence (page 27)

The VEGP CSP deviates from RG 5.71 by changing the phrase:

Once the security program is in place...

to:

Once the cyber security program is in place...

This deviation is acceptable because the CSP only applies to the applicant's cyber security program.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.53 RG 5.71, Section C.4, first paragraph, first bullet (page 28)

The VEGP CSP deviates from RG 5.71 as previously described in Section 13.8.4.11 of this SER by changing the phrase "continuous monitoring and assessment" to "ongoing monitoring and assessment." This description is consistent with the method in RG 5.71 by establishing intervals for these assessments, which include the same elements as in RG 5.71, and meeting the periodicity requirements of 10 CFR 73.55(m).

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.54 RG 5.71, Section C.4.1, section heading and first paragraph, first sentence (page 28)

The VEGP CSP deviates from RG 5.71 as previously described in Sections 13.8.4.11 and 13.8.4.24.53 of this SER by changing the phrase “continuous monitoring and assessment” to “ongoing monitoring and assessment.” This description is consistent with the method in RG 5.71 by establishing intervals for these assessments, which include the same elements in RG 5.71 and meeting the periodicity requirements of 10 CFR 73.55(m).

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.55 RG 5.71, Section C.4.1, second paragraph, first sentence (page 28)

The VEGP CSP deviates from RG 5.71 as previously described in Sections 13.8.4.11, 13.8.4.24.53 and 13.8.4.24.54 of this SER by changing the phrase “continuous monitoring and assessment” to “ongoing monitoring and assessment.” This description is consistent with the method in RG 5.71 by establishing intervals for these assessments, which include the same elements as in RG 5.71 and meeting the periodicity requirements of 10 CFR 73.55(m).

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.56 RG 5.71, Section C.4.1, second paragraph, first bullet (page 28)

The VEGP CSP deviates from RG 5.71 by making an editorial correction to RG 5.71. This involves changing the phrase:

ongoing assessments of verify that the security controls...

to:

ongoing assessments to verify that the security controls...

This change is acceptable because it captures the intent of this sentence in RG 5.71, by substituting “to” for “of.”

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.57 RG 5.71, Section C.4.1, third paragraph, first and second sentences (page 28)

The VEGP CSP deviates from RG 5.71 as previously described in Sections 13.8.4.11, 13.8.4.24.53, 13.8.4.24.54 and 13.8.4.24.55 of this SER by

changing the phrase “continuous monitoring and assessment” to “ongoing monitoring and assessment.” This description is consistent with the method in RG 5.71 by establishing intervals for these assessments, which include the same elements as in RG 5.71, and meeting the periodicity requirements of 10 CFR 73.55(m).

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.58 RG 5.71, Section C.4.1.1, first paragraph, second sentence (page 28)

Section 3.1.1 of the VEGP CSP states that status of security controls will be verified in accordance with the requirements of 10 CFR 73.55(m).

The NRC staff reviewed the above and found that reviewing security controls in accordance with 10 CFR 73.55(m) is in accordance with RG 5.71. The time period between evaluations may be longer than the time period provided in RG 5.71. However, this period cannot exceed 24 months, which conforms to 10 CFR 73.54(g), requiring the applicant to review the cyber security program as a component of the physical security program in accordance with the requirements of 10 CFR 73.55(m), including the periodicity requirements. The requirements of 10 CFR 73.55(m) are that, at minimum, the applicant review each element of the physical protection program at least every 24 months.

The licensee has also committed to address C.13 of Appendix C to RG 5.71, “Security Assessment and Risk Management,” which calls for vulnerability assessments on a quarterly basis. SNC commits to apply this control, apply an alternative that provides no less protection than C.13, or demonstrate that any attack vectors associated with vulnerabilities that may be discovered through quarterly assessments do not exist. The VEGP CSP also includes addressing controls that specifically include defined verification periods and that detect when some controls are not working correctly.

This, coupled with the CSP conforming to requirements of 10 CFR 73.55(m), which includes an initial assessment within 12 months of the program inception, and as necessary based on site-specific analyses, assessments, or other performance indicators, provides a level of protection consistent with the method in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.59 RG 5.71, Section C.4.1.2, first paragraph, third sentence (page 29)

Section 3.1.1 of the VEGP CSP states that effectiveness of security controls will be verified in accordance with the requirements of 10 CFR 73.55(m). As previously discussed in Section 13.8.4.12 of this SER, the NRC staff reviewed

the above and found that the period of effectiveness analysis is comparable with that of RG 5.71.

The time period between evaluations is 12 months longer than the time period provided in RG 5.71. However, this 24-month time period conforms to 10 CFR 73.54(g) requiring the applicant to review the cyber security program as a component of the physical security program in accordance with the requirements of 10 CFR 73.55(m), including the periodicity requirements. The requirements of 10 CFR 73.55(m) are that, at minimum, the applicant review each element of the physical protection program, which includes the cyber security program, at least every 24 months and within 12 months of the implementation of the program, or within 12 months when changes that may adversely impact the security program occur.

Furthermore, the VEGP CSP states that controls will be reviewed according to the requirements of the security controls if that period of review occurs more often. This is also consistent with the method provided in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.60 RG 5.71, Section C.4.1.3, first paragraph, second sentence
(page 29)**

VEGP CSP Section 4.1.3 deviates from RG 5.71 by stating that vulnerability assessments will occur periodically. RG 5.71, Section C.4.1.3 states that vulnerability assessments will occur no less frequently than on a quarterly basis.

As previously described in Section 13.8.4.14 of this SER, the VEGP CSP states vulnerability assessments will be performed as specified in the security controls in Appendices B and C of RG 5.71, and when new vulnerabilities that could affect the effectiveness of the cyber security program and the security of the CDAs are identified. The licensee also commits to addressing vulnerabilities that could cause CDAs to become compromised or could have an adverse impact on SSEP functions. Section 13.1 of Appendix C of RG 5.71, which VEGP commits to address in accordance with the process in Section 3.1.6 of Appendix A, provides that vulnerability assessments should occur no less frequently than once a quarter, at random intervals, and when new potential vulnerabilities are reported and identified. SNC has not deviated from the interval.

The process the applicant has committed to in Section 3.1.6 of the VEGP CSP requires SNC, if it does not implement Section 13.1 of Appendix C, to implement an alternate control that does not provide less protection than the corresponding control in Appendices B and C, or to demonstrate that any attack vectors associated with vulnerabilities that may be discovered through quarterly assessments do not exist.

Therefore, if SNC does not implement the security control in Appendix C, Section 13.1 of RG 5.71, or deviates from the guidance for a quarterly vulnerability assessment, it will ensure that this deviation does not provide less protection than performing quarterly vulnerability assessments, and will provide

an analysis that demonstrates that the attack vector does not exist and will document this justification for inspection.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.61 RG 5.71, Section C.4.2, first paragraph, second sentence
(page 30)**

The VEGP CSP deviates from RG 5.71 by committing not to implement the security controls in Section 11 of Appendix C of RG 5.71, but rather to address those controls in accordance with Section C.3.3 of RG 5.71.

As previously described in Section 13.8.4.7 of this SER, the VEGP CSP deviates from RG 5.71 by committing to address security controls rather than committing to apply them. The VEGP CSP states that when a control from Appendices B and C of RG 5.71, such as Section 11 of Appendix C, is not implemented that the licensee will implement alternate control(s) that “do not provide less protection than the corresponding” control in the appendix. This deviation is consistent with the method used in RG 5.71, which states that controls should provide equal or better protection.

As also previously discussed in Section 13.8.4.7 of this SER, the VEGP CSP deviates from RG 5.71 by stating that when a control can be proven to be unnecessary, the applicant will perform an analysis demonstrating that the control is not necessary, and will provide a documented justification. Therefore, SNC commits that in addressing the security controls in Appendix C, Section 11 of RG 5.71 that it will either apply the control, apply an alternative that does not provide less protection or will demonstrate that the control is not necessary because the attack vectors do not exist. This method is consistent with the method used in RG 5.71, which also allows for controls to be addressed.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

**13.8.4.24.62 RG 5.71, Section C.4.2.1, first paragraph, third sentence
(page 30)**

The VEGP CSP deviates from RG 5.71 in a manner similar to the previous deviation in Section 13.8.4.24.61 of this SER. Specifically, that configuration management will be used to ensure that each of the controls is addressed in Appendices B and C of RG 5.71, as opposed to implemented. This method is consistent with the method in RG 5.71, as the applicant commits to follow the process in Section C.3.3 of RG 5.71, which requires that the applicant implement the control, apply an alternative control that does not provide less protection than the corresponding control in RG 5.71, or demonstrate that the attack vector associated with the control does not exist. Therefore, the VEGP CSP method will provide no less protection than the method provided for in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.63 RG 5.71, Section C.4.2.1, second paragraph, third sentence (page 30)

The VEGP CSP deviates from RG 5.71 by including the statement, “in accordance with the process described in Section C.3.3 of this guide.” As previously discussed in Section 13.8.4.14 of this SER, the method in Section C.3.3 is consistent with the method in RG 5.71, which requires that the licensee either implement the control, apply an alternative control that does not provide less protection than the corresponding control in RG 5.71, or demonstrate that the attack vector associated with the control does not exist. Therefore, the VEGP CSP method will provide no less protection than the method provided for in RG 5.71.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.64 RG 5.71, Section C.4.3, second paragraph (page 31)

The VEGP CSP deviates from RG 5.71, as previously discussed in Section 13.8.4.22 of this SER, by stating that the applicant has established the necessary measures and governing procedures to implement periodic reviews of applicable program elements, in accordance with the requirements of 10 CFR 73.55(m). Specifically, the VEGP CSP calls for a review of the program’s effectiveness at least every 24 months. In addition, reviews are to be conducted as follows:

- within 12 months following initial implementation of the program*
- as necessary based upon site-specific analyses, assessments, or other performance indicators*
- as soon as reasonably practical, but no longer than 12 months, after changes occur in personnel, procedures, equipment, or facilities that potentially could adversely affect cyber security*
- by individuals independent of those personnel responsible for program management and any individual who has direct responsibility for implementing the program*

This deviates from RG 5.71 in the specific wording, but includes the same commitments as RG 5.71. Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.65 RG 5.71, Section C.5, second paragraph, second and third sentences (page 32)

As previously discussed in Section 13.8.4.23, the VEGP CSP deviates from RG 5.71 documentation retention commitments. Specifically, VEGP CSP

Section 5 states the records are retained to document access history and information needed to discover the source of cyber attacks and incidents. The VEGP CSP deletes the phrase:

Records required for retention include, but are not limited to, digital records, log files, audit files, and nondigital records that capture, record, and analyze network and CDA events.

The VEGP CSP commits to retaining all access history records, records to discover the source of cyber attacks or other security-related incidents affecting CDAs or SSEP functions, or both. This is consistent with what is included in RG 5.71 Section 5, as it includes all the performance-based characteristics and commitments of that section.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.66 RG 5.71, Glossary (Page 35)

The VEGP CSP's definition of a CDA deviates from the definition provided in RG 5.71. Specifically, the VEGP CSP deviates by stating that a CDA can be a CS or a subcomponent of a CS. This definition does not materially change the use of the term, and is correct: A CDA can be a CS. This definition is consistent with the definition in RG 5.71. The VEGP CSP, by the use of this definition, does not provide for less protection than RG 5.71, nor does this reduce the scope of the assets required to be protected under the rule.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.67 RG 5.71, Glossary (Page 35)

The VEGP CSP deviates from the definition of a CS in RG 5.71 by adding the phrase "as defined by the approved plant licensing basis." RG 5.71 states that a CS is an analog or digital technology based system in or outside the plant that performs or is associated with a safety-related, important-to-safety, security, or emergency preparedness function. These CSs include, but are not limited to, plant systems, equipment, communication systems, networks, offsite communications, or support systems or equipment, that perform or are associated with safety-related, important-to-safety, security, or emergency preparedness functions.

The addition of the phrase "as defined by the approved plant licensing basis" limits the scope of the functions to those that are defined by the licensing basis. As previously discussed in Section 13.8.4.4 of this SER, the staff was concerned that this modifier might cause the licensee to exclude CSs, which ought to be included, according to the rule. 10 CFR 73.54(a)(1) requires that the licensee protect digital computer and communication systems and networks associated with: (i) safety-related and important-to-safety functions; (ii) security functions; (iii) emergency preparedness functions, including offsite communications; and (iv) support systems and equipment, which if compromised would adversely

impact SSEP functions. However, further reviews resulted in the staff finding that the VEGP CSP scoping discussion adequately described a process to include all CDAs within the scope of 10 CFR 73.54(a)(1).

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.68 RG 5.71, Glossary (Page 35)

The VEGP CSP deviates from the RG 5.71 definition of cyber attack by replacing the phrase “conducted by threat agents having either malicious or non-malicious intent” with the phrase “conducted by threat agents.” The NRC staff finds this deviation to be acceptable because deletion of the intent of a threat agent, be it malicious or non-malicious, still provides a commitment to protect against threats by threat agents.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

13.8.4.24.69 RG 5.71, Appendix A, Introduction (Page A-1)

The VEGP CSP deviates from the RG 5.71 scope discussion by including within scope systems or equipment that perform important to safety functions including SSCs in the BOP that could directly or indirectly affect reactivity at a nuclear power plant and could result in an unplanned reactor shutdown or transient. Additionally, these SSCs are under the licensee’s control and include electrical distribution equipment out to the first inter-tie with the offsite distribution system. The NRC staff finds this deviation to be acceptable because it is consistent with Commission policy.

Based on the above review and assessment, the NRC staff finds that this deviation is acceptable.

License Conditions

- *Part 10, License Condition 2, COL Item 13.6-5 and License Condition 3, Item G.10*

The applicant proposed two license conditions in Part 10 of the VEGP COL application, which will require the applicant to implement the cyber security program prior to initial fuel load.

In a letter dated October 22, 2010, the applicant provided supplemental information which proposed to amend the milestone included in Part 2, FSAR Table 13.4-201 to implement the cyber security program prior to receipt of fuel onsite (protected area.) The NRC staff finds the proposed implementation milestone for the cyber security program (security prior to receipt of fuel onsite (protected area)) appropriate and in accordance with the requirement in 10 CFR 73.55(a) (4). Therefore the staff finds that the proposed License Conditions 2 and 3 are not necessary.

- *Part 10, License Condition 6*

The applicant proposed a license condition in Part 10 of the VEGP COL application to provide a schedule to support the NRC's inspection of operational programs, including the cyber security program. Although the CSP is not identified as an operational program in SECY-05-0197, the proposed license condition is consistent with the policy established in SECY-05-0197 for operational programs in general, and is acceptable.

13.8.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff finds substance of the requirements of License Condition (13-7) acceptable, and the substance of those requirements will be included in the license in a more general condition that covers the implementation of all programs:

- License Condition (13-7) - No later than 12 months after issuance of the COL, FPL shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the operational programs listed in FSAR Table 13.4-201, including the associated estimated date for initial loading of fuel. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until all the operational programs listed in FSAR Table 13.4-201 have been fully implemented.

13.8.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COLA are documented in NUREG-1793 and its supplements.

The staff has reviewed the CSP for format and content using the NRC CSP template in RG 5.71, and, for the reasons set forth above, finds that it includes all features considered essential to such a program. In particular the staff finds that it complies with applicable Commission regulations including 10 CFR 73.1, 10 CFR 73.54, 10 CFR 73.55(a) (1), 10 CFR 73.55(b) (8), 10 CFR 73.55(m), and 10 CFR Part 73, Appendix G.

14.0 INITIAL TEST PROGRAMS

The initial test program covers structures, systems, and components (SSCs) and design features for both the nuclear portion of the facility and the balance of plant. The information provided addresses the major phases of the test program, including preoperational tests, initial fuel loading and initial criticality, low-power tests, and power ascension tests. The scope of the initial test program and general plans for accomplishing it are described in sufficient detail to demonstrate that due consideration has been given to matters that normally require advance planning.

The technical aspects of the initial test program are described in sufficient detail to show that: (1) the test program adequately verifies the functional requirements of plant SSCs; and (2) the sequence of testing is such that the safety of the plant does not depend on untested SSCs. In addition, measures are described to ensure that: (1) the initial test program is accomplished with adequate numbers of qualified personnel; (2) adequate administrative controls will be established to govern the initial test program; (3) the test program is used, to the extent practicable, to train and familiarize the plant's operating and technical staff in the operation of the facility; and (4) the adequacy of plant operating and emergency procedures is verified, to the extent practicable, during the period of the initial test program.

This chapter also provides information on the inspections, tests, analyses and acceptance criteria (ITAAC) that are proposed to demonstrate that, when the ITAAC are performed and the acceptance criteria met, the facility has been constructed and will operate in conformance with the combined license (COL), the Atomic Energy Act, and Nuclear Regulatory Commission (NRC) regulations.

14.1 **Specific Information to be Included in Preliminary/Final Safety Analysis Reports (Related to Regulatory Guide (RG) 1.206, Section C.III.1, Chapter 14, C.I.14.1, "Specific Information To Be Addressed for the Initial Plant Test Program")**

Section 14.1 of the Turkey Point Units 6 and 7 COL Final Safety Analysis Report (FSAR), Revision 8, incorporates by reference, with no departures or supplements, Section 14.1, "Specific Information to be Included in Preliminary/Final Safety Analysis Reports," of Revision 19 of the AP1000 Design Control Document (DCD). The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793, "Final Safety Evaluation Report [FSER] Related to Certification of the AP1000 Standard Design," and its supplements.

¹ See Section 1.2.2 for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a design certification (DC).

**14.2 Specific Information to be Included in Standard Safety Analysis Reports
(Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2, “Initial Plant Test
Program”)**

14.2.1 Summary of Test Program and Objectives

14.2.1.1 *Introduction*

This section describes the major phases of the initial test program as well as the general prerequisites and specific objectives to be achieved for each phase.

14.2.1.2 *Summary of Application*

Section 14.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 14.2 of the AP1000 DCD, Revision 19. Section 14.2 of the DCD includes Section 14.2.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 14.2.1, the applicant provided the following:

AP1000 COL Information Item

- STD COL 14.4-3

The applicant provided additional information in standard (STD) COL 14.4-3 to address the COL holder's responsibility for development of a site-specific startup administrative manual (procedure) that will include the administrative procedures and requirements that will govern the activities associated with the plant's initial test program. Also added was information related to first of a kind testing features.

Additionally, the applicant described how the initial test program is applied to the facility. This information was provided to supplement the information incorporated by reference from the AP1000 DCD.

14.2.1.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the test program summary and objectives are given in Section 14.2 of NUREG-0800, “Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition.”

The applicable regulatory requirements for the information being reviewed in this section are Title 10 of the *Code of Federal Regulations* (10 CFR) 52.79(a)(28) and Criterion XI of Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants” to 10 CFR Part 50, “Domestic licensing of production and utilization facilities.” RG 1.68, Revision 3, “Initial Test Program [ITP] for Water-Cooled Nuclear Power Plants,” provides guidance on how to comply with Criterion XI of Appendix B to 10 CFR Part 50.

14.2.1.4 *Technical Evaluation*

The NRC staff reviewed Section 14.2.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the initial test program summary and objectives. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant (VEGP), Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 14.2.1.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 14.4-3*

The NRC staff reviewed STD COL 14.4-3 related to COL Information Item 14.4-3 included in the VEGP COL FSAR. The applicant provided additional information to address COL Information Item 14.4-3 and to supplement the information addressed in the AP1000 DCD.

COL Information Item 14.4-3 states:

The Combined License holder is responsible for a site-specific startup administration manual (procedure), which contains the administration procedures and requirements that govern the activities associated with the plant initial test program, as identified in Subsection 14.2.3.

This commitment was also captured as COL Action Item 14.4-3 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant is responsible for preparing a startup administrative manual which contains the administrative procedures and standards that govern the activities associated with the plant initial test program.

STD COL 14.4-3 was not explicitly evaluated in Section 14.2.1.4 of the BLN SER. However, portions of the evaluation material in Section 14.2.1.4 of the BLN SER are directly applicable to this COL item. Therefore, the NRC staff used this evaluation material, identified below as standard content material, in the disposition of STD COL 14.4-3, as it relates to the initial test program summary and objectives.

The staff reviewed Section 14.2.1 and requested that as part of RAI 14.2-12, dated December 8, 2008, the applicant describe how the BLN test program meets the objectives in Section 14.2.1 of the AP1000 DCD, Revision 17. In its January 22, 2009, response to this RAI, the applicant proposed to revise Section 14.2.1 of the BLN COL FSAR to supplement Section 14.2.1 of the AP1000 DCD, Revision 17. The applicant stated in its response that Section 14.2 of the BLN COL FSAR describes the controls that will be implemented in the site-specific startup administrative manual (procedure). The applicant also described the testing of first-of-a-kind design features and the use of operating experience (OE) from previous first-of-a-kind tests performed on other AP1000 plants. Additionally, the applicant proposed to develop administrative controls for crediting previously performed testing of first-of-a-kind AP1000 design features.

*The staff determined that the proposed changes adequately clarify the objectives of the initial test program, consistent with the guidance in RG 1.68. Therefore, the staff finds this change acceptable. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. This item is identified as **Confirmatory Item 14.2-1**, pending NRC review and approval of the revised BLN COL FSAR.*

Resolution of Standard Content Confirmatory Item 14.2-1

The staff verified that the VEGP applicant has incorporated into its FSAR the proposed administrative controls identified as Confirmatory Item 14.2-1 in the

staff's SER for the BLN COL. On this basis, Confirmatory Item 14.2-1 is resolved.

14.2.1.5 Post Combined License Activities

There are no post-COL activities related to this section.

14.2.1.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. The staff based its conclusions on the following:

- STD COL 14.4-3 is acceptable because it provides an adequate description of the administrative requirements associated with the test program objectives that will be implemented during the conduct of the initial test program.

14.2.2 Organization, Staffing, and Responsibilities (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.2, "Organization and Staffing")

14.2.2.1 Introduction

The organization used to manage, supervise, or execute all phases of the initial test program is described. This description includes the organizational responsibilities and authorities, the degree of participation of each organizational unit in the implementation of the initial test program, and personnel training, experience, and qualification requirements.

14.2.2.2 Summary of Application

Section 14.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 14.2 of the AP1000 DCD, Revision 19. Section 14.2 of the DCD includes Section 14.2.2.

Turkey Point Units 6 and 7 COL FSAR Section 14.2.2 addresses the plant test and operations organization (PT&O) and other organizations that will participate in the implementation of the initial test program.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 14.2.2, the applicant provided the following:

AP1000 COL Information Item

- STD COL 14.4-1

The applicant provided additional information in STD COL 14.4-1 to provide a description of the organization, staffing, and responsibilities related to the initial test program.

- PTN COL 14.4-1

The applicant provided additional information in PTN COL 14.4-1 to describe plant test and operations (PT&O) responsibilities.

14.2.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the organization, staffing, and responsibilities are given in Section 14.2 of NUREG-0800.

The applicable regulatory requirements for the information being reviewed in this section are 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. RG 1.68 provides guidance on how to comply with Criterion XI of Appendix B to 10 CFR Part 50.

14.2.2.4 Technical Evaluation

The NRC staff reviewed Section 14.2.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the initial test program organization, staffing, and responsibilities. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 14.2.2.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 14.4-1*

The NRC staff reviewed STD COL 14.4-1 related to COL Information Item 14.4-1 included under Section 14.2.2 of the BLN COL FSAR. The applicant provided information to replace the existing information in AP1000 DCD Section 14.2.2 with a description of the organization, staffing, and responsibilities related to the initial test program. This information was provided to address COL Information Item 14.4-1 in the AP1000 DCD, Revision 17. COL Information Item 14.4-1 states:

The specific staff, staff responsibilities, authorities, and personnel qualifications for performing the AP1000 initial test program are the responsibility of the Combined License applicant. This test organization is responsible for the planning, executing, and documenting of the plant initial testing and related activities that occur between the completion of plant/system/component construction and commencement of plant commercial operation. Transfer and retention of experience and knowledge gained during initial testing for the subsequent commercial operation of the plant is an objective of the test program.

This commitment was also captured as COL Action Item 14.4-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will establish the specific staff, staff responsibilities, authorities, and personnel qualifications for performing the AP1000 initial test program.

To address STD COL 14.4-1, the applicant described the PT&O organization in Section 14.2.2 of the BLN COL FSAR. The applicant stated that the PT&O organization will be responsible for the implementation of the initial test program, including the construction and installation, preoperational, and startup testing

phases. In addition, the applicant described the responsibilities, interfaces, and authorities of the positions in the PT&O organization, including the following:

- Manager in charge of the PT&O organization [Plant Test & Operations (PT&O) Manager], responsible for staffing the PT&O organization, developing procedures for the preoperational and startup test phases, managing the initial test program, implementing the initial test program schedule, and manage contracts associated with the initial test program.*
- Functional Manager in charge of the PT&O support [Plant Test & Operations (PT&O) Support Manager], responsible for the implementation of plans, schedules, and development and approval of test procedures.*
- PT&O Engineers, responsible for the development of system test procedures.*
- Functional manager in charge of startup [Startup Manager], responsible for the management of preoperational and startup testing. Activities include participation in the Joint Test Working Group (JTWG), preparation of the detailed schedule for preoperational and startup test activities, coordination of vendor participation in the initial test program, supervising and directing startup engineers, and developing periodic progress reports.*
- Startup Engineers, responsible for coordinating testing activities, identifying special or temporary equipment or services needed to support testing, ensuring compliance with administrative controls, and reviewing and evaluating test results.*
- PT&O organization personnel qualifications and training program description.*

The staff reviewed the applicant's proposed resolution to COL Information Item 14.4-1 addressing organizational and staffing responsibilities for the initial test program. In its review, the staff identified areas where additional information was needed.

In RAIs 14.2-5 and 14.2-6, dated May 15, 2008, the staff requested that the applicant supplement the information incorporated by reference from Section 14.2.2 of the AP1000 DCD, Revision 17, and provide a description of the responsibilities, authorities, interfaces, and qualifications requirements of the organizations responsible for the overall administration of the initial test program, consistent with the guidance in RG 1.206 and Section 14.2 of NUREG-0800. In its response to RAIs 14.2-5 and 14.2-6, dated June 26, 2008, the applicant stated that Section 14.4 of the BLN COL FSAR incorporated by reference Section 14.4.3 of the AP1000 DCD and no further changes to the BLN COL FSAR were needed. However, the staff determined that the information included in BLN COL FSAR was insufficient. Therefore, the staff asked the applicant in RAI 14.2-12, dated December 8, 2008, to provide information regarding the organization(s) that will be in charge of the overall administration, technical direction, coordination, and implementation of the initial test program.

Specifically, the staff requested that the applicant provide organizational descriptions of the principal management positions (including any augmenting organizations) responsible for planning, executing, and documenting preoperational and startup testing activities. RAI 14.2-12 stated that this description should include the authorities, responsibilities and interfaces, and the degree of participation of each identified organizational unit. Additionally, the staff requested that the applicant describe training and qualification requirements for organizations responsible for implementing the initial test program.

In its response to RAI 14.2-12 dated January 22, 2009, the applicant proposed to include in Section 14.2.2 of the BLN COL FSAR, a description of the following organizational groups that will participate in the implementation of the initial test program:

- The JTWG, including details of the key responsibilities, authorities, and interfaces*
- The Site Construction Group (Architect-Engineer), including participating organizations, authorities, interfaces, and functional responsibilities*
- The Site Preoperational Test Group, including participating organizations, authorities, interfaces, and functional responsibilities*
- The Site Startup Test Group, including participating organizations, authorities, interfaces, and functional responsibilities*

In addition, the applicant proposed to include information related to the education, training, experience, and qualification requirements of supervisory personnel, test personnel, and other major participating organizations responsible for implementing the initial test program and developing testing, operating, and emergency procedures. This description would include administrative provisions for the establishment of a training program consistent with the criteria described in Three Mile Island (TMI) Action Plan Item I.G.1, (NUREG-0737, "Clarification of TMI Action Plan Requirements") and considerations for staffing effects that could result from overlapping initial test programs at multi-unit sites.

The staff reviewed the proposed organizational description provided by the applicant as part of the response to RAI 14.2-12. The applicant proposed to describe its overall responsibility for the conduct of the initial test program and also proposed to include a description of the major organizations that will be responsible for the administration and technical direction of the initial test program. To this end, the applicant proposed to include in Section 14.2.2.3 of the BLN COL FSAR the functions, responsibilities, and composition of the JTWG. Specifically, the JTWG will be composed of representatives from the plant's operations group, Westinghouse, the Architect-Engineer, and representatives from the test support groups. The applicant proposed to include a description of the responsibilities, authorities, and interfaces of these organizations. The JTWG will provide oversight of the implementation of the initial test program, including planning, scheduling, and performance of preoperational and startup testing.

Also, the JTWG will review, evaluate, and approve administrative and test procedures, and will review and evaluate construction, preoperational, and startup test results and test turnover packages. The applicant proposed to revise the BLN COL FSAR to include the proposed organizational description.

Additionally, the applicant proposed to include a description of the responsibilities, authorities, and interfaces of supporting organizations including the Site Construction Group (Architect-Engineer), the Site Preoperational Test Group, and the Site Startup Test Group. A description of each proposed test group follows.

Section 14.2.2.4 of the BLN COL FSAR would be revised to describe the Site Construction Group (Architect-Engineer). The Site Construction Group will be composed, as necessary, of members from the construction group, the construction services group, the construction services procurement group, and the construction services quality group. The Site Construction Group will provide oversight of construction installation and testing, vendor interface and procurement associated with support testing activities, and turnover of tested equipment, systems, and testing documentation to the Site Preoperational Test Group.

Section 14.2.2.5 of the BLN COL FSAR would be revised to describe the Site Preoperational Test Group. The Site Preoperational Test Group will consist of engineering leads and preoperational test teams, and will accept turnover of systems and equipment from the construction organization, and plan, scope, schedule, and oversee testing of plant systems. Additionally, the Site Preoperational Test Group will coordinate tagging and maintenance of systems, will provide coordination with other participating organizations, and will resolve open items and exceptions identified during the implementation of the preoperational test program.

Section 14.2.2.6 of the BLN COL FSAR would be revised to describe the Site Startup Test Group. The Site Startup Test Group will include engineering leads and startup test teams, and will be responsible for the acceptance of SSCs for integrated testing. In addition, the Site Startup Test Group will manage and oversee the testing of plant SSCs to support the plant power ascension test program, and will accept and turn over startup test packages to the site licensee.

The applicant also proposed to include information in Section 14.2.2.2 of the BLN COL FSAR to address training and qualification requirements for individuals and organizations implementing the initial test program. The response stated that the training organization will develop procedures to implement a training and qualification program in accordance with the requirements of the licensee quality assurance program and in coordination with Westinghouse. This training and qualification program will be used to confirm that test personnel have adequate training, qualification, and certification. In addition, the proposed training and qualification program will confirm that experienced and qualified personnel are available to develop testing, operating, and emergency procedures. The proposed training and qualification program will also provide supplemental operator training in accordance with TMI Action Plan Item I.G.1. The response

stated that the site-specific startup administrative manual will contain measures to verify that personnel formulating and conducting test activities are not the same personnel who designed or are responsible for satisfactory performance of systems or design features under test. In addition, the startup administrative manual will provide controls for the consideration of staffing effects that could result from overlapping initial test programs at multi-unit sites.

*The staff determined that the proposed changes adequately define the organizations that will carry out the initial test program, describe the authorities, responsibilities, and interfaces, and delineate training and qualification requirements for organizations participating in the implementation of the initial test program, consistent with the guidance in RG 1.68. Additionally, Section 1.0, Table 1.9-201 of the BLN COL FSAR includes a commitment to RG 1.8, Revision 3, "Qualification and Training of Personnel for Nuclear Power Plants," which provides training and qualification requirements for nuclear power plant personnel, including personnel participating in initial test program activities. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. Therefore, the staff finds this change acceptable. This is identified as **Confirmatory Item 14.2-2**, pending NRC review and approval of the revised BLN COL FSAR.*

Resolution of Standard Content Confirmatory Item 14.2-2

The staff verified that the VEGP applicant has incorporated into its FSAR the proposed administrative controls identified as Confirmatory Item 14.2-2 in the staff's SER for the BLN COL. On this basis, Confirmatory Item 14.2-2 is resolved.

Evaluation of Additional Information

In its letter dated November 11, 2010, the VEGP applicant provided additional information on the training and qualification requirements for nonsupervisory test engineers participating in initial test program activities. In the standard content evaluation presented above for STD COL 14.4-1, the staff notes that RG 1.8 is referenced by the applicant as providing the training and qualification requirements for nuclear power plant personnel, including personnel participating in initial test program activities. In the November 11, 2010, letter, the applicant stated that VEGP COL FSAR Section 14.2.2.2 would be revised to state that acceptable qualifications for nonsupervisory test engineers will follow the guidance provided in RG 1.28 as discussed in VEGP COL FSAR Appendix 1AA, i.e., Appendix 2A-1 of American Society of Mechanical Engineers (ASME) NQA-1-1994, "Quality Assurance Requirements for Nuclear Facility Applications."

The use of ASME NQA-1-1994 is endorsed in Section 17.5 of NUREG-0800 as providing an acceptable means for complying with 10 CFR Part 50, Appendix B, Criterion II, "Quality Assurance Program." Specifically, Item T of Part II of Section 17.5 of NUREG-0800 references ASME NQA-1-1994 in its guidance on training and qualification for personnel associated with inspection and testing activities. Therefore, the staff finds acceptable the proposed changes to VEGP

*COL FSAR Section 14.2.2.2, as stated in the applicant's November 11, 2010, letter. The planned VEGP COL application changes will be tracked as **VEGP Confirmatory Item 14.2-1**.*

Resolution of VEGP Standard Content Confirmatory Item 14.2-1

VEGP Confirmatory Item 14.2-1 is an applicant commitment to revise its FSAR to specify the qualifications for test engineers. The staff verified that VEGP COL FSAR Section 14.2.2.2 was appropriately updated. As a result, VEGP Confirmatory Item 14.2-1 is now closed. The applicant indicated that the proposed changes to its FSAR Section 14.2.2.2 is expected to be standard for the subsequent COL applicants. Since Confirmatory Item 14.2-1 already exists as a standard confirmatory item in this SER, the staff designated this standard confirmatory item as VEGP Confirmatory Item 14.2-1.

Turkey Point Units 6 and 7 COL Information Item

- PTN COL 14.4-1

The NRC staff reviewed PTN COL 14.4-1 related to COL Information Item 14.4-1 included under Section 14.2.2 of the Turkey Point Units 6 and 7 COL FSAR. The applicant provided additional information for the PT&O responsibilities and changed the titles for some managers within the PT&O organization. The responsibilities and qualifications for these positions are the same as discussed in the standard content evaluation above; therefore, the NRC finds these changes acceptable.

14.2.2.5 Post Combined License Activities

There are no post-COL activities related to this section.

14.2.2.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that, the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. The staff based its conclusions on the following:

- STD COL 14.4-1 and PTN COL 14.4-1 are acceptable because they provide an adequate description of the organizational responsibilities and authorities, the degree of participation of each organizational unit in the implementation of the initial test program, and personnel training, experience, and qualification requirements and meet the guidance in RG 1.68.

14.2.3 Test Specifications and Test Procedures (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.3, “Test Procedures,” C.I.14.2.4, “Conduct of Test Program,” C.I.14.2.5, “Review, Evaluation, and Approval of Test Results,” and C.I.14.2.6, “Test Records”)

14.2.3.1 Introduction

Test specifications and test procedures address the process used to develop, review, and approve individual test procedures, including the organizational units or personnel that are involved in performing these activities and their respective responsibilities.

“Conduct of Test Program” describes the administrative controls that govern the conduct of each major phase of the test program. This description includes the administrative controls used to ensure that the necessary prerequisites are satisfied for each major phase and for individual tests. Controls to be followed during plant modifications or maintenance tasks that are determined to be necessary to conduct the test program are also described, as well as the methods used to ensure retesting following such modifications or maintenance.

“Review of Test Results” describes the specific controls to be established for the review, evaluation, and approval of test results by appropriate personnel and/or organizations. This description includes specific controls to be established to ensure notification of affected and responsible organizations or personnel when test acceptance criteria are not met, as well as the controls established to resolve such matters.

In addition, administrative controls to identify and cross-reference each test (or portion thereof) required to be completed before initial fuel loading to satisfy ITAAC in accordance with 10 CFR 52.99(a) are discussed.

14.2.3.2 Summary of Application

Section 14.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 14.2 of the AP1000 DCD, Revision 19. Section 14.2 of the DCD includes Section 14.2.3.

In addition, in Turkey Point Units 6 and 7 COL FSAR Sections 14.2 and 14.4, the applicant provided the following:

AP1000 COL Information Items

- STD COL 14.4-2

The applicant provided additional information in STD COL 14.4-2 to address COL holder responsibility for the development of test specifications and test procedures.

- STD COL 14.4-3

The applicant provided additional information in STD COL 14.4-3 to address COL holder responsibility for the development of a site-specific startup administrative manual (procedure) that will include the administrative procedures and requirements that will govern the activities associated with the plant’s initial test program.

- STD COL 14.4-4

The applicant provided additional information in STD COL 14.4-4 to address COL holder responsibility for the review and evaluation of test results.

- PTN COL 14.4-4

The applicant provided additional information in PTN COL 14.4-4 to address responsibility for the review and evaluation of test results of the preoperational test phase before initial fuel load.

Supplemental Information

- STD SUP 14.2-5

The applicant provided additional information in STD Supplement (SUP) 14.2-5 to address administrative requirements for the preparation of work requests.

- STD SUP 14.2-6

The applicant provided additional information in STD SUP 14.2-6 to address administrative requirements for turnover of systems and components during the construction phase.

- STD SUP 14.2-7

The applicant provided additional information in STD SUP 14.2-7 to address administrative controls for the conduct of modifications during the initial test program.

- STD SUP 14.2-8

The applicant provided additional information in STD SUP 14.2-8 to address administrative controls for the conduct of maintenance during the initial test program.

In addition, in Part 10 of the Turkey Point Units 6 and 7 COL application, the applicant provided the following information:

License Conditions

- Part 10, License Condition 2, Items 14.4-2, 14.4-3 and 14.4-4

The proposed license conditions will require the licensee to complete the actions described in STD COL 14.4-2 and STD COL 14.4-4 prior to fuel loading and STD COL 14.4-3 prior to initiation of the test program.

- Part 10, License Condition 6

The proposed license condition will require the licensee to provide a schedule to support NRC inspections of operational programs including a submittal for approved preoperational and startup test procedures.

- Part 10, License Condition 8

The proposed license condition will require the licensee to report any changes to the initial test program within one month of such a change.

14.2.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the test specifications and test procedures, conduct of test program, and review and evaluation of test results are given in Section 14.2 of NUREG-0800.

The applicable regulatory requirements for the information being reviewed in this section are 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. RG 1.68 provides guidance on how to comply with Criterion XI of Appendix B to 10 CFR Part 50.

14.2.3.4 Technical Evaluation

The NRC staff reviewed Section 14.2.3 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the test specifications and procedures, conduct of test program, and review and evaluation of test results. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the

SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 14.2.3.4 of the VEGP SER:

AP1000 COL Information Items

- *STD COL 14.4-2, addressing test specifications and test procedures.*

The NRC staff reviewed STD COL 14.4-2 related to COL Information Item 14.4-2 included in the BLN COL FSAR. The applicant provided information to address COL Information Item 14.4-2 and to supplement the information addressed in the AP1000 DCD, Revision 17. COL Information Item 14.4-2 states:

The Combined License holder will provide the Preoperational and Startup Procedures to the NRC prior to each planned test in accordance with the requirements of DCD Subsection 14.2.3.

The following words represent the original Combined License Information Item commitment:

The Combined License applicant is responsible for providing test specifications and test procedures for the preoperational and startup tests, as identified in Subsection 14.2.3, for review by the NRC.

The commitment was also captured as COL Action Item 14.4-2 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will develop test specifications and procedures for the preoperational and startup tests for review by the NRC.

The staff reviewed the applicant's proposed resolution of COL Information Item 14.4-2.

In reviewing Section 14.2 of the BLN COL FSAR, Revision 0, the applicant did not provide a description of the methodology used to develop test specifications and procedures; did not provide a description of the controls to ensure the participation of the design organization(s), the COL applicant, architect-engineer(s), and other major contractors, subcontractors, and vendors, as applicable; and did not discuss the qualification or experience requirements for personnel participating in the development of test specifications and test procedures. In RAI 14.2-8, the staff requested that the applicant provide information regarding the methodology that will be used for the generation, review, and approval of preoperational and startup test procedures. Additionally, the staff requested that the applicant explain which provisions in the application ensure the availability of approved test procedures for review by NRC inspectors at least 60 days before their intended use, and ensure timely notification to the

NRC of changes in approved test procedures that have been made available for NRC review.

In its response to RAI 14.2-8 dated June 26, 2008, the applicant stated that Section 14.2.3 of the AP1000 DCD provided administrative controls to ensure that approved test procedures will be provided to the NRC about 60 days prior to the scheduled performance of preoperational tests, such as test for systems and components that perform safety-related functions, and tests of systems and components that are non-safety-related but perform defense-in-depth functions. The staff found this response acceptable. However, the applicant did not provide a description of the administrative controls to be used to develop, review, and approve preoperational and startup test procedures. In RAI 14.2-12, dated December 8, 2008, the staff requested that the applicant provide such a description in the BLN COL FSAR.

In its response to RAI 14.2-12 dated January 22, 2009, the applicant proposed to include in Section 14.2.3 of the BLN COL FSAR the following administrative controls that will be prescribed in the site-specific startup administrative manual for the development, review, and approval of test specifications and test procedures:

- Provisions to ensure that the appropriate technical information required for the preparation of test procedures is included, including prerequisites, format and content, objectives, test conditions, and acceptance criteria*
- Provisions to ensure the participation of the design organization in the development of detailed test procedures*
- Provisions to ensure that personnel developing and reviewing test procedures have the appropriate technical background and experience*
- Provisions to ensure the availability of test procedures to the NRC onsite inspectors approximately 60 days prior to their intended use*

*The staff reviewed the applicant's response to this RAI and determined that the proposed changes provide the general methods and administrative provisions to control procedure development, review, and approval, including the responsibilities of the various organizations participating in this process, consistent with the guidance in RG 1.68. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. Therefore, the staff finds the proposed change acceptable. This is identified as **Confirmatory Item 14.2-3**, pending NRC review and approval of the revised BLN COL FSAR.*

The applicant identified COL Information Item 14.4-2 as an activity that cannot be fully resolved prior to issuance of the COL. In BLN COL FSAR, Part 10, "License Conditions and ITAAC," License Condition 2, "COL Holder Items," the applicant proposed Item 14.4-2 to address the development of test specifications and test procedures. Additionally, the applicant proposed License Condition 6, "Operational Program Readiness," addressing implementation schedules to support planning for and conduct of NRC staff inspections of operational

programs. Because the initial test program is identified as an operational program, the applicant provided implementation milestones consistent with the guidance contained in RG 1.206. To address the availability of test specifications and test procedures, Item d. of License Condition 6 requires a submittal schedule for preoperational and startup test procedures.

Since development of test specifications and test procedures will require detailed plant-specific design information and close coordination with design organizations, the staff determined that it is acceptable to develop detailed preoperational and startup test specifications and test procedures during the post-COL phase (See Section 14.2.3.5). Therefore, the staff finds acceptable proposed License Condition 2, Item 14.4-2. Concerns remain regarding the adequacy of administrative controls in License Condition 6, Item d., for the development of test specifications and test procedures. This is identified as **Open Item 14.2-1**.

In RAI 14.2-11, the NRC staff requested that the applicant provide additional information regarding the provisions that will identify and cross-reference all or part of each test that is required to be completed before initial fuel loading and that is designed to satisfy ITAAC. The staff requested that the applicant revise Section 14.2 of the BLN COL FSAR to address this issue. In its September 3, 2008, response to RAI 14.2-11, the applicant stated that test procedures (or sections thereof) will be cross-referenced to ITAACs. In addition, activities related to ITAAC closure will include references to test procedures in order to facilitate NRC review and acceptance. The applicant stated that Chapter 14 of the BLN COL FSAR would be revised to include development of a cross-reference list between ITAACs and test procedures and/or sections of procedures. The staff confirmed that this change was incorporated in Revision 1 of the BLN COL FSAR. Section 14.4.2 of the BLN COL FSAR states that a cross-reference list will be developed between ITAACs and test procedures and/or sections of test procedures. The staff finds this change acceptable. This resolves RAI 14.2-11.

Resolution of Standard Content Confirmatory Item 14.2-3

The staff verified that the VEGP applicant has incorporated into its FSAR the proposed administrative controls identified as Confirmatory Item 14.2-3 in the staff's SER for the BLN COL. On this basis, Confirmatory Item 14.2-3 is resolved.

Resolution of Standard Content Open Item 14.2-1

Part 10 of the VEGP COL application, proposed License Condition 6, "Operational Program Readiness," describes the process for submitting to the appropriate Director of the NRC a schedule that will support planning for and conduct of NRC inspections of operational programs. The applicant also included, in Item c. of License Condition 6 (which corresponds to Item d. of License Condition 6 in the BLN COL application), administrative provisions for the submittal of approved preoperational and startup test procedures to NRC onsite inspectors in accordance with Section 14.2.3 of the FSAR. Following the

evaluation of Item d. of License Condition 6 in the BLN COL application, as documented in the BLN SER, the staff has determined on closer examination that proposed License Condition 2, Item 14.4-2, will result in adequate administrative controls for the development of detailed test specifications and test procedures. On this basis, the staff finds that Item c. in proposed License Condition 6 of Part 10 of the VEGP COL application is acceptable and Open Item 14.2-1 is therefore resolved.

The following portion of this technical evaluation section is reproduced from Section 14.2.3.4 of the BLN SER:

- *STD COL 14.4-3, addressing the conduct of test program*

The NRC staff reviewed STD COL 14.4-3 related to COL Information Item 14.4-3 included in the BLN COL FSAR. The applicant provided additional information to address COL Information Item 14.4-3 and to supplement the information addressed in the AP1000 DCD, Revision 17. COL Information Item 14.4-3 states:

The Combined License holder is responsible for a site-specific startup administration manual (procedure), which contains the administration procedures and requirements that govern the activities associated with the plant initial test program, as identified in Subsection 14.2.3.

The following words represent the original COL information item commitment:

The Combined License applicant is responsible for a startup administration manual (procedure), which contains the administration procedures and requirements that govern the activities associated with the plant initial test program, as identified in Subsection 14.2.3.

This commitment was also captured as COL Action Item 14.4-3 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant is responsible for preparing a startup administrative manual which contains the administrative procedures and standards that govern the activities associated with the plant initial test program.

In Section 14.4 of the BLN COL FSAR, the applicant incorporated by reference Section 14.4.3 of the AP1000 DCD, Revision 17. This section provided a summary overview of the administrative process and program controls to be utilized in the conduct of the AP1000 Startup Test Program at a licensed AP1000 operational plant site. It also provided a general description of responsibilities and activities related to the testing of plant equipment in the period between system turnover until plant acceptance.

The staff reviewed the information provided to address COL Information Item 14.4-3 related to the conduct of the initial test program in the BLN COL FSAR. In its review, the staff identified areas where additional information was needed. A description of the specific issues follows.

In RAI 14.2-4, the staff requested that the applicant supplement the information incorporated by reference from Section 14.4.3 of the AP1000 DCD, Revision 17, and to provide a description of the administrative controls that will be implemented during the conduct of the initial test program, consistent with the guidance in RG 1.206 and Section 14.2 of NUREG-0800. In its response to RAI 14.2-4 dated June 26, 2008, the applicant stated that Section 14.4 of the BLN COL FSAR incorporated by reference Section 14.4.3 of the AP1000 DCD and no further changes to the BLN COL FSAR were needed. However, the staff determined that the information included in BLN COL FSAR was insufficient. Therefore, in RAI 14.2-12 dated December 8, 2008 [SIC], the staff requested the applicant include a set of administrative controls for the conduct of the initial test program in Section 14.2 of the BLN COL FSAR.

In its response to RAI 14.2-12 dated January 22, 2009 and March 26, 2009, the applicant proposed to include in Section 14.2.3.1 of the BLN COL FSAR a description of the administrative controls for the control of testing activities. The proposed controls will include measures for procedure verification, work control, system turnover, conduct of modifications, and conduct of maintenance activities during the initial test program.

Section 14.2.3.1.1 would be revised to provide administrative controls for the verification of approved test procedures. The response stated that this section will include measures to consider design and licensing changes made after the development of test procedures to ensure that these changes are incorporated in approved test procedures. In addition, the applicant stated that available information regarding operating experience (OE) will be factored in the development of individual test procedures. Test deficiencies, nonconformances, exceptions, and failures will be tracked using the applicant's corrective action program. The applicant also proposed controls to involve design organizations in the resolution of design-related problems that result in, or contribute to, a failure to meet test acceptance criteria. In its description, the applicant assigned responsibilities for the review of test procedures, test execution, data collection and recording, and for the review and evaluation of test results prior to commencing each major phase of the initial test program.

The following supplemental items were not in Revision 1 of the BLN FSAR and are addressed for the first time in this SER for the VEGP COL application. However, portions of the standard evaluation material in the BLN SER under the evaluation of STD COL 14.4-3 are directly applicable to the new STD SUP items identified in the VEGP FSAR. Therefore, the NRC staff used this evaluation material, identified below as standard content material, in the disposition of these supplemental items.

Supplemental Information

- STD SUP 14.2-5

The applicant provided additional information in STD SUP 14.2-5 to address administrative requirements for the preparation of work requests.

The following portion of this technical evaluation section is reproduced from Section 14.2.3.4 of the BLN SER:

Section 14.2.3.1.2 would be revised to provide administrative measures for the control of work requests and controls for the control of tagging requests. Specifically, the response stated that the applicant will be responsible for the preparation of work requests and for supervising minor repairs and modifications, changes to equipment settings, and disconnecting and reconnecting of electrical terminations. Additionally, the Startup Group will provide for the coordination of construction-related work requests. The applicant also stated that the Startup Test Engineers may perform independent verification of work requests. These activities will be controlled by administrative procedures.

- STD SUP 14.2-6

The applicant provided additional information in STD SUP 14.2-6 to address administrative requirements for turnover of systems and components during the construction phase.

The following portion of this technical evaluation section is reproduced from Section 14.2.3.4 of the BLN SER:

Section 14.2.3.1.3 would be revised to provide controls for system turnover during the conduct of the test program. The response proposed guidelines that will be used to define the boundary and interfaces between related systems/subsystems and to generate boundary scope documents. The response also proposed a systematic turnover process that includes requirements for the following:

- *Documenting inspections performed by the construction organization (e.g., highlighted drawings showing areas inspected)*
- *Documenting results of construction testing*
- *Determining the construction related inspections and tests that need to be completed before preoperational testing begins. Any open items are evaluated for acceptability before commencing preoperational testing.*
- *Developing and implementing plans for correcting adverse conditions and open items, and means for tracking such conditions and items*

- Verifying completeness of construction and documentation of incomplete items
- STD SUP 14.2-7

The applicant provided additional information in STD SUP 14.2-7 to address administrative controls for the conduct of modifications during the initial test program.

The following portion of this technical evaluation section is reproduced from Section 14.2.3.4 of the BLN SER:

Section 14.2.3.1.4 would be revised to include controls for modifications during the conduct of the test program. The response also proposed measures for retesting activities following such modifications. In its description, the applicant stated that modifications will be documented in test procedures and will contain restoration steps to confirm satisfactory restoration to the required configuration. Additionally, modifications will be reviewed to determine the scope of post-modification testing activities. Finally, the response stated that retesting for modifications will be documented and verified to ensure the validity of preoperational testing and ITAAC.

- STD SUP 14.2-8

The applicant provided additional information in STD SUP 14.2-8 to address administrative controls for the conduct of maintenance during the initial test program.

The following portion of this technical evaluation section is reproduced from Section 14.2.3.4 of the BLN SER:

Section 14.2.3.1.5 would be revised to include controls for corrective or preventive maintenance during the conduct of the initial test program. The response proposed that the applicant will review maintenance activities to determine post-maintenance testing to be performed. Additionally, post-maintenance testing will be conducted and documented, and its results verified to maintain the validity of preoperational testing and ITAAC.

The following portion of this technical evaluation section is reproduced from Section 14.2.3.4 of the BLN SER, and is applicable to all four STD SUP items discussed above.

*The staff reviewed the applicant's response to this RAI and determined that this change provides an adequate set of administrative measures to control the conduct of the initial test program, consistent with the guidance in RG 1.68, RG 1.206, and Section 14.2 of NUREG-0800. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. Therefore, the staff finds this change acceptable. This is identified as **Confirmatory Item 14.2-4**, pending NRC review and approval of the revised BLN COL FSAR.*

In addition to the administrative controls for the conduct of the initial test program, the applicant identified COL Information Item 14.4-3 as an activity that cannot be fully resolved prior to issuance of the COL. In BLN COL FSAR, Part 10, "License Conditions and ITAAC," License Condition 2, "COL Holder Items," the applicant proposed Item 14.4-3 to address the development of a site-specific startup administrative manual. This site-specific startup administrative manual will contain the administration procedures and requirements that govern the activities associated with the plant initial test program, as described in Section 14.2 of the BLN COL FSAR. The applicant stated that the startup administrative manual will be provided to the NRC prior to initiating the initial test program. Additionally, in Part 10 of the BLN COL FSAR, proposed License Condition 8, "Startup Testing," the applicant discussed the process for making changes to the initial test program described in Chapter 14 of the Bellefonte COL FSAR. The applicant stated that any changes to the initial startup test program made in accordance with the provisions of 10 CFR 50.59 or Section VIII of Appendix D to 10 CFR Part 52 shall be reported in accordance with 50.59(d) within one month of such change.

*The staff determined that it is acceptable to develop a site-specific startup administrative manual, which will contain the administrative procedures and standards that govern the activities associated with the plant initial test program, during the post-COL phase (see Section 14.2.3.5). Therefore, the staff finds acceptable proposed License Condition 2, Item 14.4-3. Concerns remain regarding the adequacy of administrative controls for changing the test program as described in License Condition 8. This is identified as **Open Item 14.2-2**.*

Resolution of Standard Content Confirmatory Item 14.2-4

The staff verified that the VEGP applicant has incorporated into its FSAR, as STD SUP 14.2-5 through STD SUP 14.2-8, the proposed administrative controls identified as Confirmatory Item 14.2-4 in the staff's SER for the BLN COL. On this basis, Confirmatory Item 14.2-4 is resolved.

Resolution of Standard Content Open Item 14.2-2

Part 10 of the VEGP COL application, proposed License Condition 8, "Startup Testing," describes the process for initiating changes to the initial test program. The applicant proposed to notify the NRC of any change made to the startup test program described in Chapter 14 of the VEGP COL FSAR in accordance with provisions of 10 CFR 50.59(d) or Section VIII of Appendix D, "Design Certification Rule for the AP1000 Design," to 10 CFR Part 52 within one month of such change. Following the evaluation of License Condition 8 in the BLN COL application, as documented in the BLN SER, the staff has determined, based on closer examination, that proposed License Condition 8 provides adequate administrative controls for notifying the NRC of changes to the test program, consistent with regulatory requirements in 10 CFR 50.59(d) and Section VIII of Appendix D to 10 CFR Part 52. On this basis, the staff determined that the applicant adequately addressed Open Item 14.2-2, and it is, therefore, resolved.

The following portion of this technical evaluation section is reproduced from Section 14.2.3.4 of the BLN SER:

AP1000 COL Information Item

- *STD COL 14.4-4 [and PTN 14.4-4], addressing the review and evaluation of test results*

The NRC staff reviewed STD COL 14.4-4 related to COL Information Item 14.4-4 included under Section 14.2.3.2 of the BLN COL FSAR. The applicant provided additional information to address COL Information Item 14.4-4 as described in the AP1000 DCD, Revision 17. COL Information Item 14.4-4 states:

The combined license holder is responsible for review and evaluation of individual test results as well as final review of overall test results and for review of selected milestones or hold points within the test phases. Test exceptions or results which do not meet acceptance criteria are identified to the affected and responsible design organizations, and corrective actions and retests, as required, are performed.

The commitment was also captured as COL Action Item 14.4-4 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant or holder is responsible for review and evaluation of individual test results.

In Section 14.2.3.2 of the BLN COL FSAR, the applicant provided specific administrative controls for the review and evaluation of test results. The applicant stated that the startup engineer is responsible for reviewing and evaluating the test data, test results, and verifying that the acceptance criteria have been met. The applicant also stated that test results will be reviewed and approved by the JTWG. The applicant included provisions to identify and notify the responsible design organizations when test exceptions or results do not meet acceptance criteria. The applicant also discussed the utilization of the corrective action program for tracking test results that do not meet the acceptance criteria, and for providing corrective action and retests, as required. Additionally, the applicant provided controls for the review of preoperational and startup test results, and for the retention of test reports.

While reviewing Section 14.2.3.2, the staff was unable to find provisions to ensure that retesting required for modification or maintenance remains in compliance with ITAAC. In RAI 14.2-10, the staff requested that the applicant provide additional information regarding the provisions to ensure that retesting remains in compliance with ITAAC. The staff requested that the applicant revise Section 14.2.3.2 of the BLN COL FSAR to include such provisions. In its September 8, 2008, response to the staff's RAI, the applicant stated that normal maintenance, repairs, and design changes are controlled by the configuration control process in conjunction with the quality assurance and corrective action programs. These processes will provide for the review of changes that could

have an impact on ITAAC. The staff confirmed that Section 14.2.3.2 of the BLN COL FSAR, Revision 1, was amended to include provisions to verify that the results of retesting do not invalidate ITAAC. The staff finds this change acceptable. This resolves RAI 14.2-10.

In RAI 14.2-12, dated December 8, 2008, the staff requested that the applicant supplement Section 14.2.3.2 of the BLN COL FSAR by adding additional administrative controls to be implemented for the review, evaluation, and approval of test results, consistent with the guidance in RG 1.206. In its January 22, 2009, response to the staff's RAI, the applicant proposed controls and assigned responsibilities for the review of each major phase of the initial test program. Specifically, the applicant proposed to develop controls to assure that results of the preoperational and startup test phases will be reviewed and evaluated by qualified personnel from the PT&O and the JTWG organizations and approved by the plant manager. Also, the review of test results will include participation from design and construction organizations. Following each major phase of the initial test program, and before proceeding to the next stage of testing, the applicant will review test results to ensure that all required tests have been completed and that testing for the next major phase will be conducted in a safe manner. Additionally, the applicant proposed to develop controls to prepare startup test results in accordance with RG 1.16, "Reporting of Operating Information – Appendix A Technical Specifications."

The staff reviewed the applicant's response to RAI 14.2-12 and determined that the proposed changes provide administrative provisions to control the review, evaluation, and approval of test results, consistent with the guidance in RG 1.68, RG 1.206, and Section 14.2 of NUREG-0800. Therefore, the staff finds this change acceptable. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. This is identified as **Confirmatory Item 14.2-5**, pending NRC review and approval of the revised BLN COL FSAR.

In addition to the administrative controls for the review, evaluation, and approval of test results, the applicant identified COL Information Item 14.4-4 as an activity that cannot be fully resolved prior to issuance of the COL. In BLN COL FSAR, Part 10, "License Conditions and ITAAC," proposed License Condition 2, "COL Holder Items," the applicant proposed Item 14.4-4 to address the review and evaluation of test results. The applicant stated that the COL holder will be responsible for the review and evaluation of test results, as well as the final review of overall test results and for the review of selected milestones or hold points within the test phases. In addition, the applicant stated that test exceptions or results which do not meet acceptance criteria will be identified to the affected and responsible design organizations, and corrective actions and retests, as required, will be performed.

Since test results will not be available until a facility is built, the staff determined that it is appropriate and acceptable for the COL holder to review and evaluate individual test results during the post-COL phase (see Section 14.2.3.5). The staff reviewed the proposed license condition and determined that the applicant provided sufficient administrative controls for the review and evaluation of test

results, consistent with the guidance contained in RG 1.68, RG 1.206, and Section 14.2 of NUREG-0800.

Test Records

In its response to RAI 14.2-12, the applicant proposed to supplement the information incorporated by reference from Section 14.2.3.3 of the AP1000 DCD, Revision 17. The applicant stated that startup test reports will be generated and will describe and summarize the completion of tests during the initial test program. These proposed reports will address each test described in the BLN COL FSAR, describe measured values of operating conditions or characteristics from the initial test program as compared to design or specification values, and describe corrective actions and information required by license conditions. The applicant also described the frequency of such reports. Specifically, these proposed reports will be submitted 9 months following initial criticality, 90 days after completion of the test program, or 90 days after the start of commercial operations. The applicant also stated that in the event that one report does not cover these three events (i.e., initial criticality, completion of the test program, and start of commercial operations), supplemental reports will be submitted every three months until all three events are completed.

The staff reviewed the applicant's response to RAI 14.2-12 and determined that the proposed changes provide a set of administrative provisions to generate test reports, consistent with the guidance in RG 1.68, RG 1.206, and Section 14.2 of NUREG-0800. Therefore, the staff finds this change acceptable. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. This is identified as **Confirmatory Item 14.2-6**, pending NRC review and approval of the revised BLN COL FSAR.

The staff determined that the supplemental information provided by the applicant described an acceptable method for activities related to test specifications and test procedures, conduct of the initial test program, and review, evaluation, and approval of test results, consistent with the guidance in RG 1.68 and RG 1.206. Therefore, the staff finds this change to be acceptable.

Resolution of Standard Content Confirmatory Items 14.2-5 and 14.2-6

The staff verified that the VEGP applicant has incorporated into its FSAR the proposed administrative controls identified as Confirmatory Items 14.2-5 and 14.2-6 in the staff's SER for the BLN COL. On this basis, Confirmatory Items 14.2-5 and 14.2-6 are resolved.

Evaluation of Revised License Condition 2, Items 14.4-3 and 14.4-4

In a letter dated October 15, 2010, the applicant proposed revisions to Items 14.4-3 and 14.4-4 of License Condition 2. Item 14.4-3 (evaluated above as part of the four SUP items) and Item 14.4-4 (evaluated above as part of STD COL 14.4-4) are considered unnecessary by the applicant as they can be adequately addressed by other proposed license conditions. The applicant proposed to replace the current text for Item 14.4-3 with, "Note - addressed by

proposed License Conditions #3 and #6," and proposed to replace the current text for Item 14.4-4 with, "Note - addressed by proposed License Condition #9."

The text of Item 14.4-3 of License Condition 2 proposed to be deleted by the applicant's October 15, 2010, letter states that a site-specific startup administration manual (procedure), which includes the administration procedures and requirements that govern the activities associated with the plant's initial test program, would be provided prior to initiating the plant initial test program. Proposed License Condition 3 requires the operational program that addresses startup testing to be implemented prior to beginning the testing, and the proposed revision to Item c of License Condition 6 (evaluated above) would add the site-specific startup administrative manual to the items for which a schedule of availability would be provided to the NRC. The staff agrees that the combination of proposed License Condition 3 and proposed License Condition 6 (as revised) will accomplish the goal of the text that is currently in Item 14.4-3 of License Condition 2.

The text of Item 14.4-4 of License Condition 2 that is proposed to be deleted by the applicant's October 15, 2010, letter states that prior to initial fuel load, the licensee is responsible for review and evaluation of individual test results, as well as final review of overall test results and for review of selected milestones or hold points within the test phases. Test exceptions or results that do not meet acceptance criteria are identified to the affected and responsible design organizations, and corrective actions and retests are performed. The applicant stated that the proposed revision to License Condition 9 (which was initially proposed by the applicant in a letter dated June 18, 2010) also requires review and evaluation of individual test results, and that test exceptions or results that do not meet acceptance criteria are identified to the affected and responsible organizations, and corrective actions and retests, as required, are performed. The proposed revision would specifically add the review and evaluation of test results for those tests conducted during preoperational testing and for those conducted during power ascension (i.e., above low-power testing (defined as less than 5 percent rated thermal power [RTP])) up to and including testing at 100 percent RTP. This condition would then cover the entire startup testing program and would be retitled as "Startup Program Test Results." The staff agrees that the proposed revisions to License Condition 9 will accomplish the goal of the text that is currently in Item 14.4-4 of License Condition 2. Proposed License Condition 9 is evaluated by the staff in Section 14.2.8 of this SER.

Review of Test Results

Turkey Point Units 6 and 7 COL FSAR Section 14.2.3.2, "Review of Test Results," and Section 14.2.10, "Startup Test Procedures," addresses considerations in determining whether any phases of startup tests should proceed to the next power level. In RAI 6915, Question 14.02-1, the staff requested the applicant revise the scope of plant conditions to include test outcomes that should be reviewed by the JTWG in identifying actions such as stopping a test or not proceeding to the next power plateau for events that could lead to potential violations of NRC regulations under 10 CFR Part 20. Specifically, the applicant was requested to address plant conditions associated with radiation safety requirements under 10 CFR Part 20 and Appendix B

to Part 20, and Part 50.36a in controlling and monitoring liquid and gaseous effluents under Part 50, Appendix I.

In its response the applicant stated the initial test program for the AP1000 standard plant is described in Chapter 14, Section 14.2 of the DCD. The applicant provided an example of administrative procedures and requirements that govern the activities of the conduct of the initial test program included in DCD, Revision 19, Section 14.2.3.1, "Conduct of Test Program." The example provided, covers all plant conditions before and after fuel load and states:

- "Various phases of the initial test program and the requirements for progressing from one phase to the next, as well as requirements for moving beyond selected hold points or milestones within a given phase"

Additionally the applicant provided a more specific reference that addresses unexpected radiological concerns. In COLA section 14.2.10, "Startup Test Procedures" (discussed below), STD SUP 14.2-3 contains bullets which state:

- "Perform general surveys of plant systems and equipment to confirm that they are operating within expected values."
- "Check for unexpected radioactivity in process systems and effluents"

The applicant stated that information on plant test conditions including test outcomes will be shared with the Joint Test Working Group. Also that any indication of a non-compliant test condition or test outcome that does not meet the acceptance criteria, an evaluation of the non-compliance to assure continued safe conduct of operations will be completed before proceeding to the next power level. In light of the above, the staff finds the applicant's response acceptable since the description of administrative procedures and requirements adequately ensure that the JTWG is capable of identifying changing radiological conditions of plant systems, and stop a test or not proceed to the next power plateau before exceeding radiation exposures and dose limits to plant workers and members of the public and liquid and gaseous effluent releases in unrestricted areas. Accordingly, RAI 6915, Question 14.02-1 is considered closed.

14.2.3.5 Post Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

- License Condition (14-1) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the approved preoperational and startup procedures (including the site-specific startup administration manual). The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until this license condition has been fully implemented. The schedule shall identify the completion of or implementation of the pre-operational and startup procedures (including

the site-specific startup administration manual) identified in FSAR Section 14.2.3 (before initiating the initial test program).

- License Condition (14-2) – Within one month of change, any changes to the Initial Startup Test Program described in Chapter 14 of the Turkey Point Units 6 and 7 COL FSAR made in accordance with the provisions of 10 CFR 50.59 or Section VIII of Appendix D to 10 CFR Part 52 shall be reported in accordance with 10 CFR 50.59(d).

14.2.3.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. The staff based its conclusions on the following:

- STD COL 14.4-2 is acceptable because it provides an adequate description of the administrative controls for the development, review, and approval of individual test specifications and test procedures that will be implemented during the conduct of the initial test program and meets the guidance in NUREG-0800, Section 14.2.
- STD COL 14.4-3 is acceptable because it provides an adequate description of the administrative controls for the development of a site-specific administrative manual (procedure) that will be implemented during the conduct of each major phase of the initial test program and meets the guidance in NUREG-0800, Section 14.2.
- STD COL 14.4-4 and PTN COL 14.4-4 are acceptable because they provide an adequate description of: 1) the administrative controls for the review, evaluation, and approval of test results by qualified personnel; and 2) the resolution of test exceptions or tests that do not meet the acceptance criteria during each major phase of the initial test program. In addition, this standard COL action item meets the guidance in NUREG-0800, Section 14.2 and RG 1.68.
- STD SUP 14.2-5 is acceptable because it provides an adequate description of the administrative controls for work and tagging requests that will be implemented during the conduct of the initial test program and meets the guidance in NUREG-0800, Section 14.2.
- STD SUP 14.2-6 is acceptable because it provides an adequate description of the administrative controls for system turnover in an orderly and well-coordinated manner during the conduct of the initial test program and meets the guidance in NUREG-0800, Section 14.2.

- STD SUP 14.2-7 is acceptable because it provides an adequate description of the administrative controls for plant modifications and repairs identified as a result of plant testing and meets the guidance in NUREG-0800, Section 14.2.
- STD SUP 14.2-8 is acceptable because it provides an adequate description of the administrative controls for corrective or preventive maintenance that will be implemented during the conduct of the initial test program and meets the guidance in NUREG-0800, Section 14.2.

14.2.4 Compliance of Test Program with Regulatory Guides

Section 14.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 14.2.4, "Compliance of Test Program with Regulatory Guides," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

14.2.5 Utilization of Operating Experience (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.8, "Utilization of Reactor Operating and Testing Experiences in Development of Test Program")

14.2.5.1 Introduction

The design, testing, startup, and OE from previous pressurized water reactor plants is utilized in the development of the initial preoperational and startup test program for the AP1000 plant. It is also the responsibility of the COL applicant to utilize the reactor operating and testing experience in different aspects of the testing program.

14.2.5.2 Summary of Application

Section 14.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 14.2 of the AP1000 DCD, Revision 19. Section 14.2 of the DCD includes Section 14.2.5.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 14.2.5 and in Part 10 of the application, the applicant provided the following:

Supplemental Information

- STD SUP 14.2-4

The applicant provided supplemental information to describe the utilization of operating experience in the development of plant administrative procedures.

License Conditions

- Part 10, License Condition 2, Item 14.4-6

The proposed license condition addresses first-plant-only and three-plant-only tests. In a letter dated January 30, 2013, the applicant endorsed the VEGP letter dated October 15, 2010, that proposed a revision to License Condition Item 14.4-6.

- Part 10, License Condition 7

The proposed license condition will require the licensee to provide notification when first-plant-only and three-plant-only tests are completed. In a letter dated January 30, 2013, the applicant endorsed the VEGP letter dated October 15, 2010, that proposed a revision to proposed License Condition 7.

14.2.5.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the utilization of operating and testing experience are given in Section 14.2 of NUREG-0800.

The applicable regulatory requirements for the information being reviewed in this section are 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. RG 1.68 provides guidance on how to comply with Criterion XI of Appendix B to 10 CFR Part 50.

14.2.5.4 Technical Evaluation

The NRC staff reviewed Section 14.2.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the utilization of operating and testing experience. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.

- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER.

The following portion of this technical evaluation section is reproduced from Section 14.2.5.4 of the VEGP SER:

Supplemental Information

- *STD SUP 14.2-4*

The applicant provided supplemental information to describe the utilization of operating experience in the development of plant administrative procedures.

STD SUP 14.2-4 was not in Revision 1 of the BLN FSAR and is addressed for the first time in this SER for the VEGP COL application. However, portions of the standard evaluation material in Section 14.2.5.4 of the BLN SER are directly applicable to the new STD SUP item identified in the VEGP FSAR. Therefore, the NRC staff used this evaluation material, identified below as standard content material, in the disposition of STD SUP 14.2-4.

Section 14.2.5 of the AP1000 DCD provided a summary overview of the administrative controls to be utilized for the development of preoperational and startup test programs for the AP1000 plant. As part of RAI 14.2-12, dated December 8, 2008, the NRC staff requested that the applicant supplement the BLN COL FSAR to describe how OE information will be used in developing and executing test procedures. In its January 22, 2009, response to the staff's RAI, the applicant proposed to revise the information in Section 14.2.5 of the BLN COL FSAR. The response stated that administrative procedures will be used for the control and evaluation of OE information. Specifically, the response proposed the use of OE during test procedure preparation, including the sources and types of information reviewed. Sources of OE reported and described include NRC reports, Institute of Nuclear Power Operations reports, and Significant Operating Event Reports. The response stated that Section 14.2.5 of the BLN COL FSAR would include a summary of the principal conclusions from a review of operating and testing experiences at other reactor facilities and their effect on the applicant's test program.

The staff determined that the information proposed by the applicant describes an acceptable method for the consideration of reactor operating and testing experience, and discussed the principal conclusions from a review of operating and testing experience and its inclusion into the initial test program description, consistent with the guidance in RG 1.68 and RG 1.206. Therefore, the staff finds

*this change acceptable. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. This is identified as **Confirmatory Item 14.2-7**, pending NRC review and approval of the revised BLN COL FSAR.*

Resolution of Standard Content Confirmatory Item 14.2-7

The staff verified that the VEGP applicant has incorporated into its FSAR, in response to STD SUP 14.2-4, the proposed administrative controls identified as Confirmatory Item 14.2-7 in the staff's SER for the BLN COL. On this basis, Confirmatory Item 14.2-7 is resolved.

License Conditions

- *Part 10, License Condition 2, Item 14.4-6*

The following portion of this technical evaluation section is reproduced from Section 14.2.5.4 of the BLN SER:

In BLN COL FSAR, Part 10, "License Conditions and ITAAC," proposed License Condition 2, "COL Holder Items," the applicant proposed Item 14.4-6 to address first-plant-only and three-plant-only tests. The applicant stated that the COL holder for the first plant and the first three plants will perform the tests listed in Section 14.2.5 of the BLN COL FSAR. For subsequent plants, the COL applicant shall provide a justification that the results of the first-plant only tests or first-three-plant tests are applicable to the subsequent plant. In addition, COL holders referencing the results of the tests will provide the report prior to preoperational testing.

The staff reviewed the proposed license condition and determined that the applicant provided sufficient administrative controls for the performance of first-plant-only and three-plant-only tests, consistent with the guidance contained in RG 1.68, RG 1.206, and Section 14.2 of NUREG-0800. In addition, since test activities will not start until a facility is built, the staff determined that it is appropriate and acceptable for the COL holder to conduct these first-plant-only and three-plant-only tests during the post-COL phase (see Section 14.2.5.5).

Evaluation of Revised License Condition 2, Item 14.4-6

In a letter dated October 15, 2010, the VEGP applicant proposed a revision to License Condition 2, Item 14.4-6. Item 14.4-6 is considered unnecessary by the applicant as it can be adequately addressed by other proposed license conditions. The applicant proposed to replace the current text for Item 14.4-6 with, "Note - addressed by proposed License Conditions #7 and #9."

The text of Item 14.4-6 proposed to be deleted by the applicant's October 15, 2010, letter states the licensee(s) for the first plant and the first three plants will perform the tests listed in Section 14.2.5 of the VEGP COL FSAR. For subsequent plants, either tests listed in Section 14.2.5 shall be performed or the licensee shall provide a justification to the NRC, prior to fuel load, that the results of the first-plant-only tests or first-three-plant tests are applicable to the

subsequent plant. The licensee(s) for the first AP1000 plant (or first-three-plants) will perform the tests defined during preoperational and startup testing as identified in Sections 14.2.9 and 14.2.10 of the VEGP COL FSAR.

The applicant stated that the October 15, 2010, proposed revisions to License Conditions 7 and 9 (both license conditions were initially proposed by the applicant in a letter dated June 18, 2010) adequately address the 3 parts of Item 14.4-6. Proposed License Condition 7 provides details on first-plant-only and three-plant-only tests and proposed License Condition 9 requires review and evaluation of individual test results, and that test exceptions or results, which do not meet acceptance criteria, are identified to the affected and responsible organizations, and corrective actions and retests, as required, are performed. The October 15, 2010, proposed revision to License Condition 9 would specifically add the review and evaluation of test results for those tests conducted during preoperational testing and for those conducted during power ascension (i.e., above low-power testing (<5 percent RTP) up to and including testing at 100 percent RTP). The October 15, 2010, proposed revision to License Condition 7 will address the written notifications for the pertinent testing.

The staff agrees that the proposed revisions to License Conditions 7 and 9 will accomplish the goal of the text that is currently in Item 14.4-6 of License Condition 2. Proposed License Condition 7 is evaluated by the staff later in this SER section. Proposed License Condition 9 is evaluated by the staff in Section 14.2.8 of this SER.

- *Part 10, License Condition 7*

In its letter dated June 18, 2010, as revised by letter dated October 15, 2010, the applicant proposed License Condition 7, providing additional details on first-plant-only and three-plant-only tests. Certain design features of the AP1000 plant will be subjected to special tests to establish unique phenomenological performance parameters of the AP1000 design. Because of the standardization of the AP1000 design, these special tests (designated as first-plant-only tests and first-three-plant-only tests) are not required on subsequent plants. These tests will be controlled through license conditions to ensure that relevant test results are reviewed, evaluated, and approved by the designated licensee management before proceeding with the next testing phase. Accordingly, the applicant proposed the following license condition:

First-Plant-Only and First-Three-Plant-Only Testing

A licensee shall provide written identification of the applicable references for documentation for the completion of the testing to the Director of the Office of New Reactors (or equivalent NRC management) within thirty (30) calendar days of the licensee confirmation of acceptable test results.

Subsequent plant licensees crediting completion of testing by the first-plant or by the first-three plants shall provide a report referencing the applicable documentation identified by the first (or

first three) plant(s) confirming the testing to the Director of the Office of New Reactors (or equivalent NRC management). This report shall be provided to NRC either prior to initiation of pre-operational testing, or within sixty (60) days of the identification of the documentation for the completion of the testing by the first plant (or third plant, as appropriate), whichever is later.

The NRC staff reviewed the proposed license condition and concludes that it contains some of the necessary attributes to achieve sufficient oversight by licensee management and assure adequate and timely notification to the NRC. However, the NRC staff plans to impose additional conditions in the areas addressed by proposed License Condition 7 to ensure that the relevant requirements in Section 14.2 of the AP1000 DCD are met.

14.2.5.5 Post Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license condition acceptable:

- License Condition (14-3) – The licensee shall perform the design-specific pre-operational tests identified below:
 1. In-Containment Refueling Water Storage Tank (IRWST) Heatup Test (first plant test as identified in AP1000 Design Control Document (DCD), Rev. 19, Section 14.2.9.1.3 Item (h));
 2. Pressurizer Surge Line Stratification Evaluation (first plant test as identified in AP1000 DCD, Rev. 19, Section 14.2.9.1.7 Item (d));
 3. Reactor Vessel Internals Vibration Testing (first plant test as identified in AP1000 DCD, Rev. 19, Section 14.2.9.1.9);
 4. Core Makeup Tank Heated Recirculation Tests (first three plants test as identified in AP1000 DCD, Rev. 19, Section 14.2.9.1.3 Items (k) and (w)); and
 5. Automatic Depressurization System Blowdown Test (first three plants test as identified in AP1000 DCD, Rev. 19, Section 14.2.9.1.3 Item (s)).

The licensee shall notify the Director of NRO, or the Director's designee, in writing, upon successful completion of the design specific pre-operational tests.

14.2.5.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. The staff based its conclusions on the following:

- STD SUP 14.2-4 is acceptable because it provides an adequate description of the administrative procedures that will be implemented to utilize operating experience in the development of plant administrative procedures during the conduct of the initial test program and meets the guidance in NUREG-0800, Section 14.2.

14.2.6 Use of Plant Operating and Emergency Procedures (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.9, “Trial Use of Plant Operating and Emergency Procedures”)

14.2.6.1 Introduction

To the extent practicable throughout the preoperational and initial startup test program, test procedures utilize operating, emergency, and abnormal procedures where applicable in the performance of tests. The use of these procedures is intended to do the following:

1. Provide the specific procedure or illustrate changes that may be required.
2. Provide training of plant personnel in the use of these procedures.
3. Increase the level of knowledge of plant personnel on the systems being tested.

A testing procedure utilizing an operating, emergency, or abnormal procedure references the procedure directly, or extracts a series of steps from the procedure in a way that is optimal to accomplishing the above goals while efficiently performing the specified testing.

14.2.6.2 Summary of Application

Section 14.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 14.2 of the AP1000 DCD, Revision 19. Section 14.2 of the DCD includes Section 14.2.6.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 14.2.6, the applicant provided the following:

AP1000 COL Information Item

- STD COL 14.4-3

The applicant provided additional information in STD COL 14.4-3 to address COL holder responsibility for the development of a site-specific startup administrative manual (procedure) that will include the administrative procedures and requirements that will govern the activities associated with the plant's initial test program.

14.2.6.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the use of plant operating and emergency procedures are given in Section 14.2 of NUREG-0800.

The applicable regulatory requirements for the information being reviewed in this section are 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. RG 1.68 provides guidance on how to comply with Criterion XI of Appendix B to 10 CFR Part 50.

14.2.6.4 Technical Evaluation

The NRC staff reviewed Section 14.2.6 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to plant operating and emergency procedures. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAls.
- The staff confirmed that all responses to RAls identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 14.2.6.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 14.4-3*

STD COL 14.4-3 was not explicitly evaluated in Section 14.2.6.4 of the BLN SER. However, the standard evaluation material in Section 14.2.6.4 of the BLN SER is directly applicable to this COL item. Therefore, the NRC staff used this evaluation material, identified below as standard content material, in the

disposition of STD COL 14.4-3, as it relates to plant operating and emergency procedures.

Section 14.2.6 of the AP1000 DCD stated that plant normal, abnormal, and emergency operating procedures will be used when performing preoperational and startup tests. As part of RAI 14.2-12, dated December 8, 2008, the staff requested that the applicant supplement the information incorporated by reference and describe how, and to what extent, the plant operating, emergency, and surveillance procedures will be trial-tested during the initial test program. In its January 22, 2009, response to the staff's RAI, the applicant proposed a method to develop, trial-test, and correct plant operating and emergency procedures during the initial test program. The response stated that preoperational and start up test procedures, normal, abnormal, and emergency procedures, and alarm response procedures, will be verified, validated, and implemented. The response proposed to describe administrative measures for the trial use of procedures in human machine interface testing as part of the control room design finalization. The response also proposed that controls would include the development of operating and emergency procedures to support human factors engineering, operational task analysis, training simulator development, and verification and validation of procedures and training material.

The response also proposed to include Section 14.2.6.1, "Operator Training and Participation during Certain Initial Tests," in the BLN COL FSAR. The response proposed administrative controls that will provide for the participation of plant operators and shift crews in plant changes, off-normal events, test program schedule, and selected startup tests. The response also proposed measures to ensure that unexpected plant or system responses will be reviewed, evaluated, and their results factored into the operator training program. The response stated that the operator training program will satisfy the criteria described in TMI Action Plan Item I.G.1 of NUREG-0737.

*The staff determined that the information proposed by the applicant describe an acceptable method for the trial use of plant operating, emergency, and surveillance procedures, consistent with the guidance in RG 1.68 and RG 1.206. Therefore, the staff finds this change acceptable. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. This is identified as **Confirmatory Item 14.2-8**, pending NRC review and approval of the revised BLN COL FSAR.*

Resolution of Standard Content Confirmatory Item 14.2-8

The staff verified that the VEGP applicant has incorporated into its FSAR the proposed administrative controls identified as Confirmatory Item 14.2-8 in the staff's SER for the BLN COL. On this basis, Confirmatory Item 14.2-8 is resolved.

14.2.6.5 Post Combined License Activities

There are no post-COL activities related to this section.

14.2.6.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. The staff based its conclusions on the following:

- STD COL 14.4-3 is acceptable because it provides an adequate description of the administrative measures for the trial use of plant operating, emergency, and surveillance procedures that will be implemented during the conduct of the initial test program and meets the guidance in NUREG-0800, Section 14.2 and RG 1.68.

14.2.7 Initial Fuel Loading and Initial Criticality

Section 14.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 14.2.7, "Initial Fuel Loading and Initial Criticality," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

14.2.8 Test Program Schedule (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.11, "Test Program Schedule")

14.2.8.1 Introduction

This section describes administrative controls for the development of a schedule, relative to the fuel loading date, for conducting each major phase of the test program. Each test required to be completed before initial fuel loading is identified.

14.2.8.2 Summary of Application

Section 14.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 14.2 of the AP1000 DCD, Revision 19. Section 14.2 of the DCD includes Section 14.2.8.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 14.2.8, the applicant provided the following:

Supplemental Information

- STD SUP 14.2-1

The applicant provided supplemental information to address the site-specific initial test program schedule.

In addition, in Part 10 of the Turkey Point Units 6 and 7 COL application, the applicant provided the following:

License Conditions

- Part 10, License Condition 3

The proposed license condition addresses the initial test program implementation milestones.

- Part 10, License Condition 6

The proposed license condition addresses reporting requirements to the NRC regarding the initial test program.

- Part 10, License Condition 9

The proposed license condition addresses review and evaluation of test results, as well as notification to the NRC of completion of the test phases, during power-ascension. In a letter dated January 30, 2013, the applicant endorsed the VEGP letter dated October 15, 2010, that proposed a revision to License Condition 9.

14.2.8.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the test program schedule are given in Section 14.2 of NUREG-0800.

The applicable regulatory requirements for the information being reviewed in this section are 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. RG 1.68 provides guidance on how to comply with Criterion XI of Appendix B to 10 CFR Part 50.

14.2.8.4 Technical Evaluation

The NRC staff reviewed Section 14.2.8 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the test program schedule. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard

content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAls.
- The staff confirmed that all responses to RAls identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER.

The following portion of this technical evaluation section is reproduced from Section 14.2.8.4 of the VEGP SER:

Supplemental Information

- *STD SUP 14.2-1*

The applicant provided supplemental information to address the site-specific initial test program schedule.

The following portion of this technical evaluation section is reproduced from Section 14.2.8.4 of the BLN SER:

Test Program Schedule

As part of RAI 14.2-12, dated December 8, 2008, the staff requested that the applicant supplement the information incorporated by reference and describe the methodology that will be used to develop a schedule for conducting each major phase of the initial test program and for the development of test procedures. In its January 22, 2009, response to the staff's RAI, the applicant proposed to include information that further describes the administrative controls that will be used to develop a test program schedule. The applicant proposed controls for the development of a site-specific schedule that will address each major phase of the test program and will consider the organizational impact on overlapping test program schedules for multi-unit sites. The applicant also discussed the administrative measures in the startup administrative manual related to the test procedure development schedule and the initial test program schedule. The applicant proposed specific controls for the development of detailed plant

operating and emergency procedures, the availability of approved test procedures for review by NRC inspectors, and for the notification to the NRC of changes to approved test procedures. The response also stated that schedule milestones for the development of plant operating procedures are presented in Table 13.4-201 of the BLN COL FSAR. Finally, the response stated that operating and emergency procedures will be available for use both prior to the start of licensed operator training as well as during the initial test program implementation.

The staff determined that the information proposed by the applicant described the methodology that will be used to develop a schedule, relative to the fuel loading date, for conducting each major phase of the test program, and for the development of test procedures, consistent with the guidance in RG 1.68 and RG 1.206. Therefore, the staff finds this change acceptable. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. This is identified as **Confirmatory Item 14.2-9**, pending NRC review and approval of the revised BLN COL FSAR.

Operational Programs Required by the Regulations

In Section 13.4, Table 13.4-201, of the BLN COL FSAR, the applicant provided information to address the implementation of operational programs. The applicant identified the initial test program as an operational program and provided implementation milestones for each major phase of the test program. Additionally, the applicant stated that the initial test program will be implemented in three phases, namely the construction test program phase, the preoperational test program phase, and the startup test program phase. The construction test program phase will start prior to the first construction test being conducted. It will be followed by the preoperational test phase, which will start prior to the first preoperational test. Finally, the startup test phase is identified, and the applicant stated that it will start prior to initial fuel load. The staff reviewed the proposed milestones and determined that they adequately describe the implementation of each major phase of the initial test program and are, therefore, acceptable.

Resolution of Standard Content Confirmatory Item 14.2-9

The staff verified that the VEGP applicant has incorporated into its FSAR, in response to STD SUP 14.2-1, the proposed administrative controls identified as Confirmatory Item 14.2-9 in the staff's SER for the BLN COL. On this basis, Confirmatory Item 14.2-9 is resolved.

License Conditions

- Part 10, License Conditions 3 and 6

The following portion of this technical evaluation section is reproduced from Section 14.2.8.4 of the BLN SER:

In Part 10 of the BLN COL FSAR, License Condition 3, "Operational Program Implementation," the applicant proposed a license condition for the

implementation of operational programs as described in Table 13.4-201 of the FSAR. This license condition included implementation milestones for the initial test program, namely E.1, F.1, and H.1. Specifically:

- Milestone E.1 states that for construction testing, the licensee will implement the construction testing phase of the initial test program prior to the first construction test being conducted.
- Milestone F.1 states that for preoperational testing, the licensee will implement the preoperational testing phase of the initial test program prior to the first preoperational test being conducted.
- Milestone H.1 states that for startup testing, the licensee will implement the startup testing phase prior to initial fuel load.

In Part 10 of the BLN COL FSAR, proposed License Condition 6, "Operational Program Readiness," the applicant states:

The licensee shall submit to the appropriate Director of the NRC, a schedule, no later than 12 months after issuance of the COL, that supports planning for and conduct of the NRC inspection of the operational programs listed in the operation program FSAR Table 13.4-201. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operation programs in the FSAR table have been fully implemented or the plant has been placed in commercial service.

The staff reviewed the BLN COL FSAR Table 13.4-201, and notes that the initial test program is listed as an operational program.

The staff determined that the proposed license conditions adequately describe the implementation of each major phase of the initial test program, consistent with the guidance contained in RG 1.68, RG 1.206, and Section 14.2 of NUREG-0800. In addition, since test activities will not start until a facility is built; the staff determined that it is appropriate and acceptable for the COL holder to submit a schedule, which will contain implementation details of operational programs, during the post-COL phase (see Section 14.2.8.5).

- Part 10, License Condition 9

Certain milestones within the startup testing phase of the initial test program (i.e., pre-critical testing, criticality testing, and low-power testing) will need to be controlled through license conditions to ensure that relevant test results are reviewed, evaluated, and approved by the designated licensee management before proceeding with the power ascension test phase.

In its second letter dated June 18, 2010², as revised by letter dated October 15, 2010, the applicant proposed License Condition 9, providing

² The first letter dated June 18, 2010, provided proposed License Condition 7, which is evaluated in Section 14.2.5 of this SER.

additional detail on the power-ascension test phase. Specifically, the applicant proposed the following license condition:

Pre-operational Testing

Following completion of pre-operational testing, the licensee shall review and evaluate individual test results. Test exceptions or results which do not meet acceptance criteria are identified to the affected and responsible organizations, and corrective actions and retests, as required, are performed.

Pre-critical and Criticality Testing

- 1. Following completion of pre-critical and criticality testing, the licensee shall review and evaluate individual test results. Test exceptions or results which do not meet acceptance criteria are identified to the affected and responsible organizations, and corrective actions and retests, as required, are performed.*
- 2. The licensee shall provide written notification to the Director of the Office of New Reactors (or equivalent NRC management) within fourteen (14) calendar days of completion of the pre-critical and criticality testing.*

Low-Power (<5% RTP) Testing

- 1. Following completion of low-power testing (<5% RTP), the licensee shall review and evaluate individual test results. Test exceptions or results which do not meet acceptance criteria are identified to the affected and responsible organizations, and corrective actions and retests, as required, are performed.*
- 2. The licensee shall provide written notification to the Director of the Office of New Reactors (or equivalent NRC management) within fourteen (14) calendar days of completion of the low power testing.*

At-Power (5%-100% RTP) Testing

- 1. Following completion of at-power testing (at or above 5% RTP up to and including testing at 100% RTP), the licensee shall review and evaluate individual test results. Test exceptions or results which do not meet acceptance criteria are identified to the affected and responsible organizations, and corrective actions and retests, as required, are performed.*

2. *The licensee shall provide written notification to the Director of the Office of New Reactors (or equivalent NRC management) within fourteen (14) calendar days of completion of the at-power testing.*

The NRC staff reviewed the proposed license condition and concludes that it contains some of the necessary attributes to achieve sufficient oversight by licensee management and assure adequate and timely notification to the NRC. However, the NRC staff plans to impose additional conditions in the areas addressed by proposed License Condition 9 to ensure that the relevant guidance of RG 1.68 and the relevant requirements of Criterion XI of Appendix B to 10 CFR Part 50 are met.

14.2.8.5 Post Combined License Activities

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

- License Condition (14-4) – The licensee shall implement the initial test program or applicable portions thereof as described in the milestones below:
 1. Construction Test Program implemented before the first construction test;
 2. Preoperational Test Program implemented before the first preoperational test; and
 3. Startup Test Program implemented before initial fuel load.
- License Condition (14-5) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO, or the director's designee, a schedule that supports planning for and conduct of NRC inspections of the Initial Test Program (ITP). The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the ITP has been fully implemented.
- License Condition (14-6) –

Pre-operational Testing

1. The licensee shall review and evaluate the results of the tests identified in License Condition (14-3) and confirm that these test results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specified functions in accordance with AP1000 DCD Rev. 19, Section 14.2.9.
2. The licensee shall notify the Director of NRO, or the Director's designee, in writing, upon successful completion of the design specific pre-operational tests identified in License Condition (14-3); and
3. The licensee shall notify the Director of NRO, or the Director's designee, in writing, upon the successful completion of all the ITAAC.

Nuclear Fuel Loading and Pre-critical Testing

1. Until the submission of the notification required by “Pre-operational Testing,” item 2, above, the licensee shall not load fuel into the reactor vessel;
2. Upon submission of the notification required by “Pre-operational Testing,” item 2, above, and upon a Commission finding in accordance with 10 CFR 52.103(g) that all the acceptance criteria in the ITAAC are met, the licensee is authorized to perform pre-critical tests in accordance with the conditions specified herein;
3. The licensee shall perform the pre-critical tests identified in AP1000 DCD Rev. 19, Section 14.2.10.1;
4. The licensee shall review and evaluate the results of the tests identified in “Nuclear Fuel Loading and Pre-critical Testing,” item 3, above, and confirm that these test results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specified functions in accordance with AP1000 DCD Rev. 19, Section 14.2.10; and
5. The licensee shall notify the Director of NRO, or the Director’s designee, in writing, upon successful completion of the pre-critical tests identified in “Nuclear Fuel Loading and Pre-critical Testing,” item 3, above.

Initial Criticality and Low-Power Testing

1. Upon submission of the notification required by “Nuclear Fuel Loading and Pre-critical Testing,” item 5, above, the licensee is authorized to operate the facility at reactor steady-state core power levels not to exceed 5-percent thermal power in accordance with the conditions specified herein;
2. The licensee shall perform the initial criticality and low-power tests identified in AP1000 DCD Rev. 19, Sections 14.2.10.2 and 14.2.10.3, respectively, the Natural Circulation (first plant test) identified in AP1000 DCD Rev. 19, Section 14.2.10.3.6, and the Passive Residual Heat Removal Heat Exchanger (first plant test) identified in AP1000 DCD Rev. 19, Section 14.2.10.3.7;
3. The licensee shall review and evaluate the results of the tests identified in “Initial Criticality and Low-Power Testing,” item 2, above, and confirm that these test results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specified functions in accordance with AP1000 DCD Rev. 19, Section 14.2.10.2 and 14.2.10.3; and
4. The licensee shall notify the Director of NRO, or the Director’s designee, in writing, upon successful completion of initial criticality and low-power tests identified in “Initial Criticality and Low-Power Testing,” item 2, above, including the design-specific tests identified therein.

Power Ascension Testing

1. Upon submission of the notification required by “Initial Criticality and Low-Power Testing,” item 4, above, the licensee is authorized to operate the facility at reactor steady-state core power levels not to exceed 100-percent thermal power in accordance with the conditions specified herein, but only for the purpose of performing power ascension testing;
2. The licensee shall perform the power ascension tests identified in the AP1000 DCD Rev. 19, Section 14.2.10.4, the Rod Cluster Control Assembly Out of Bank Measurements (first plant test) identified in AP1000 DCD, Rev. 19,

Section 14.2.10.4.6, and the Load Follow Demonstration (first plant test) identified in AP1000 DCD, Rev. 19, Section 14.2.10.4.22;

3. The licensee shall review and evaluate the results of the tests identified in “Power Ascension Testing,” item 2, above, and confirm that these test results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specified functions in accordance with AP1000 DCD Rev.19, Section 14.2.10.4; and
4. The licensee shall notify the Director of NRO, or the Director’s designee, in writing, upon successful completion of power ascension tests identified in “Power Ascension Testing,” item 2, above, including the design-specific tests identified therein.

Maximum Power Level

Upon submission of the notification required by “Power Ascension Testing,” item 4, above, the licensee is authorized to operate the facility at steady state reactor core power levels not to exceed 3400 MW thermal (100-percent thermal power), as described in the FSAR, in accordance with the conditions specified herein.

14.2.8.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff’s review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. The staff based its conclusions on the following:

- STD SUP 14.2-1 is acceptable because it provides an adequate description of the administrative measures for the development of a site-specific initial test program schedule and meets the guidance in NUREG-0800 Section 14.2 and RG 1.68.

14.2.9 Preoperational Test Descriptions (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.12, “Individual Test Descriptions”)

14.2.9.1 Introduction

This section includes test abstracts for each individual test conducted during the initial test program. The abstracts: (1) identify each test by title; (2) specify the prerequisites and major plant operating conditions necessary for each test (such as power level and mode of operation of major control systems); (3) provide a summary description of the test objectives and method, significant parameters, and plant performance characteristics to be monitored; and (4) provide a summary of the acceptance criteria established for each test to ensure that the test verifies the functional adequacy of the SSCs involved in the test. The abstracts also include sufficient information to justify the specified test method if such method does not subject the SSC under test to representative design operating conditions. In addition, the abstracts identify pertinent

precautions for individual tests, as necessary (e.g., minimum flow requirements or reactor power level that must be maintained).

14.2.9.2 Summary of Application

Section 14.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 14.2 of the AP1000 DCD, Revision 19. Section 14.2 of the DCD includes Section 14.2.9.

In addition, in Turkey Point Units 6 and 7 COL FSAR the applicant provided the following:

Departures

- PTN DEP 6.4-2

The applicant provided additional information in Section 14.2.9 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR, is reviewed in Section 21.3 of this SER.

AP1000 COL Information Items

- STD COL 14.4-5

The applicant provided additional information in STD COL 14.4-5 to address interface requirements.

- STD COL 3.9-5

The applicant provided additional information in STD COL 3.9-5 to address initial testing of the pressurizer surge line piping.

Turkey Point Units 6 and 7 COL Information Item

- PTN COL 14.4-5

The applicant provided additional information in PTN COL 14.4-5 to address site specific interface requirements for integrated testing of the raw water system.

Supplemental Information

- STD SUP 14.2-2

The applicant provided additional information in STD SUP 14.2-2 to address the development of administrative procedures that will be implemented during the preoperational testing activities.

14.2.9.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the preoperational test descriptions are given in Section 14.2 of NUREG-0800.

The applicable regulatory requirements for the information being reviewed in this section are 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. RG 1.68 provides guidance on how to comply with Criterion XI of Appendix B to 10 CFR Part 50.

14.2.9.4 *Technical Evaluation*

The NRC staff reviewed Section 14.2.9 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the preoperational test descriptions. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER.

The following portion of this technical evaluation section is reproduced from Section 14.2.9.4 of the VEGP SER:

AP1000 COL Information Items

- STD COL 14.4-5

The NRC staff reviewed STD COL 14.4-5 related to COL Information Item 14.4-5, which addresses interface requirements. The applicant provided additional information in Sections 14.2.9 and 14.2.10 of the VEGP COL FSAR to address COL Information Item 14.4-5. COL Information Item 14.4-5 states:

The Combined License applicant is responsible for testing that may be required of structures and systems which are outside the scope of this design certification. Test Specifications and acceptance criteria are provided by the responsible design organizations as identified in subsection 14.2.3 [of the AP1000 DCD]. The interfacing systems to be considered for testing are taken from Table 1.8-1 [of the AP1000 DCD] and include as a minimum, the following:

- Storm drains
- Site specific seismic sensors
- Offsite [alternating current] ac power systems
- Circulating water heat sink
- Raw and sanitary water systems
- Individual equipment associated with the fire brigade
- Portable personnel monitors and radiation survey instruments
- Equipment associated with the physical security plan

The commitment was also captured as COL Action Item 14.4-5 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant is responsible for testing that may be required of structures and systems that are outside the scope of the design certification.

The following portion of this technical evaluation section is reproduced from Section 14.2.9.4 of the BLN SER. Some of the text in the BLN SER associated with STD COL 14.4-5 has been relocated to the evaluation of STD SUP 14.2-2, as discussed below.

In its review of the information provided by the applicant to address COL Information Item 14.4-5, the staff noted that the seismic monitoring system testing described in Section 14.2.9.4.15 of the AP1000 DCD also applies to the site-specific seismic sensors.

The applicant also provided information regarding the following systems:

- storm drains (Section 14.2.9.4.22)
- offsite ac power systems (Section 14.2.9.4.23)
- raw water systems (Section 14.2.9.4.24)
- sanitary drainage system (Section 14.2.9.4.25)
- fire brigade support equipment (Section 14.2.9.4.26)
- portable personnel monitors and radiation survey instruments (Section 14.2.9.4.27)
- cooling tower(s) (Section 14.2.10.4.29)

The staff notes that information provided relative to equipment associated with the Physical Security Plan will be reviewed in Chapter 13 of this SER.

As part of RAI 14.2-1, the staff requested that the applicant provide additional information in the test abstract related to the offsite ac power systems. Specifically, Section 14.2.9.4.23 of the BLN COL FSAR states that the offsite ac power system components undergo a series of individual component and integrated system preoperational tests to verify that the offsite ac power system performs in accordance with the associated component design specifications. The individual component and integrated tests include:

- a. Availability of ac and direct current (dc) power to the switchyard equipment is verified.*
- b. Operation of high voltage (HV) circuit breakers is verified.*
- c. Operation of HV disconnect switches and ground switches is verified.*
- d. Operation of substation transformers is verified.*
- e. Operation of current transformers, voltage transformers, and protective relays is verified.*
- f. Operation of switchyard equipment controls, metering, interlocks, and alarms that affect plant offsite ac power system performance is verified.*
- g. Design limits of switchyard voltages and stability are verified.*
- h. Under simulated fault conditions, proper function of alarms and protective relaying circuits is verified.*

The staff asked in its RAI that the above list should include the following items:

- *Operation of instrumentation and control alarms used to monitor switchyard equipment status*
- *Proper operation and load carrying capability of breakers, switchgear, transformers, and cables*

- *Proper operation of the automatic transfer capability of the preferred power supply to the maintenance power supply through the reserve auxiliary transformer*
- *Operation of main generator in islanding mode is verified to ensure that the onsite power system equipment including the Class 1E battery chargers and uninterruptible power supplies can withstand the voltage spike from the generator following isolation from the grid.*
- *Switchyard interface agreement and protocols are verified.*

The staff requested that the applicant revise Section 14.2.9.4.23 to include the above items, or justify their exclusion.

In its June 26, 2008, response to RAI 14.2-1, the applicant agreed to add the above tests to BLN COL FSAR Section 14.2.9.4.23, except for verifying the proper operation of the generator in islanding mode. The applicant stated that this islanding mode test does not belong to this BLN COL FSAR section. This test is specified by Westinghouse as a load rejection test from 100 percent power in AP1000 DCD Section 14.2.10.4.21. That section will verify proper operation of equipment utilized in the generator islanding mode by a combination of the purchase specifications for the equipment and verification of satisfactory performance after the load reject test from 100 percent power. The applicant proposed to revise BLN COL FSAR Chapter 14, Section 14.2.9.4.23 by adding the following to the end of the existing Section 14.2.9.4.23 in the sequence indicated:

- i. Operation of instrumentation and control alarms used to monitor switchyard equipment status.*
- j. Proper operation and load carrying capability of breakers, switchgear, transformers, and cables, and verification of these items by a non-testing means such as a [quality control] QC nameplate check of as-built equipment where testing would not be practical or feasible.*
- k. Verification of proper operation of the automatic transfer capability of the preferred power supply to the maintenance power supply through the reserve auxiliary transformer.*
- l. Switchyard interface agreement and protocols are verified.*

*With the addition of above offsite ac power system tests to the existing Section 14.2.9.4.23, the staff finds that the offsite ac power system testing performed under BLN COL FSAR Chapter 14, Section 14.2.9.4.23 will demonstrate the energization and proper operation of the as-installed switchyard components. In addition, the staff concurs with the applicant that verification of proper operation of the generator in islanding mode is part of AP1000 DCD Section 14.2.10.4.21, "100 Percent Load Rejection." Therefore, the staff finds the applicant's response acceptable. This is **Confirmatory Item 14.2-11**, pending NRC review and approval of the revised BLN COL FSAR.*

As part of RAI 14.2-2, the staff also requested that the applicant provide additional information to the test abstract related to the offsite ac power systems. The staff stated that the AP1000 DCD provides interface requirements for the transmission switchyard and onsite power system in accordance with 10 CFR 52.79(b). Specifically, Summary Table 1.8-1, "Plant Interfaces with the Remainder of Plant," requires the COL applicant to address offsite ac requirements (Item 8.2) for steady-state load, inrush kVA for motors, nominal voltage, allowable voltage regulation, nominal allowable frequency fluctuation, maximum frequency decay rate, and limiting under-frequency value for the reactor coolant pump (RCP). It further requires the offsite transmission system analysis (Item 8.3) for loss of the AP1000 unit or the largest unit, for voltage operating range, for maintaining transient stability, and for the RCP bus voltage to remain above the voltage required to maintain the flow assumed in Chapter 15 analyses for a minimum of three seconds following a turbine trip. The staff requested that the applicant discuss how the preoperational test performed under Section 14.2.9.4.23 (General Test Methods and Acceptance Criteria) for BLN verifies all requirements cited in Sections 8.2 and 8.3 of the AP1000 DCD.

In its June 26, 2008, response to RAI 14.2-2, the applicant stated that site interface requirements in AP1000 DCD Table 1.8-1, Items 8.2 (offsite ac requirements) and 8.3 (offsite transmission system and stability analyses) are verified not just by BLN COL FSAR Section 14.2.9.4.23 (preoperational test for offsite ac power systems) alone, but a combination of analyses and testing as described below:

- The site interface parameters identified in AP1000 DCD Table 1.8-1, Items 8.2 and 8.3, as provided by Westinghouse, are used as input parameters or acceptance criteria in the Grid Stability Analysis performed.*
- The Offsite AC Power Systems tests detailed in BLN COL FSAR Section 14.2.9.4.23, as modified by the applicant's response to RAI 14.2-1, require specific preoperational testing of as-installed switchyard components as described in BLN COL FSAR Section 8.2 to demonstrate proper operation of the design capabilities and protective features of those components.*
- The tests detailed in AP1000 DCD Section 14.2.9.4.21, Main, Unit Auxiliary and Reserve Auxiliary Transformer Test, demonstrate the energization of the transformers and the proper operation of associated protective relaying, alarms, and control devices.*
- The tests detailed in AP1000 DCD Section 14.2.9.2.15, Main AC Power System Testing, verify power availability to support proper operation of required electrical loads.*
- The 100 percent load reject test described in AP1000 DCD Section 14.2.10.4.21 provides for an integrated plant response and verification of the demands placed on the electrical distribution system when the plant is separated from the grid.*

The staff has reviewed BLN COL FSAR Section 14.2.9.4.23 and AP1000 DCD Sections 14.2.9.4.21, 14.2.9.2.15, and 14.2.10.4.21 cited by the applicant for proper operation of components and the interface parameters required for the grid stability and offsite transmission system analyses. The staff concurs with the applicant that the site interface requirements in AP1000 DCD Table 1.8-1, Items 8.2 and 8.3 can be verified by the combination of analyses and testing described above. Therefore, the NRC staff finds the applicant's response to be acceptable. This resolves RAI 14.2-2.

Turkey Point Units 6 and 7 COL Information Item

- PTN COL 14.4-5

In FSAR Subsection 14.2.9.4.24, Raw Water System, the COL applicant included a site-specific LMA of PTN COL 14.4-5. The LMA is necessary to specifically address this portion of the Turkey Point Units 6 and 7 FSAR dealing with General Test Methods and Acceptance Criteria. Turkey Point Units 6 and 7 does not include heat tracing on the raw water cooling system piping, thus the subparagraph c. in the R-COLA subsection regarding component and integrated system tests was deleted. The staff found this acceptable since heat tracing is not required for the non-safety related raw water cooling system and since heat tracing is not needed for the Turkey Point minimum normal temperature conditions.

The following portion of this technical evaluation section is reproduced from Section 14.2.9.4 of the VEGP SER:

In RAI 14.2-9, the staff requested that the applicant provide additional information in the test abstract related to the fire brigade support equipment test abstract in Section 14.2.9.4.26 of the BLN COL FSAR. Specifically, RG 1.189, Regulatory Position 3.4.2, Hydrants and Hose Houses, states that "threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings, and standpipe risers. Alternatively, a sufficient number of hose thread adapters may be provided." The importance of ensuring that installed plant fire equipment be compatible with the equipment used by local fire departments warrants the inclusion of installed plant fire equipment (hydrants, hoses, couplings, and standpipe risers) in the initial test program to verify either the compatibility of threads or the provision of an adequate supply of hose thread adaptors that will be readily available in the event of a fire. The staff requested that the applicant revise Section 14.2.9.4.26 to address this issue. In addition, with respect to BLN COL FSAR Section 14.2.9.4.26(c), the staff requested that the applicant specifically identify any portable "communication equipment" that is credited for fire brigade use. In a letter dated June 30, 2008, the applicant proposed to add the requirement to verify fire equipment hose thread compatibility in Section 14.2 in a future revision of the BLN COL FSAR. The staff confirmed that the applicant addressed the relevant information in Revision 1 of the BLN COL FSAR, and there is no outstanding information expected to be addressed related to this section. This resolves RAI 14.2-9.

In RAI 12.3-12.4-5, the staff requested that the applicant provide additional information related to the portable personnel monitors and radiation survey

instruments test abstract contained in Section 14.2.9.4.27 of the BLN COL FSAR. Specifically, the staff requested the applicant to provide information regarding the accuracy and overall performance of portable survey instruments addressed in standard ANSI N42.17A-1989, and information related to the calibration and maintenance of portable radiation survey instruments addressed in ANSI N323A-1997. The staff also requested that the applicant revise Section 14.2 of the BLN COL FSAR to address this issue. In a letter dated September 22, 2008, the applicant proposed to revise Section 14.2.9.4.27 by providing additional text to the general method and acceptance criteria. Specifically, the applicant proposed that the portable monitors and instrument test shall include provisions for verifying proper functioning of monitors and instruments to respond to radiation as required and proper operability [sic] of instrumentation controls, battery, and alarms as applicable. Further, the applicant proposed to revise Appendix 1AA to Chapter 1, to include the updated version of ANSI N323A cited in the exception to Regulatory Guide 8.6. The staff reviewed the applicant's response and found the proposed changes acceptable. Further, the staff confirmed that the applicant addressed the relevant information in Revision 1 of the BLN COL FSAR, and there is no outstanding information expected to be addressed related to this section. This resolves RAI 12.3-12.4-5.

Resolution of Standard Content Confirmatory Item 14.2-11

The staff verified that the VEGP applicant has incorporated into its FSAR the proposed administrative controls identified as Confirmatory Item 14.2-11 in the staff's SER for the BLN COL. On this basis, Confirmatory Item 14.2-11 resolved.

- **STD COL 3.9-5**

In a letter dated July 2, 2010 and supplemented by letter dated August 6, 2010, the VEGP applicant identified changes to be made to VEGP COL FSAR Section 14.2.9 involving the initial testing of the pressurizer surge line piping. This COL item is primarily addressed in Section 3.9.3 of the VEGP COL FSAR and that portion is reviewed by the NRC staff in Section 3.12 of this SER. The portion of STD COL 3.9-5 addressed in FSAR Section 14.3, and evaluated in this SER section, is the discussion of the test abstract to identify the standard operating conditions for surge line thermal monitoring instrumentation verification and data gathering that complies with NRC Bulletin 88-11, "Pressurizer Surge Line Thermal Stratification." The staff notes that this proposed testing is to be done on the first AP1000 unit placed in operation.

*The NRC staff has compared the purpose, prerequisites, and general test methods and acceptance criteria provided by the VEGP applicant in the test abstract for the pressurizer surge line piping, to the guidance in NRC Bulletin 88-11. The staff concludes that sufficient information on the test procedure has been provided to assure that the test results will quantify the extent of thermal stratification, thermal stripping and piping deflections, as recommended in Bulletin 88-11. Therefore, the staff finds that the portion of STD COL 3.9-5 relevant to the preoperational testing of the pressurizer surge line piping to be acceptable. The incorporation of the planned changes to the VEGP COL FSAR will be tracked as **VEGP Confirmatory Item 14.2-2**.*

Resolution of VEGP (Standard Content) Confirmatory Item 14.2-2

VEGP Confirmatory Item 14.2-2 is an applicant commitment to revise its FSAR to specify surge line monitoring test procedures. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, VEGP Confirmatory Item 14.2-2 is now closed. The applicant indicated that the proposed changes to its FSAR are expected to be standard for the subsequent COL applicants. Since Confirmatory Item 14.2-2 already exists as a standard confirmatory item in this SER, the staff designated this standard confirmatory item as VEGP Confirmatory Item 14.2-2.

Supplemental Information

- STD SUP 14.2-2

The applicant provided additional information in STD SUP 14.2-2 to address the development of administrative procedures that will be implemented during the preoperational testing activities.

STD SUP 14.2-2 was not in Revision 1 of the BLN FSAR and is addressed for the first time in this SER for the VEGP COL application. However, portions of the standard evaluation material in Section 14.2.9.4 of the BLN SER are directly applicable to the new STD SUP item identified in the VEGP FSAR. Therefore, the NRC staff used this evaluation material, identified below as standard content material, in the disposition of STD SUP 14.2-2.

As part of the response to RAI 14.2-12, the applicant proposed to supplement Section 14.2.9 of the AP1000 DCD, Revision 17, with additional administrative controls that will be implemented during preoperational testing activities. The response stated that the control of systems that need to be returned to the construction organization for modifications, repairs, or to correct a new problem will be through administrative procedures. These procedures will also provide directions for the following activities:

- Release control of systems and/or components to construction
- Documentation of the actual work performed and the impact on testing
- Identification of required testing to restore the system to an identified status (operability, functionality, availability), as well as the identification of re-performance tests based on the impact of the work performed
- Authorizations and tracking of operability and unavailability determinations
- Verification activities to ensure that retests stay in compliance with ITAAC commitments

*The staff reviewed this supplemental information related to preoperational test descriptions and determined that it provided adequate administrative controls for an orderly turnover of plant systems when these have to be returned to the construction organization. Therefore, the staff finds this information acceptable. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. This is identified as **Confirmatory Item 14.2-10**, pending NRC review and approval of the revised BLN COL FSAR.*

Resolution of Standard Content Confirmatory Item 14.2-10

The staff verified that the VEGP applicant has incorporated into its FSAR, in response to STD SUP 14.2-2, the proposed administrative controls identified as Confirmatory Item 14.2-10 in the staff's SER for the BLN COL. On this basis, Confirmatory Item 14.2-10 resolved.

14.2.9.5 Post Combined License Activities

There are no post-COL activities related to this section.

14.2.9.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. It also meets the guidance in NUREG-0800 Section 14.2 and RG 1.68.

The staff based its conclusions on the following:

- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.
- STD COL 14.4-5 and PTN COL 14.4-5 are acceptable because they provide an adequate description of testing of structures and systems that are outside the scope of the DC, but within the scope of the COL.
- STD COL 3.9-5, as it applies to the test abstract for the surge line thermal monitoring, is acceptable because it provides assurance that the test results will quantify the extent of thermal stratification, thermal stripping and piping deflections, as recommended in Bulletin 88-11.

- STD SUP 14.2-2 is acceptable because it provides an adequate description for the development of administrative controls that will be implemented during the preoperational testing activities.

14.2.10 Startup Test Procedures (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.12, “Individual Test Descriptions”)

14.2.10.1 Introduction

Startup test procedures address the tests that comprise the startup phase of the test program. For each test, a general description is provided for test objective, test prerequisites, test description, and test performance criteria, where applicable. In describing a test, the operating and safety-related characteristics of the plant to be tested and evaluated are identified. Where applicable, the relevant performance criteria for the test are discussed. Some of the criteria relate to the value of process variables assigned in the design or analysis of the plant, component systems, and associated equipment. Other criteria may be associated with expectations relating to the performance of systems.

14.2.10.2 Summary of Application

Section 14.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 14.2 of the AP1000 DCD, Revision 19. Section 14.2 of the DCD includes Section 14.2.10.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 14.2.10, the applicant provided the following:

AP1000 COL Information Item

- STD COL 14.4-5

The applicant provided additional information in STD COL 14.4-5 to address interface requirements related to cooling towers. This COL item is evaluated by the staff in Section 14.2.9 of this SER.

Supplemental Information

- STD SUP 14.2-3

The applicant provided additional information in STD SUP 14.2-3 to address the development of administrative controls that will be implemented during power ascension testing activities.

14.2.10.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the startup test procedures are given in Section 14.2 of NUREG-0800.

The applicable regulatory requirements for the information being reviewed in this section are 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. RG 1.68 provides guidance on how to comply with Criterion XI of Appendix B to 10 CFR Part 50.

14.2.10.4 Technical Evaluation

The NRC staff reviewed Section 14.2.10 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the startup test procedures. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 14.2.10.4 of the VEGP SER:

Supplemental Information

- *STD SUP 14.2-3*

The applicant provided additional information in STD SUP 14.2-3 to address the development of administrative controls that will be implemented during power ascension testing activities.

STD SUP 14.2-3 was not in Revision 1 of the BLN FSAR and is addressed for the first time in this SER for the VEGP COL application. However, the standard evaluation material in Section 14.2.9.4 of the BLN SER is directly applicable to the new STD SUP item identified in the VEGP FSAR. Therefore, the NRC staff used this evaluation material, identified below as standard content material, in the disposition of STD SUP 14.2-3.

As part of the response to RAI 14.2-12, the applicant proposed supplemental information in Section 14.2.10 of the BLN COL FSAR, with additional administrative controls that will be implemented during power ascension testing activities consistent with the guidance in RG 1.68 and NUREG-0800. The applicant proposed to discuss a power ascension test plan that will provide controls for operations during the power ascension test phase, including the following:

- Verification of core performance parameters
- Verification of adequate calibration of nuclear instrumentation
- Controls for high flux trips consistent with TS requirements
- Conduct of surveys of plant systems and equipment
- Checks for unexpected radioactivity in process systems and effluents
- Perform reactor coolant leak checks
- Controls for reviews of testing at each power plateau

Additionally, the applicant proposed to provide controls for the extrapolation of tests at lower power levels in order to determine the acceptability of performing the test at higher power levels. The applicant proposed to describe measures for the use of surveillance test procedures to document portions of tests, and the use of initial test program tests to satisfy TS surveillance requirements.

The staff reviewed this proposed supplemental information related to the power ascension test phase and determined that it provided adequate administrative controls for activities during power ascension testing. Therefore, the staff finds this information acceptable. The applicant will revise the BLN COL FSAR to include the proposed administrative controls. This is identified as **Confirmatory Item 14.2-12**, pending NRC review and approval of the revised BLN COL FSAR.

Resolution of Standard Content Confirmatory Item 14.2-12

The staff verified that the VEGP applicant has incorporated into its FSAR, in response to STD SUP 14.2-3, the proposed administrative controls identified as Confirmatory Item 14.2-12 in the staff's SER for the BLN COL. On this basis, Confirmatory Item 14.2-12 is resolved.

14.2.10.5 Post Combined License Activities

There are no post-COL activities related to this section.

14.2.10.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50. The staff based its conclusions on the following:

- STD SUP 14.2-3 is acceptable because it provides an adequate description of the administrative controls associated with the activities that will be implemented during the power ascension testing phase of the initial test program and meets the guidance in NUREG-0800 Section 14.2 and RG 1.68.

14.3 Certified Design Material (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.3, "Inspections, Tests, Analyses, and Acceptance Criteria")

14.3.1 Introduction

This section addresses the selection criteria and processes used to develop the Turkey Point Units 6 and 7 certified design materials (CDMs). It specifically addresses the site-specific inspections, tests, analyses, and acceptance criteria (SS-ITAAC). The COL applicant provides its proposed selection methodology and criteria for establishing the ITAAC that are necessary and sufficient to provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license and the Commission's rules and regulations.

The applicant proposes, in addition to the ITAAC incorporated by reference from the AP1000 DCD, SS-ITAAC to provide reasonable assurance that the facility has been constructed and will operate in conformance with the applicable regulations.

14.3.2 Summary of Application

Section 14.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 14.3 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 14.3 the applicant provided the following:

Departures

- PTN DEP 3.2-1

The applicant revised DCD Table 14.3-2, "Design Basis Accident Analysis," Sheets 7 and 8 of 17, as new Turkey Point Units 6 and 7 COL FSAR Table 14.3-202, Sheets 1 and 2, providing additional information about PTN DEP 3.2-1 related to design modifications to and performance of the condensate return portion of the Passive Core Cooling System. This information, as well

as related PTN DEP 3.2-1 information appearing in other chapters of the Turkey Point Units 6 and 7 COL FSAR, is reviewed in Section 21.1 of the SER.

- PTN DEP 6.4-1

The applicant provided additional information in Section 14.3 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

- PTN DEP 6.4-2

The applicant provided additional information in Section 14.3 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR, is reviewed in Section 21.3 of this SER.

- PTN DEP 7.3-1

The applicant provided additional information in Section 14.3 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 7.3-1 related to required design changes for the PMS source range neutron flux doubling logic to comply with the requirements of IEEE Std. 603-1991, Clause 6.6. This information, as well as related PTN DEP 7.3-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.5 of this SER.

AP1000 COL Information Items

- STD COL 3.6-1

The applicant provided additional information in STD COL 3.6-1 to provide its plan for completing the pipe rupture hazard analysis.

- STD COL 3.9-7

The applicant provided additional information in STD COL 3.9-7 to provide its plan for completing the piping design.

- STD COL 13.6-1

The applicant provided additional information in STD COL 13.6-1 to state that the generic physical-security inspection, test, analysis, and acceptance criteria (PS-ITAAC) have been developed in a coordinated effort between the NRC and the Nuclear Energy Institute (NEI).

Supplemental Information

- STD SUP 14.3-1

The applicant provided supplemental information in STD SUP 14.3-1 in Turkey Point Units 6 and 7 COL FSAR Section 14.3.2.3, "Site-Specific ITAAC (SS-ITAAC)," and Section 14.3.2.3.3, "Other Site-Specific Systems." Section 14.3.2.3 describes the SS-ITAAC and Section 14.3.2.3.3 identifies the Transmission Switchyard and Offsite Power System as meeting the ITAAC selection criteria.

- PTN SUP 14.3-1

The applicant provided supplemental information in PTN SUP 14.3-1 in Turkey Point Units 6 and 7 COL FSAR Section 14.3.2.3.1, "Emergency Planning ITAAC (EP-ITAAC)," based on the generic ITAAC provided in Appendix C.II.I-B of RG 1.206.

- PTN SUP 14.3-2

The applicant provided supplemental information in PTN SUP 14.3-2 in Turkey Point Units 6 and 7 COL FSAR Section 14.3.2.3.3, "Other Site-Specific Systems," discussing the ITAAC screening summary for site-specific systems.

- PTN SUP 14.3-3

The applicant provided supplemental information in PTN SUP 14.3-3 in Turkey Point Units 6 and 7 COL FSAR Section 14.3.3.1, "Subbasemat Concrete ITAAC."

- PTN COL 2.5-17

The applicant provided supplemental information in PTN COL 2.5-17 in Turkey Point Units 6 and 7 COL FSAR Section 14.3.3.4, "Waterproofing Membrane ITAAC." This section describes the design of the waterproof membrane beneath the nuclear island basemat in AP1000 DCD Section 3.4.1.1.1.1.

14.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the CDM are given in Section 14.3 of NUREG-0800.

The applicable regulatory requirements for SS-ITAAC are in 10 CFR 52.80(a) and 10 CFR 52.97, "Issuance of combined licenses."

The regulatory basis for STD COL 3.6-1 and STD COL 3.9-7 are provided in NUREG-0800.

14.3.4 Technical Evaluation

The NRC staff reviewed Section 14.3 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the CDMs. The results of the NRC staff's

evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 14.3.4 of the VEGP SER:

AP1000 COL Information Items

- *STD COL 3.6-1 and STD COL 3.9-7*

The portion of STD COL 3.6-1 addressed in VEGP COL FSAR Section 14.3 is the discussion of the ITAAC established to provide reasonable assurance that the design portion of the pipe rupture hazard analysis will be conducted in conformity with the license and the Commission's rules and regulations. The portion of STD COL 3.9-7 addressed in VEGP COL FSAR Section 14.3 is the discussion of the ITAAC established to provide reasonable assurance that the piping design is completed appropriately for applicable systems.

In a letter dated March 18, 2010, as revised by letter dated April 23, 2010, in response to an open item in the NRC staff's SER for BLN (Open Item 3.6-1 in BLN SER Section 3.6.4), the VEGP applicant provided proposed revisions to the VEGP COL application related to the pipe rupture hazard analysis ITAAC. In addition, the applicant provided information related to the piping design ITAAC.

The VEGP applicant proposed to expand FSAR Section 14.3.3 to include, as part of STD COL 3.6-1 and STD COL 3.9-7, a description of the ITAAC established to

provide reasonable assurance that the design portion of the pipe rupture hazard analysis and piping design will be conducted in conformity with the license and the Commission's rules and regulations. The applicant proposed revision of two license conditions in Part 10 of the COL application to address when the information would be available for staff review and expanding Appendix B of Part 10 to include the two ITAAC associated with review of the pipe rupture hazard analysis and the piping design. STD COL 3.6-1 and STD COL 3.9-7 are evaluated by the staff in Sections 3.6 and 3.12 respectively, of this SER, including the proposed pipe rupture hazard analysis ITAAC and piping design ITAAC.

Supplemental Information

- STD SUP 14.3-1, addressing SS-ITAC
- PTN SUP 14.3-1, addressing Emergency Planning ITAAC (EP-ITAC)
- PTN SUP 14.3-2, addressing ITAAC screening summary for additional site-specific systems

The following portion of this technical evaluation section is reproduced from Section 14.3.4 of the VEGP SER:

The following portion of this technical evaluation section is reproduced from Section 14.3 of the BLN SER. This portion of the BLN SER combined the evaluation of STD SUP 14.3-1 and BLN SUP 14.3-2. The NRC staff concludes that the evaluation of BLN SUP 14.3-2 applies to VEGP SUP 14.3-2, based on the similarities of these two plant-specific supplemental items.

The NRC staff concludes that the evaluation of BLN SUP 14.3-2 and VEGP SUP 14.3-2 applies to PTN SUP 14.3-2, based on the similarities of these three plant-specific supplemental items.

The following portion of this technical evaluation section is reproduced from Section 14.3.4 of the VEGP SER:

As part of STD SUP 14.3-1 and BLN SUP 14.3-2, the applicant provided:

- *Site-specific ITAAC selection criteria*
- *Site-specific ITAAC selection methodology*
- *Site-specific ITAAC screening summary*

A table of ITAAC entries was provided for each site-specific system described in the BLN COL FSAR that meets the selection criteria, and that is not included in the certified design. The COL applicant adopted the same selection criteria and methodology as the AP1000 DCD for establishing the SS-ITAC. The selection criteria and methodology contained in the AP1000 DCD was accepted by the NRC as described in NUREG-1793. Therefore, the staff finds the applicant's use of this criteria and methodology appropriate and acceptable. The ITAAC are provided in tables with information for the following three columns: design commitment; inspection, tests, analyses; and acceptance criteria.

Emergency Planning-ITAAC (EP-ITAAC) [PTN SUP 14.3-1] are discussed in the application as required for inclusion in accordance with 10 CFR 52.80(a). The site-specific EP-ITAAC are based on the generic ITAAC provided in Appendix C.II.1-B of RG 1.206. The staff's review of the current set of EP-ITAAC and the information related to this ITAAC is contained in Chapter 13.6 [13.3] of the SER.

Physical Security-ITAAC (PS-ITAAC) [STD COL 13.6-1] are discussed in the application as required for inclusion in accordance with 10 CFR 52.80(a). The site-specific PS-ITAAC are based on the generic ITAAC provided in Appendix C.II.1-C of RG 1.206. The NRC staff's review of the current set of PS-ITAAC and the information related to this ITAAC is contained in Chapter 13.4 [13.6] of the SER.

The NRC staff reviewed the supplemental information relating to ITAACs included under Section 14.3.2 of the BLN COL. The applicant identified no additional site-specific systems meeting the ITAAC selection criteria. With the exception of the Transmission Switchyard and Offsite Power System, the staff agrees no additional site-specific ITAAC are required in accordance with 10 CFR 52.80(a).

In RAI-14.3-1, the staff asked the applicant to justify the omission of site-specific ITAAC for transmission switchyard and the offsite power system. Subsequently, in a letter dated May 11, 2009, the applicant agreed to include an ITAAC in the BLN COL FSAR for transmission switchyard and the offsite power system. The information related to this ITAAC is evaluated in Chapter 8 of the SER. This is Confirmatory Item 14.3-1, pending NRC review and approval of the revised BLN COL FSAR.

Resolution of Standard Content Confirmatory Item 14.3-1

Confirmatory Item 14.3-1 required the applicant to update its FSAR to include proposed ITAAC for the offsite power system. The NRC staff provides its evaluation of the proposed ITAAC for the offsite power system in Section 8.2.A of this SER. The NRC staff verified that the VEGP COL application was appropriately updated. As a result, Confirmatory Item 14.3-1 is resolved.

- PTN COL 2.5-17

The NRC staff reviewed PTN COL 2.5-17 in Turkey Point Units 6 and 7 COL FSAR Section 14.3.3.4 related to the waterproof membrane ITAAC. The staff's review of this ITAAC is documented in Section 3.8 of this SER.

- PTN SUP 14.3-3

The NRC staff reviewed PTN SUP 14.3-3 in Turkey Point Units 6 and 7 COL FSAR Section 14.3.3.1 related to the Subbasemat Concrete ITAAC. The staff's review of this ITAAC is documented in Section 3.8 of this SER.

14.3.5 Post Combined License Activities

The SS-ITAAC in the previous section of this SER are considered post-COL activities and discussed in the individual SER sections as stated above.

14.3.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of 10 CFR 52.80(a) and 10 CFR 52.97. The staff based its conclusions on the following:

- PTN DEP 3.2-1, related to design modifications to the condensate return portion of the Passive Core Cooling System, is reviewed and found acceptable by the staff in Section 21.1 of this SER.
- PTN DEP 6.4-1, related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.
- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.
- PTN DEP 7.3-1, related to required design changes for the PMS source range neutron flux doubling logic to comply with the requirements of IEEE Std. 603-1991, Clause 6.6, is reviewed and found acceptable by the staff in Section 21.5 of this SER.
- STD COL 3.6-1, STD COL 3.9-7, STD COL 13.6-1, PTN COL 2.5-17, STD SUP 14.3-1, PTN SUP 14.3-1, PTN SUP 14.3-2, and PTN SUP 14.3-3 are acceptable because the ITAAC specified for the site-specific systems provide adequate assurance that these systems have been constructed and will be operated in conformity with the license and the Commission's rules and regulations.

15.0 ACCIDENT ANALYSIS

The evaluation of the safety of a nuclear power plant includes analyses of the plant's responses to postulated disturbances in process variables and postulated equipment failures or malfunctions. Such safety analyses provide a significant contribution to the selection of limiting conditions for operation, limiting safety system settings, and design specifications for components and systems from the standpoint of public health and safety. These analyses are a focal point of the combined license (COL) reviews. In Chapter 15 of the Final Safety Analysis Report (FSAR), the COL applicant discussed the applicable transient and accident analyses to justify its conformance to the applicable regulations.

The U.S. Nuclear Regulatory Commission (NRC) staff's review of Turkey Point Unit 6 and 7 COL FSAR Chapter 15 follows the format in Turkey Point Unit 6 and 7 COL FSAR Chapter 15.

15.0 Accident Analysis (Related to Regulatory Guide (RG) 1.206, Section C.III.1, Chapter 15, C.I.15.1, "Transient and Accident Classification," C.I.15.2, "Frequency of Occurrence," C.I.15.3, "Plant Characteristics Considered in the Safety Evaluation," C.I.15.4, "Assumed Protection System Actions," and C.I.15.5, "Evaluation of Individual Initiating Events")

15.0.1 Introduction

Design basis transient and accident analyses are required as a part of an evaluation of the safety of a nuclear power plant by analyzing the plant's responses to postulated disturbances in process variables and postulated equipment failures or malfunctions. The safety analyses provide a significant contribution to the determination of limiting conditions for operation, limiting safety system settings, and design specifications for plant components and systems to protect public health and safety.

15.0.2 Summary of Application

Section 15.0 of the Turkey Point Unit 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 15.0 of the AP1000 Design Control Document (DCD), Revision 19.

In addition, in the Turkey Point Unit 6 and 7 COL FSAR the applicant provided the following:

Departures

- PTN DEP 3.2-1

The applicant provided additional information about PTN DEP 3.2-1 in Section 15.0.13 of the FSAR related to the performance of the condensate return portion of the Passive Core Cooling System. This information, as well as related PTN DEP 3.2-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.1 of this report.

- PTN DEP 6.4-1

The applicant provided additional information in Section 15.0.11 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information,

as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

AP1000 COL Information Item

- STD COL 15.0-1

In letters dated November 15, 2010, April 20, 2011, and September 14, 2011, the applicant endorsed Vogtle Electric Generating Plant (VEGP) letters dated May 21, 2010, October 29, 2010, and February 8, 2011, respectively. In these letters, the applicant proposed Standard (STD) COL 15.0-1, adding new text to Turkey Point Unit 6 and 7 COL FSAR Section 15.0. STD COL 15.0-1 was provided in a response to a request for additional information (RAI) related to the AP1000 design certification (DC) amendment review. Specifically, in its response dated May 6, 2009, to NRC RAI AP1000 DCD RAI-SRP15.0-SRSB-02, Westinghouse proposed COL Information Item 15.0-1 to provide documentation of the plant calorimetric uncertainty methodology. RAI-SRP15.0-SRSB-02 noted that the AP1000 DCD assumes a 2 percent power uncertainty for the initial condition for most transients and accidents. However, a 1 percent power uncertainty is assumed for the initial reactor power for the large-break loss-of-coolant accident (LOCA) in AP1000 DCD Section 15.6.5.4A, as well as the mass and energy release calculation in AP1000 DCD Sections 6.2.1.3 and 6.2.1.4. In response to this RAI, Westinghouse proposed a new COL information item to be included in a future revision to AP1000 DCD Section 15.0.15. COL Information Item 15.0-1 states:

Following selection of the actual plant operating instrumentation and calculation of the instrumentation uncertainties of the operating plant parameters prior to fuel load, the Combined License holder will calculate the primary power calorimetric uncertainty. The calculations will be completed using an NRC acceptable method and confirm that the safety analysis primary power calorimetric uncertainty bounds the calculated values.

License Conditions

- License Condition 2, Item 15.0-1

In a letter dated November 15, 2010, the applicant endorsed the VEGP letter dated May 21, 2010, that proposed adding Item 15.0-1 to License Condition 2, which would confirm that the plant-operating instrumentation installed for feedwater flow measurement is a Caldon/Cameron Leading Edge Flow Meter (LEFM) CheckPlus™ system. In its letter dated April 20, 2011, the applicant endorsed the VEGP letter dated October 29, 2010, that revised Item 15.0-1 to state that the documentation of plant calorimetric uncertainty methodology would be addressed as a plant-specific inspections, tests, analyses and acceptance criteria (ITAAC) item in lieu of License Condition 2.

- License Condition 6

In its letter dated April 20, 2011, the applicant endorsed the VEGP letter dated October 29, 2010, that proposed adding new line items to proposed License Condition 6, associated with the power calorimetric uncertainty instrumentation.

Inspections, Tests, Analyses and Acceptance Criteria

In its letter dated April 20, 2011, the applicant endorsed the VEGP letter dated October 29, 2010, that proposed ITAAC associated with the plant calorimetric uncertainty methodology.

15.0.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

The need to address the calorimetric power uncertainty is found in Section 15.0 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)." Specifically, NUREG-0800 Section 15.0, Section I.3, "Plant Characteristics in the Safety Evaluation," states in part that "the reviewer also ensures that the application specifies the permitted fluctuations and uncertainties associated with reactor system parameters and assumes the appropriate conditions, within the operating band, as initial conditions for transient analysis." For the LOCA analysis, Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic licensing of production and utilization facilities," Appendix K, ECCS Evaluation Models," specifies that an assumed power level lower than 1.02 times the licensed power level may be used provided the proposed alternative value has been demonstrated to account for uncertainties due to power level instrumentation error.

15.0.4 Technical Evaluation

The NRC staff reviewed Section 15.0 of the Turkey Point Unit 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to accident analysis. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Unit 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Unit 6 and 7 Units 2 and 3 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Unit 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Unit 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.

¹ See Section 1.2.2 for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a DC.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Unit 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

The following portion of this technical evaluation section is reproduced from Section 15.0.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 15.0-1*

In a letter dated May 21, 2010, as revised by a letter dated October 29, 2010, the VEGP applicant submitted information to address COL Information Item 15.0-1. In these letters, the applicant stated that the plant operating instrumentation for feedwater flow measurement would be the Caldon/Cameron LEFM CheckPlus™ system and referenced the NRC staff's final safety evaluation that approved the Caldon topical report, ER-157P, Revision 8, "Supplement to Topical Report ER-80P: Basis for a Power Uprate with the LEFM Check or Checkplus™ System." The NRC staff has previously approved several plant applications of the Caldon/Cameron CheckPlus™ LEFM system to support a power measurement uncertainty lower than 1 percent. This AP1000 COL information item supports the 1 percent power uncertainty. The NRC staff's review herein focused on ensuring that the generically approved Caldon/Cameron topical reports are properly implemented for the VEGP COL application. The NRC staff verified compliance with the applicable conditions in the NRC staff's safety evaluations approving the topical reports. The NRC staff's review also confirmed that appropriate license conditions and ITAAC were established for those items that cannot be resolved prior to issuance of the COL.

Compliance with Caldon/Cameron Topical Report ER-80P

NRC staff approval of the Caldon/Cameron topical report ER-80P (safety evaluation (SE) dated March 8, 1999) established four criteria to be satisfied by each applicant or licensee. The VEGP applicant addressed each criterion as described below.

Criterion 1

Discuss maintenance and calibration procedures that will be implemented with the incorporation of the LEFM, including processes and contingencies for inoperable LEFM instrumentation and the effect on thermal power measurements and plant operation.

The VEGP applicant stated that calibration and maintenance programs would be developed in accordance with the Caldon/Cameron LEFM technical manuals and recommendations. Preventative Maintenance (PM) tasks would be periodically performed within the plant control system and support systems to provide continued reliability. Plant instrumentations that affect the power calorimetric, including the Caldon/Cameron LEFM CheckPlus™ inputs, would be monitored by plant system engineering personnel. These instruments would be included in the plant PM program for periodic calibration. The NRC staff finds these measures acceptable.

The VEGP applicant stated when the Caldon/Cameron LEFM CheckPlus™ flow meter becomes inoperable beyond the allowed outage time; the plant would be operated at de-rated conditions. De-rated operation is appropriate at power levels consistent with a 2 percent power uncertainty. With the plant operating at 100 percent load with 1 percent uncertainty, a de-rating to 99 percent maintains a 2 percent uncertainty. When the LEFM CheckPlus™ is inoperable, plant calorimetric power would be monitored with the use of feedwater venturi elements. An inoperable LEFM would not leave the plant in a condition where steady-state operation would be immediately compromised since it would not directly impact the calibration of the nuclear instrumentation utilized for power level related trips or safety system actuations. Thus, procedures require confirmation of the availability of alternate instrumentation (i.e., the feedwater venturi instrumentation) and initiation of the above described reduction in power within 48 hours. These measures are consistent with the operating plants. The NRC staff finds that operation with an inoperable Caldon/Cameron CheckPlus™ has been acceptably addressed.

Criterion 2

For plants that currently have LEFMs installed, provide an evaluation of the operational and maintenance history of the installed instrumentation and confirmation that the installed instrumentation is representative of the LEFM system and bounds the analyses and assumptions set forth in TR ER-80P.

The VEGP applicant stated that, since this application represents construction of a new plant with no previously installed LEFM equipment, this item is not applicable. The NRC staff finds the VEGP applicant's response acceptable.

Criterion 3

Confirm that the methodology used to calculate the uncertainty of the LEFM in comparison to the current feedwater instrumentation is based on accepted plant setpoint methodology (with regard to the development of instrument uncertainty). If an alternative approach is used, the application should be justified and applied to both venturi and ultrasonic flow measurement instrumentation installations for comparison.

The VEGP applicant stated that the uncertainty of the LEFM would be calculated in accordance with the Westinghouse methodology as applied in the Beaver

Valley Power Station Units 1 and 2 License Amendment Request Nos. 289 and 161, which was approved by the NRC staff in a letter dated September 24, 2001, titled, "Beaver Valley Power Station, Unit Nos. 1 and 2 (BVPS-1 and 2) – Issuance of Amendment Re: 1.4-Percent Power Uprate and Revised BVPS-2 Heatup and Cooldown Curves." The NRC staff reviewed this SE and found that the calculation methodology complies with the recommendations of American National Standards Institute/Independent Safety Assessment (ANSI/ISA) Standard 67.04-2000, "Setpoints for Nuclear Safety-Related Instrumentation," and Regulatory Guide (RG) 1.105, "Setpoints for Safety-Related Instrumentation," Revision 2. In these calculations, uncertainties for the parameters that are not statistically independent are arithmetically summed to produce groups that are independent of each other, which can be statistically combined. Then, all independent parameters/groups that contribute to the power measurement uncertainty are combined using a square root of sum of squares (SRSS) approach to determine the overall power measurement uncertainty. This methodology has been reviewed and approved by the NRC staff for Westinghouse pressurized-water reactors (PWRs) (e.g., Beaver Valley), and is also acceptable for AP1000, which is a Westinghouse-designed PWR. The staff finds the AP1000 design sufficiently similar to other Westinghouse PWR designs that have been approved such that the methodology applies to both designs. Therefore, the NRC staff finds that the VEGP applicant's response acceptable.

Criterion 4

Licensees for plant installations where the ultrasonic meter (including LEFM) was not installed with flow elements calibrated to a site specific piping configuration (flow profiles and meter factors not representative of the plant specific installation), should provide additional justification for use. This justification should show that the meter installation is either independent of the plant specific flow profile for the stated accuracy, or that the installation can be shown to be equivalent to known calibrations and plant configurations for the specific installation including the propagation of flow profile effects at higher Reynolds numbers. Additionally, for previously installed calibrated elements, the licensee should confirm that the piping configuration remains bounding for the original LEFM installation and calibration assumptions.

The VEGP applicant stated that its application represents construction of a new plant with no previously installed flow metering equipment. The AP1000 main feedwater flow measurement instrumentation, consistent with the use of normalized flow meters, would be required to be calibrated at a certified test laboratory in hydraulic model geometry consistent with the AP1000 plant design. The LEFM commissioning process (i.e., installation acceptance testing) would confirm that the actual instrument performance is consistent with the assumptions of the uncertainty calculation. The NRC staff finds this response acceptable.

Compliance with Caldon/Cameron Topical Report ER-157P, Revision 8

The VEGP applicant addressed the five SE conditions found in the NRC SE for ER-157P, Revision 8, dated August 16, 2010, as described below.

Condition 1

Continued operation at the pre-failure power level for a pre-determined time and the decrease in power that must occur following that time are plant-specific and must be acceptably justified.

The VEGP applicant stated that a failure of the ultrasonic flow meter (UFM) will result in the use of the feedwater venturi as the input into the calorimetric calculation. Since the contingency is not based on continued reliance on the CheckPlus™ system, the NRC staff finds the VEGP applicant's response acceptable.

Condition 2

A CheckPlus operating with a single failure is not identical to an LEFM Check. Although the effect on hydraulic behavior is expected to be negligible, this must be acceptably quantified if a licensee wishes to operate using the degraded CheckPlus at an increased uncertainty.

The VEGP applicant stated that a degraded UFM resulting in an instrument uncertainty greater than the values assumed in the AP1000 calorimetric uncertainty calculation would be considered a failure and subject to compensatory actions as discussed above in response to Caldon/Cameron topical report (ER-80P) Criterion 1. Since the applicant does not intend to operate using a degraded CheckPlus™, the NRC staff finds the VEGP applicant's response acceptable.

Condition 3

An applicant with a comparable geometry can reference the above Section 3.2.1 [of the SE for ER-157P] finding to support a conclusion that downstream geometry does not have a significant influence on CheckPlus calibration. However, CheckPlus test results do not apply to a Check and downstream effects with use of a CheckPlus with disabled components that make the CheckPlus comparable to a Check must be addressed. An acceptable method is to conduct applicable Alden Laboratory tests.

The VEGP applicant stated that the AP1000 feedwater flow measurement instrumentation would be located in piping with downstream geometry more favorable than the arrangements referenced in Section 3.2.1 of the SE for ER-157P. Therefore, the effects of downstream piping geometry are not considered to have a significant influence on the accuracy of the UFM. Because the flow measurement instrumentation would be located in piping with favorable

downstream geometry, the NRC staff finds the VEGP applicant's response acceptable.

Condition 4

An applicant that requests a MUR [measurement uncertainty recapture] with the upstream flow straightener configuration discussed in Section 3.2.2 [of the SE for ER-157P] should provide justification for claimed CheckPlus uncertainty that extends the justification provided in Reference 17 [Letter from E. Hauser dated March 19, 2010]. Since the Reference 17 evaluation does not apply to the Check, a comparable evaluation must be accomplished if a Check is to be installed downstream of a tubular flow straightener.

The VEGP applicant stated that the AP1000 UFM installation would not utilize an upstream flow straightener. Therefore, this condition is not applicable to the AP1000 design. The NRC staff finds the VEGP applicant's response acceptable.

Condition 5

An applicant assuming large uncertainties in steam moisture content should have an engineering basis for the distribution of the uncertainties or, alternatively, should ensure that their calculations provide margin sufficient to cover the differences shown in Figure 1 of Reference 18 [Letter from E. Hauser dated March 18, 2010].

The VEGP applicant stated that this AP1000 application of the CheckPlus™ LEFM is to support a 1 percent overall power uncertainty, as compared to lower than 0.5 percent typically justified for operating plants using CheckPlus™. The result of this application of the LEFM at a higher uncertainty (i.e., lower accuracy) is that the assumed steam separator/dryer performance becomes less of a relative contribution to the overall uncertainty. Furthermore, an engineering basis for the AP1000 moisture content assumption is in the calorimetric uncertainty calculation. Because the steam separator/dryer performance uncertainty is a relatively small contribution to the overall uncertainty of 1 percent, the NRC staff finds the VEGP applicant's response acceptable.

Based on its review of the VEGP applicant's responses, the NRC staff finds that the licensee has acceptably addressed all applicable conditions specified in the NRC staff's SEs for the Caldon/Cameron topical reports. Hence, the NRC staff finds that the Caldon/Cameron topical reports, ER-80P and ER-157P, are acceptable for referencing in the VEGP COL application and that the applicant has adequately addressed COL Information Item 15.0-1.

License Conditions

- License Condition 2, Item 15.0-1

In a letter dated May 21, 2010, the applicant proposed adding Item 15.0-1 to License Condition 2 that would confirm that the plant operating instrumentation installed for feedwater flow measurement is a Caldon/Cameron LEFM CheckPlus™ system. In its October 29, 2010, letter, the applicant revised Item 15.0-1 to state that the documentation of plant calorimetric uncertainty methodology would be addressed as a plant-specific ITAAC item in lieu of License Condition 2. The staff finds the use of ITAAC to confirm proper documentation of plant calorimetric uncertainty methodology to be acceptable. The plant-specific ITAAC item proposed by the applicant is evaluated below.

- License Condition 6

In a letter dated October 29, 2010, the applicant proposed adding new line items to proposed License Condition 6, associated with the power calorimetric uncertainty instrumentation. Specifically, the applicant proposed to add the following two items:

- *The availability of documented instrumentation uncertainties to calculate a power calorimetric uncertainty (prior to initial fuel load).*
- *The availability of administrative controls to implement maintenance and contingency activities related to the power calorimetric uncertainty instrumentation (prior to initial fuel load).*

The two items under License Condition 6 are needed because documentation for the actual instrument uncertainties would only be available after the equipment is procured and tested and administrative controls would not be available until after the equipment is procured, which would be after the COL license is issued. The staff finds the first item acceptable because, when combined with the methodology in the proposed ITAAC, it would allow the staff to confirm that the procured equipment results in a power uncertainty of no more than 1 percent prior to the start of plant operation. The staff finds the second item acceptable because it would allow the staff to confirm that the administrative controls are in place to meet ER-80P Criterion 1 prior to the start of plant operation. These items correspond to License Condition 15-1 in the following section.

Inspections, Tests, Analyses and Acceptance Criteria

In a letter dated October 29, 2010, the applicant proposed ITAAC associated with the plant calorimetric uncertainty methodology. The proposed ITAAC item is repeated in Table 15.0-1 of this SER. This ITAAC would confirm that: (1) the installed feedwater flow measurement device is the Caldon CheckPlus™ LEFM; (2) the power calorimetric uncertainty calculation for that instrumentation is based on an acceptable Westinghouse methodology as described above in Criterion 3 for ER-80P and the uncertainty values in the calculation for that instrumentation are not lower than those for the actual installed instrumentation; and (3) the

calculated calorimetric power uncertainty measurement values are bounded by the 1 percent uncertainty value assumed for the initial reactor power in the safety analysis. The proposed ITAAC would allow the NRC staff to confirm, prior to initial fuel load, that the necessary conditions for STD COL 15.0-1 (COL Information Item 15.0-1) have been satisfied. Therefore, the NRC staff found the proposed ITAAC acceptable.

*The incorporation of the planned changes to the VEGP COL FSAR detailed in the applicant's letters dated May 21, 2010, and October 29, 2010, will be tracked as **Confirmatory Item 15.0-1**.*

Resolution of Standard Content Confirmatory Item 15.0-1

Confirmatory Item 15.0-1 is an applicant commitment to revise its FSAR Section 15.0 to address COL Information Item STD COL 15.0-1. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 15.0-1 is now closed.

Evaluation of Additional Information Submitted by Applicant

In a letter dated February 6, 2011, submitted in response to a January 24, 2011, letter from the ACRS, the applicant provided additional information related to the flow meter instrumentation, including proposed changes to the FSAR. The applicant stated that, prior to installation, the LEFM CheckPlus™ system will be calibrated at a certified facility with a test model representative of plant piping configurations. After installation in the plant, the LEFM CheckPlus™ system will be tested in accordance with the LEFM CheckPlus™ system commissioning procedure developed by Cameron to confirm that the actual instrument performance is consistent with the assumption of the uncertainty calculation. The staff found these changes acceptable because they clarified the applicant commitment regarding calibration and testing of the instrument. The staff verified that the VEGP COL FSAR was revised to include the proposed changes.

15.0.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff proposes to include the following ITAAC:

- The licensee shall perform and satisfy the plant calorimetric uncertainty and plant instrumentation performance analysis ITAAC defined in SER Table 15.0-1, "Power Calorimetric Uncertainty Methodology."

For the reasons discussed in the technical evaluation section above, the staff finds the following license condition acceptable:

- License Condition (15-1) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of Office of New Reactors a schedule that supports planning for and conduct of NRC inspections of license calculations for power calorimetric uncertainty and administrative controls to implement maintenance and contingency activities related to the power calorimetric uncertainty instrumentation. The

schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the license condition has been fully implemented. This schedule shall address:

- The availability of documented instrumentation uncertainties to calculate a power calorimetric uncertainty (prior to initial fuel load).
- The availability of administrative controls to implement maintenance and contingency activities related to the power calorimetric uncertainty instrumentation (prior to initial fuel load).

15.0.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Unit 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Unit 6 and 7 COL application is acceptable and meets the NRC regulations. The staff based its conclusion on the following:

- PTN DEP 3.2-1, related to design modifications to the condensate return portion of the passive core cooling system, is reviewed and found acceptable by the staff in Section 21.1 of this SER.
- PTN DEP 6.4-1, related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.
- STD COL 15.0-1 is acceptable because the applicant has demonstrated that the conditions identified by the NRC in its generic evaluation have been satisfied for the use of the Caldon/Cameron LEFM CheckPlus™ system for Turkey Point Unit 6 and 7. In addition, ITAAC and a license condition have been put in place to allow the staff to verify the plant calorimetric uncertainty methodology prior to initial fuel load.

15.1 Increase in Heat Removal from the Primary System (Related to RG 1.206, Section C.III.1, Chapter 15, C.I.15.6, "Event Evaluation")

Analyses focused on the increase in heat removal from the primary system address anticipated operational occurrences (AOOs) and accidents that increase the heat removal by the secondary system, which could result in a decrease in reactor coolant temperature. Increased heat removal can be caused by:

- Feedwater system malfunctions causing a reduction in feedwater temperature
- Feedwater system malfunctions causing an increase in feedwater flow
- Excessive increase in secondary steam flow
- Inadvertent opening of a steam generator relief or safety valve

- Steam system piping failure
- Inadvertent operation of the passive residual heat removal heat exchanger

Section 15.1 of the Turkey Point Unit 6 and 7 COL FSAR, Revision 8, incorporates by reference, Section 15.1, "Increase in Heat Removal from the Primary System," of Revision 19 of the AP1000 DCD.

In addition, in the Turkey Point Units 6 and 7 COL FSAR the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Section 15.1.5 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the design basis accident (DBA) radiological consequences analyses, including calculated doses to control room operators and offsite. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

The NRC staff reviewed Section 15.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this section. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

15.2 Decrease in Heat Removal By the Secondary System

Analyses focused on the decrease in heat removal by the secondary system address AOOs and accidents that could result in a reduction of the capacity of the secondary system to remove heat generated in the reactor coolant system (RCS). Decreased heat removal can be caused by:

- Steam pressure regulator malfunction or failure that results in decreasing steam flow
- Loss of external electrical load
- Turbine trip
- Inadvertent closure of main steam isolation valves
- Loss of condenser vacuum and other events resulting in turbine trip
- Loss of alternating current (ac) power to station auxiliaries
- Loss of normal feedwater flow
- Feedwater system pipe break

Section 15.2 of the Turkey Point Unit 6 and 7 COL FSAR, Revision 8, incorporates by reference, Section 15.2, "Decrease in Heat Removal by the Secondary System," of Revision 19 of the AP1000 DCD.

In addition, in the Turkey Point Units 6 and 7 COL FSAR the applicant provided the following:

Departures

- PTN DEP 6.3-1

The applicant provided additional information about PTN DEP 6.3-1 in Section 15.2.6 of the FSAR related to quantifying the duration that the passive residual heat removal system heat exchanger can maintain safe shutdown conditions, changing the indefinite duration to greater than 14 days. This information, as well as related PTN DEP 6.3-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.1 of this report.

- PTN DEP 3.2-1

The applicant provided additional information about PTN DEP 3.2-1 in Section 15.2 of the FSAR related to the performance of the condensate return portion of the Passive Core Cooling System. This information, as well as related PTN DEP 3.2-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.1 of this report.

The NRC staff reviewed Section 15.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this section. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

15.3 Decrease in Reactor Coolant System Flow Rate

Analyses focused on the decrease in RCS flow rate address AOOs and accidents that could result in a decrease in the RCS flow rate. Decreased flow rate can be caused by:

- Partial loss of forced reactor coolant flow
- Complete loss of forced reactor coolant flow
- Reactor coolant pump (RCP) shaft seizure (locked motor)
- RCP shaft break

Section 15.3 of the Turkey Point Unit 6 and 7 COL FSAR, Revision 8, incorporates by reference, Section 15.3, "Decrease in Reactor Coolant System Flow Rate," of Revision 19 of the AP1000 DCD.

In addition, in the Turkey Point Units 6 and 7 COL FSAR the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Section 15.3.3 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the DBA radiological consequences analyses, including calculated

doses to control room operators and offsite. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

The NRC staff reviewed Section 15.3 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this section. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

15.4 Reactivity and Power Distribution Anomalies

15.4.1 Introduction

Analyses focused on reactivity and power distribution anomalies address AOOs and accidents that could result in anomalies in the reactivity or power distribution in the reactor core.

Reactivity and power distribution anomalies can be caused by:

- Uncontrolled rod cluster control assembly (RCCA) bank withdrawal from a subcritical or low-power startup condition
- Uncontrolled RCCA bank withdrawal at power
- RCCA misalignment
- Startup of an inactive RCP at an incorrect temperature
- Chemical and volume control system malfunction that results in a decrease in the boron concentration in the reactor coolant
- Inadvertent loading and operation of a fuel assembly in an improper position
- Spectrum of RCCA ejection accidents

15.4.2 Summary of Application

Section 15.4 of the Turkey Point Unit 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 15.4 of the AP1000 DCD, Revision 19.

In addition, in Section 15.4 of the Turkey Point Unit 6 and 7 COL FSAR the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Sections 15.4.8 and 15.4.10 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability

of the main control room and changes to the DBA radiological consequences analyses, including calculated doses to control room operators and offsite. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

Generic Letter 85-05

In its letter dated August 23, 2010, the applicant endorsed a letter dated January 22, 2010, from the VEGP applicant that proposed to include Generic Letter (GL) 85-05, "Inadvertent Boron Dilution Events," in Table 1.9-204 of the FSAR as part of STD COL 1.9-2 to address Bulletins and GLs.

15.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

15.4.4 Technical Evaluation

The NRC staff reviewed Section 15.4 of the Turkey Point Unit 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to reactivity and power distribution anomalies. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Unit 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Unit 6 and 7 Units 2 and 3 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Unit 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Unit 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Unit 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 15.4.4 of the VEGP SER:

Generic Letter 85-05

*GL 85-05, "Inadvertent Boron Dilution Events," informed each PWR licensee of the NRC staff position resulting from the evaluation of Generic Issue 22, "Inadvertent Boron Dilution Events," and urges each licensee to ensure that its plants have adequate protection against boron dilution events. GL 85-05 was evaluated as a part of the AP1000 DCD review, and the evaluation was documented in NUREG-1793, Chapter 20. GL 85-05 was resolved based on the analyses of inadvertent boron dilution events described in AP1000 DCD Section 15.4.6, which show that in all modes of operation the inadvertent boron dilution is prevented or responded to by automatic functions, or sufficient time is available for operator action to terminate the transient. The staff also stated that COL applicants should develop plant-specific emergency operating procedures (EOPs) that address the boron dilution events. The development of EOPs is identified as COL Information Item 13.5-1, Plant Procedures, which is addressed in BLN FSAR Section 13.5. Therefore, based on the above, the applicant needs to reinsert a reference to GL 85-05 in FSAR Table 1.9-204 and provide a cross reference to COL Information Item 13.5-1. This is **Open Item 15.4-1**.*

Resolution of Standard Content Open Item 15.4-1

*To address Open Item 15.4-1 in the BLN SER with open items, the VEGP applicant stated in its letter dated January 22, 2010, that VEGP COL FSAR Table 1.9-204, "Generic Communications Assessment," would be revised to list GL 85-05 with a cross-reference to VEGP COL FSAR Section 13.5. Until this change is incorporated in a future version of the VEGP COL FSAR, this item is being tracked as **Confirmatory Item 15.4-1**.*

Resolution of Standard Content Confirmatory Item 15.4-1

Confirmatory Item 15.4-1 is an applicant commitment to revise its FSAR Table 1.9-204 to list GL 85-05 with a cross-reference to VEGP COL FSAR Section 13.5. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 15.4-1 is now closed.

15.4.5 Post Combined License Activities

There are no post-COL activities related to this section.

15.4.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Unit 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Unit 6 and 7 COL FSAR related to GL 85-05 is acceptable. Plant-specific EOPs, which will include responding to abnormal events such as the boron dilution events discussed in GL 85-05, are evaluated by the staff in Section 13.5 of this SER. PTN DEP 6.4-1, related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.

15.5 Increase in Reactor Coolant Inventory

Analyses focused on the increase in reactor coolant inventory address AOOs that could result in an increase in RCS inventory. Increased inventory can be caused by:

- Inadvertent operation of the core makeup tanks during power operation
- Chemical and volume control system malfunctions that increases reactor coolant inventory

Section 15.5 of the Turkey Point Unit 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 15.5, "Increase in Reactor Coolant Inventory," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Unit 6 and 7 COL application are documented in NUREG-1793 and its supplements.

15.6 Decrease in Reactor Coolant Inventory

Analyses focused on the decrease in reactor coolant inventory address AOOs and accidents that could result in a decrease in RCS inventory. Decreased inventory can be caused by the following:

- Inadvertent opening of a pressurizer safety valve or inadvertent operation of the automatic depressurization system
- Failure of small lines carrying primary coolant outside containment
- Steam generator tube failure
- LOCA resulting from a spectrum of postulated piping breaks within the reactor coolant pressure boundary (RCPB)

Section 15.6 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 15.6, "Decrease in Reactor Coolant Inventory," of Revision 19 of the AP1000 DCD.

In addition, in the Turkey Point Units 6 and 7 COL FSAR the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Sections 15.6.2, 15.6.3, 15.6.5, and 15.6.6 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the DBA radiological consequences analyses, including calculated doses to control room operators and offsite. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

AP1000 COL Information Item

- PTN COL 2.3-4

The applicant provided additional information in PTN COL 2.3-4, related to site-specific χ/Q values. The effect of PTN COL 2.3-4 on the design-basis accident (DBA) radiological consequences analyses is addressed in Section 15A of this SER.

The NRC staff reviewed Section 15.6 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this section. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

15.7 Radioactive Release From a Subsystem or Component

15.7.1 Introduction

The group of events considered includes the following:

- Gas waste management system leak or failure
- Liquid waste management system leak or failure (atmospheric release)
- Release of radioactivity to the environment via liquid pathways
- Fuel handling accident
- Spent fuel cask drop accident

15.7.2 Summary of Application

Section 15.7 of the Turkey Point Unit 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 15.7 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Unit 6 and 7 COL FSAR, Section 15.7 the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Section 15.7.4 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the DBA radiological consequences analyses, including calculated doses to control room operators and offsite. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

AP1000 COL Information Item

- PTN COL 15.7-1

The applicant provided additional information in PTN COL 15.7-1 to address COL Information Item 15.7-1, "Consequences of Tank Failures." This COL item is addressed by the applicant in Turkey Point Unit 6 and 7 COL FSAR Section 2.4.13.

15.7.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the radioactive release from a subsystem or component are given in Section 11.2 of NUREG-0800, including Branch Technical Position (BTP) 11-6, and Section 2.4.13 of NUREG-0800, Acceptance Criterion Number 5.

The regulatory basis for acceptance of the supplementary information on consequences of a tank failure is established in:

- 10 CFR Part 20, "Standards for protection against radiation," Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage"
- 10 CFR 20.1301, "Dose limits for individual members of the public"
- 10 CFR 20.1406, "Minimization of contamination"
- 10 CFR Part 50, "Domestic licensing of production and utilization facilities," Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criteria (GDC) 60, "Control of Releases of Radioactive Materials to the Environment," and GDC 61, "Fuel Storage and Handling and Radioactivity Control"
- 10 CFR 50.34a, "Design objectives for equipment to control releases of radioactive material in effluents—nuclear power reactors"
- 10 CFR 50.36a, "Technical specifications on effluents from nuclear power reactors"
- 10 CFR 52.80(a), "Contents of applications; additional technical information"

- Regulatory Guide (RG) 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning"
- RG 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1
- RG 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," Revision 1
- RG 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants," Revision 2, Regulatory Position C.1.1

15.7.4 Technical Evaluation

The NRC staff reviewed Section 15.7 of the Turkey Point Unit 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the radioactive release from a subsystem or component. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Unit 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Unit 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 15.7-1

COL Information Item 15.7-1 states:

Combined License applicant referencing the AP1000 certified design will perform an analysis of the consequences of potential release of radioactivity to the environment due to a liquid tank failure as outlined in Subsection 15.7.3.

The applicant addresses the consequence of a liquid waste tank failure in Turkey Point Unit 6 and 7 COL FSAR Section 2.4.13. The staff's evaluation of liquid waste tank failure is described in Section 11.2, "Liquid Waste Management Systems," of this SER.

15.7.5 Post Combined License Activities

There are no post-COL activities related to this section.

15.7.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point

Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Unit 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Unit 6 and 7 COL FSAR is acceptable and meets the regulatory guidance in Sections 2.4.13 and 11.2 of NUREG-0800. The staff based its conclusion on the following:

- PTN DEP 6.4-1, related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.
- PTN COL 15.7-1 is acceptable based on the evaluations in Sections 2.4.13 and 11.2 of this SER.

15.8 Anticipated Transients Without Scram

Analyses focused on anticipated transients without scram (ATWS) address an AOO during which an automatic reactor scram is required but fails to occur due to a common mode fault in the reactor protection system.

Section 15.8 of the Turkey Point Unit 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 15.8, "Anticipated Transients Without Scram," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Unit 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Appendix 15A Evaluation Models and Parameters for Analysis of Radiological Consequences of Accidents

15A.1 Introduction

This appendix includes the parameters and models that form the basis of the radiological consequences analyses for the various postulated accidents.

15A.2 Summary of Application

In the Turkey Point Unit 6 and 7 COL FSAR, Revision 8, Chapter 15, "Accident Analyses," the applicant incorporated by reference Appendix 15A to Chapter 15, "Accident Analysis," of the AP1000 DCD, Revision 19.

In addition, in the Turkey Point Unit 6 and 7 COL FSAR the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Appendix 15A of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main

control room and changes to the DBA radiological consequences analyses, including calculated doses to control room operators and offsite. PTN DEP 6.4-1 revises the analysis of the radiological consequences described in this section of the SER. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

AP1000 COL Information Item

- PTN COL 2.3-4

In Turkey Point Unit 6 and 7 COL FSAR Sections 15.6 and 15A, the applicant provided additional information in PTN COL 2.3-4 on site-specific χ/Q values to partially resolve COL Information Item 2.3-4. The applicant provided additional information in Turkey Point Unit 6 and 7 COL FSAR Section 2.3.4 to resolve the remaining portion of COL Information Item 2.3-4, and the staff's review of this portion is in Section 2.3.4 of this SER.

15A.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the accident analyses are given in Section 15.0.3 of NUREG-0800.

Requirements for the technical information in the FSAR for the application for a COL are given in 10 CFR 52.79. In particular, 10 CFR 52.79(a)(1)(vi) requires a description and safety assessment of the site on which the facility is to be located, including an evaluation of the offsite radiological consequences of postulated accidents to show that the site characteristics comply with the following offsite radiological consequence evaluation factors:

- (A) An individual located at any point on the exclusion area boundary (EAB) for any 2-hour period following the onset of the postulated fission product release, would not receive a radiation dose in excess of 0.25 Sievert (Sv) (25 roentgen equivalent man (rem)) total effective dose equivalent (TEDE).
- (B) An individual located at any point on the outer boundary of the low population zone (LPZ), who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage) would not receive a radiation dose in excess of 0.25 Sv (25 rem) TEDE.

Applications for DCs must include similar evaluations to show compliance with 10 CFR 52.47(a)(2), which includes the same offsite radiological consequence evaluation factors as given in 10 CFR 52.79(a)(1). In other words, both the AP1000 DCD and the COL FSAR must have DBA radiological consequences analyses that estimate a dose at or below 0.25 Sv (25 rem) TEDE at the EAB and LPZ receptors.

Compliance with the control room habitability dose requirements of 10 CFR Part 50, Appendix A, GDC 19, "Control Room," requires that the applicant show that, for a plant located at the Turkey Point Unit 6 and 7 site, the control room provides adequate radiation protection to

ensure that radiation exposures shall not exceed 0.05 Sv (5 rem) TEDE to permit access and occupancy of the control room under accident conditions for the duration of the accident.

15A.4 Technical Evaluation

The NRC staff reviewed Appendix 15A to Chapter 15 of the Turkey Point Unit 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to radiological consequences of accidents. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Unit 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Unit 6 and 7 COL FSAR:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Appendix 15A of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the DBA radiological consequences analyses, including calculated doses to control room operators and offsite. This information revises the analysis of the radiological consequences described in this section of the SER and is reviewed in Section 21.2 of this SER.

PTN DEP 6.4-1 is based on revised DBA radiological consequence analyses that make changes to specific parameters and methodologies that were used in the DBA radiological consequence analyses discussed in AP1000 DCD Chapter 15. The remainder of the analysis assumptions, inputs, and methodologies are the same as given in AP1000 DCD that the staff previously evaluated and found acceptable in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," Initial Report, Section 15.3.

AP1000 COL Information Item

- PTN COL 2.3-4

In Turkey Point Unit 6 and 7 COL FSAR Sections 15.6 and 15A, the applicant stated that it provided additional information in PTN COL 2.3-4 to partially resolve COL Information Item 2.3-4, which states:

Combined License applicants referencing the AP1000 certified design will address the site-specific χ/Q values specified in [DCD] Subsection 2.3.4. For a site selected that exceeds the bounding χ/Q values, the Combined License applicant will address how the radiological consequences associated with the controlling design basis accident continue to meet the dose reference values given in 10 CFR Part 50.34 and control room operator dose limits given in General Design Criteria 19 using site-specific χ/Q values. The Combined License applicant should consider topographical characteristics in the vicinity of

the site for restrictions of horizontal and/or vertical plume spread, channeling or other changes in airflow trajectories, and other unusual conditions affecting atmospheric transport and diffusion between the source and receptors. No further action is required for sites within the bounds of the site parameters for atmospheric dispersion.

With regard to assessment of the postulated impact of an accident on the environment, the COL applicant will provide χ/Q values for each cumulative frequency distribution which exceeds the median value (50 percent of the time).

The commitment was also captured as COL Action Items 2.3.4-1, 2.3.4-2, and 2.3.4-3 in Appendix F of NUREG-1793, which states:

The COL applicant will determine the site specific χ/Q values. If the site-specific values exceed the bounding χ/Q values, the COL applicant will address how the radiological consequences associated with the controlling DBA continue to meet the radiological dose consequence criteria given in Title 10, Section 50.34(a)(1)(ii)(D)(1) and (2), of the *Code of Federal Regulations* (10 CFR 50.34), using site-specific χ/Q values.

The COL applicant will determine the site specific χ/Q values. If the site-specific values exceed the bounding χ/Q values, the COL applicant will address how the radiological consequences associated with the controlling DBA continue to meet the control room operator dose limits given in General Design Criteria 19, using site -specific χ/Q values.

The COL applicant will provide χ/Q values for each cumulative frequency distribution that exceeds the median value (50 percent of the time).

PTN COL 2.3-4 added text to the end of Section 15.6.5.3.7.3 and Section 15A.3.3 of the AP1000 DCD to state that the site-specific atmospheric dispersion (χ/Q) values provided in Turkey Point Unit 6 and 7 COL FSAR Section 2.3 are bounded by the values given in AP1000 DCD Table 15A-5, "Offsite Atmospheric Dispersion factors (χ/Q) For Accident Dose Analysis," (offsite receptors) and Table 15A-6, "Control Room Atmospheric Dispersion Factors (χ/Q) For Accident Dose Analysis" (control room receptors).

The NRC staff reviewed the impact of the site-specific χ/Q values given in response to PTN COL 2.3-4 on the radiological consequences of DBAs. The applicant did not provide site-specific doses at the EAB, LPZ, or control room for the DBAs referenced in AP1000 DCD, Chapter 15, but instead incorporated by reference the analysis of the radiological consequences in AP1000 DCD, Chapter 15.

AP1000 DCD, Chapter 15, over several sections, describes and provides results of the radiological consequences analyses for the DBAs applicable to the AP1000 design. A list of the DBAs analyzed for radiological consequences and the corresponding sections where the radiological consequences analyses for those DBAs are discussed in the AP1000 DCD is given below.

<u>DCD Section</u>	<u>Design Basis Accident</u>
15.1.5.4	Main Steam Line Break
15.3.3.3	Reactor Coolant Pump Shaft Seizure (Locked Rotor)
15.4.8.3	Control Rod Ejection
15.6.2	Small Line Break
15.6.3.3	Steam Generator Tube Rupture
15.6.5.3	Loss of Coolant Accident (LOCA)
15.7.4.3	Fuel Handling Accident

The DBA radiological consequences analyses in the AP1000 DCD used design reference values for the accident atmospheric dispersion factors in place of site-specific values. The χ/Q values are the only input to the DBA radiological consequences analyses that are affected by the site characteristics. To resolve PTN COL 2.3-4, the applicant discussed the Turkey Point Unit 6 and 7 site-specific short-term (accident) χ/Q values in Turkey Point Unit 6 and 7 COL FSAR Section 2.3.4. The Turkey Point Unit 6 and 7 site-specific EAB and LPZ χ/Q values for DBAs are given in Turkey Point Unit 6 and 7 COL FSAR Table 2.0-201, and the control room χ/Q values for DBAs are given in Turkey Point Unit 6 and 7 COL FSAR Table 2.0-202. In Section 2.3.4 of this SER, the NRC staff discusses its review of the Turkey Point Unit 6 and 7 site-specific χ/Q values and resolution to PTN COL 2.3-4.

The estimated DBA dose calculated for a particular site is affected by the site characteristics through the calculated χ/Q input to the analysis; therefore, the resulting dose would be different than that calculated generically for the AP1000 design in the DCD. All other inputs and assumptions in the radiological consequences analyses remain the same as in the DCD. Smaller χ/Q values are associated with greater dilution capability, resulting in lower radiological doses. When comparing a DCD site parameter χ/Q value and a site characteristic χ/Q value, the site is acceptable for the design if the site characteristic χ/Q value is smaller than the site parameter χ/Q value. Such a comparison shows that the site has better dispersion characteristics than that required by the reactor design.

For each of the DBAs, the Turkey Point Unit 6 and 7 site-specific χ/Q values for each time averaging period are less than the comparable design reference χ/Q values used by Westinghouse in the AP1000 DCD radiological consequences analyses. Since the result of the radiological consequences analysis for a DBA during any time period of radioactive material release from the plant is directly proportional to the χ/Q for that time period, and because the Turkey Point Unit 6 and 7 site-specific χ/Q values are less than the comparable AP1000 DCD design reference χ/Q values for all time periods and all accidents, then the Turkey Point Unit 6 and 7 site-specific estimated total dose for each DBA is, therefore, less than the AP1000 DCD estimated total dose for each DBA.

Since the AP1000 DCD Chapter 15 DBA radiological consequences analyses show that the offsite radiological consequences meet the regulatory dose requirements of 10 CFR 52.47(a)(2) and the control room consequences meet the regulatory dose requirements of GDC 19, and since, by the logic above, the Turkey Point Unit 6 and 7 site-specific DBA radiological consequences are estimated to be less than those calculated in AP1000 DCD, then the applicant has sufficiently shown that the DBA offsite radiological consequences meet the requirements of 10 CFR 52.79(a)(1) and the DBA control room radiological consequences meet the requirements of GDC 19.

The effect of the site-specific χ/Q values on the Technical Support Center radiological habitability is evaluated by the NRC staff in SER Section 13.3 as part of its evaluation of PTN DEP 18.8-1.

15A.5 Post Combined License Activities

There are no post-COL activities related to this section.

15A.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Unit 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Unit 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR 52.79(a)(1) and 10 CFR Part 50, Appendix A, GDC 19. The staff based its conclusion on the following:

- PTN DEP 6.4-1 provides additional information related to design changes affecting habitability of the main control room and changes to the DBA radiological consequences analyses, including calculated doses to control room operators and offsite. This information revises the analysis of the radiological consequences described in this section of the SER and is reviewed and found acceptable by the staff in Section 21.2 of this SER.
- PTN COL 2.3-4 is acceptable because the DBA offsite radiological consequences meet the requirements of 10 CFR 52.79(a)(1) and the DBA control room radiological consequences meet the requirements of GDC 19.

Appendix 15B Removal of Airborne Activity from the Containment Atmosphere Following a LOCA

This appendix includes information related to the AP1000 design, which does not depend on active systems to remove airborne particulates or elemental iodine from the containment atmosphere following a postulated LOCA with core melt. The AP1000 applicant stated that naturally occurring passive removal processes provide significant removal capability such that airborne elemental iodine is reduced to very low levels within a few hours and the airborne particulates are reduced to extremely low levels within 12 hours.

Appendix 15B of the Turkey Point Unit 6 and 7 COL FSAR, Revision 8, incorporates by reference, Appendix 15B, "Removal of Airborne Activity from the Containment Atmosphere Following a LOCA," of Revision 19 of the AP1000 DCD.

In addition, in the Turkey Point Units 6 and 7 COL FSAR the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Appendix 15B of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

The NRC staff reviewed Appendix 15B of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this section. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Table 15.0-1. Power Calorimetric Uncertainty Methodology

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
<p>4. The plant calorimetric uncertainty and plant instrumentation performance is bounded by the 1 percent calorimetric uncertainty value assumed for the initial reactor power in the safety analysis.</p>	<p>Inspection will be performed of the plant operating instrumentation installed for feedwater flow measurement, its associated power calorimetric uncertainty calculation, and the calculated calorimetric values.</p>	<p>a) the as-built system takes input for feedwater flow measurement from a Caldon [Cameron] LEFM CheckPlus™ System; b) the power calorimetric uncertainty calculation documented for that instrumentation is based on an NRC-accepted Westinghouse methodology and the uncertainty values for that instrumentation are not lower than those for the actual installed instrumentation; and c) the calculated calorimetric power uncertainty measure values are bounded by the 1 percent uncertainty value assumed for the initial reactor power in the safety analysis.</p>

16.0 TECHNICAL SPECIFICATIONS

This chapter discusses the plant-specific technical specifications (PTS), as well as the design reliability assurance program (D-RAP) and the controls for systems, structures, and components (SSCs) required for defense-in-depth in accordance with the program for regulatory treatment of nonsafety systems (RTNSS).

16.1 Technical Specifications

16.1.1 Introduction

Section 16.1, "Technical Specifications," of the Turkey Point, Units 6 and 7 combined license (COL) Final Safety Analysis Report (FSAR), and the Turkey Point, Units 6 and 7 COL Part 4, "Technical Specifications," provide the PTS for Turkey Point Units 6 and 7, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.36, "Technical specifications," and 10 CFR 52.79(a)(30). Technical Specifications (TS) impose limits, operating conditions, and other requirements upon reactor facility operation for the public health and safety. The TS are derived from the analyses and evaluations in the safety analysis report. In general, TS must include: (1) safety limits and limiting safety system settings; (2) limiting conditions for operation (LCO); (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls. The PTS are derived from the analyses and evaluations in the AP1000 Design Control Document (DCD) and the Turkey Point Units 6 and 7 COL FSAR.

As part of the regulatory standardization effort, the U.S. Nuclear Regulatory Commission (NRC) staff has prepared standard technical specifications (STS) for each of the light-water reactor nuclear steam supply systems and associated balance-of-plant equipment systems. In 1992, the NRC issued the STS to clarify the content and format of requirements necessary to ensure safe operation of nuclear power plants. The STS for Westinghouse pressurized water reactors are included in NUREG-1431, "Standard Technical Specifications - Westinghouse Plants." Volume 1 addresses the STS, and Volume 2 addresses the associated STS Bases. The STS include bases for safety limits, limiting safety system settings, LCO, and associated action and surveillance requirements. Major revisions to the STS were published in 1995 (Revision 1), 2001 (Revision 2), and 2004 (Revision 3).

The format and content of the PTS and Bases for a COL referencing a certified design should be based on the generic TS (GTS) and Bases for that design. For a COL application that references a certified design, the proposed PTS and Bases may include appropriate plant-specific departures from the referenced GTS and Bases when warranted. These departures, if included with the COL application, need to be justified to demonstrate that the requirements of 10 CFR 50.36 are met.

16.1.2 Summary of Application

Section 16.1 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Sections 16.1.1 and 16.1.2 of the AP1000 DCD, Revision 19. Part 4 of the Turkey Point Units 6 and 7 COL incorporates by reference the AP1000 GTS and Bases in Section 16.1 of the DCD. In accordance with Section IV(A)(2)(c) of Appendix D, "Design Certification Rule for the AP1000 Design" to 10 CFR Part 52, "Licenses, certifications, and approvals for nuclear power plants," the applicant's PTS consist of the AP1000 GTS and site-specific information. The applicant took departures from the AP1000 GTS.

The AP1000 GTS includes items that a COL applicant must satisfy in order to complete a particular GTS provision. Detailed design information, equipment selection, instrumentation settings, and other information not available at the time of design certification (DC), are needed to establish the values or information to be included in the PTS. Locations for the addition of this information are signified in the GTS by square brackets [] or reviewer's notes to indicate that the COL applicant must provide plant-specific values or alternate text.

In Turkey Point Units 6 and 7 COL application Part 4, the applicant provided the following:

Departures

- PTN DEP 3.2-1

The applicant provided additional information about PTN DEP 3.2-1 in Turkey Point Units 6 and 7 COL Part 4, including changes to TS SR 3.5.4.7 and corresponding Bases, Bases B3.3.3 (LCO Section), and Bases B3.5.4 (Background Section), related to design modifications to the condensate return portion of the Passive Core Cooling System. This information, as well as related PTN DEP 3.2-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.1 of this SER.

- PTN DEP 6.4-1

The applicant provided additional information about PTN DEP 6.4-1 in Turkey Point Units 6 and 7 COL Part 4, including changes to TS LCO 3.7.4, TS SR 3.7.4.1, and Bases 3.4.10, 3.7.4, and 3.7.6 related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

- PTN DEP 6.4-2

The applicant provided additional information about PTN DEP 6.4-2 in Turkey Point Units 6 and 7 COL Part 4, including changes to TS 3.3.2 and corresponding Bases and TS 3.7.6 and corresponding Bases related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR, is reviewed in Section 21.3 of this SER.

- PTN DEP 7.3-1

The applicant provided additional information about PTN DEP 7.3-1 in Turkey Point Units 6 and 7 COL Part 4, including changes to the Bases for TS 3.3.1, as well as TS Table 3.3.2-1 and associated Bases, related to required design changes for the PMS source range neutron flux doubling logic to comply with the requirements of IEEE Std. 603-1991, Clause 6.6. This information, as well as related PTN DEP 7.3-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.5 of this SER.

AP1000 COL Information Item

- PTN COL 16.1-1

The applicant provided additional information in PTN COL 16.1-1 to resolve COL Information Item 16.1-1 (COL Action Item 16.2-1). The applicant provided additional information to address each of the remaining brackets [] and reviewer's notes in the AP1000 GTS.

The following sections of the Turkey Point Units 6 and 7, PTS and Bases include information that the applicant addressed as part of COL Information Item 16.1-1:

- PTS 3.3.1, 3.3.2, and 3.6.4
- PTS 4.1, 4.1.1, and 4.1.2
- PTS 5.1.1, 5.1.2, 5.2.1.a, 5.2.1.b, 5.2.2, 5.3, 5.3.1, 5.6.1, and 5.6.2

16.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for TS and Bases reviews are given in Section 16 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)." Areas of review that interface with other sections of the standard review plan (SRP) can also be found in Section 16 of NUREG-0800.

The applicable regulatory requirements for the information being reviewed in this section are:

- 10 CFR 50.36
- 10 CFR 52.79(a)(30)

16.1.4 Technical Evaluation

The NRC staff reviewed Section 16.1 of the Turkey Point Units 6 and 7 COL FSAR and Part 4 of the Turkey Point Units 6 and 7 COL application, and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic¹. The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the TS. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL

¹ See Section 1.2.2 for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a DC.

application (Vogtle Electric Generating Plant [VEGP], Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application.

Many VEGP SER section numbers were changed from those used in the BLN SER to more closely follow the PTS numbering. Therefore, the corresponding BLN SER section numbers are frequently identified when quoting standard content material from the SER for the reference COL application (VEGP).

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR and the Turkey Point Units 6 and 7 COL application, Part 4:

AP1000 COL Information Item

- PTN COL 16.1-1

The following portion of this technical evaluation section is reproduced from Section 16.1.4 of the VEGP SER:

The following portion of this technical evaluation section is reproduced from Section 16.1.4 of the BLN SER:

In Section 16.1.1 of the BLN COL FSAR, the applicant provided additional information in BLN COL 16.1-1 to resolve COL Information Item 16.1-1 (COL Action Item 16.2-1) listed under the Section 16.1.1 header, "Combined License Information," of the AP1000 DCD, Revision 17, which states:

This set of technical specifications is intended to be used as a guide in the development of the plant-specific technical specifications. The preliminary information originally provided in brackets [] has been revised with the updated information APP-GW-GLR-064 and APP-GW-GLN-075. Combined License applicants referencing the AP1000 will be required to provide the

final information for the remaining brackets [] with final plant-specific information.

In Section 16.1 of the BLN COL FSAR, the applicant noted that the GTS and Bases provided with Chapter 16 of the AP1000 DCD are incorporated by reference into the PTS provided in Part 4 of the BLN COL application.

The staff evaluated the applicant's disposition of each of the remaining bracketed information items in the respective TS sections listed below.

The staff did not review portions of the BLN PTS and Bases that were identical to the AP1000 GTS and Bases. The technical evaluation for those portions that are identical to the AP1000 GTS and Bases can be found in the NRC staff's FSER for the AP1000 DCD.

16.1.4.1 Use and Application

Section 1.0 of the BLN PTS includes definitions of terms used in the context of plant TS, and examples to illustrate the applications of logical connectors, completion times for required actions, and frequencies for surveillance requirements (SRs). Section 1.0 of the BLN PTS is identical to the AP1000 GTS. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.2 Safety Limits

Section 2.0 of the BLN PTS and Bases include[s] requirements for safety limits to ensure that the fuel design limits are not exceeded during steady state conditions, normal operational transients, and anticipated operational occurrence. Section 2.0 of the BLN PTS and Bases are [is] identical to the AP1000 GTS and Bases. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.3.0 Limiting Condition for Operation and Surveillance Requirement Applicability

The following portion of this technical evaluation section is reproduced from Section 16.1.4.3 of the BLN SER:

Section 3.0 of the BLN PTS and Bases include[s] general provisions regarding determination of equipment operability and performance of SRs in specific TS sections (i.e., TS 3.1 through TS 3.9). Section 3.0 of the BLN PTS and Bases are [is] identical to the AP1000 GTS and Bases. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.3.1 Reactivity Control Systems

The following portion of this technical evaluation section is reproduced from Section 16.1.4.4 of the BLN SER:

Section 3.1 of the BLN PTS and Bases include[s] requirements for the reactivity control systems which are designed to reliably control reactivity changes, and under postulated accident conditions, ensure that the capability to cool the core is maintained. Section 3.1 of the BLN PTS and Bases are [is] identical to the AP1000 GTS and Bases. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.3.2 Power Distribution Limits

The following portion of this technical evaluation section is reproduced from Section 16.1.4.5 of the BLN SER:

Section 3.2 of the BLN PTS and Bases include[s] requirements for the reactor core power distribution limits which are designed to reliably control core thermal limits and core power distribution consistent with the design safety analysis. Section 3.2 of the BLN PTS and Bases are [is] identical to the AP1000 GTS and Bases. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.3.3 Instrumentation

The following portion of this technical evaluation section is reproduced from Section 16.1.4.6 of the BLN SER:

Section 3.3 of the BLN PTS and Bases include[s] requirements for the instrumentation systems that display information required to protect against violating core fuel design limits and Reactor Coolant System (RCS) integrity, and to mitigate accidents.

The BLN instrumentation will be selected after COL issuance, and therefore, in accordance with COL/DC-ISG-8, "Necessary Content of Plant-Specific Technical Specifications When a Combined License is Issued," all trip setpoints and allowable values must be established through a staff-approved administrative control TS that specifies use of an NRC-approved methodology for determining the trip setpoints and allowable values, and a document controlled by 10 CFR 50.59 for recording this information. The trip setpoints and allowable values, referred to in Tables 3.3.1-1 and 3.3.2-1, will be determined after selection of specific instrumentation.

Request for additional information (RAI) 16-1 was issued in accordance with COL/DC-ISG-8, and requested that the applicant identify the method of determining the trip setpoints and allowable values, as well as establish an associated document in which to record the site-specific values and other restrictions necessary to satisfy 10 CFR 50.36. The applicant should clarify that after selection of specific instrumentation, the trip setpoints and allowable values, referred to in Tables 3.3.1-1 and 3.3.2-1, will be calculated using the setpoint control program that specifies the approved methodology (i.e., WCAP-16361, APP-PMS-JEP-001, Revision 0, May 2006, "Westinghouse Setpoint Methodology for Protection Systems – AP1000"). In addition, the applicant should propose a setpoint control program to be added in the Administrative

Control section of the TS, as stated in COL/DC-ISG-8. **This is identified as Open Item 16.1-1.**

Resolution of Standard Content Open Item 16.1-1

Resolution to this issue was brought forward at a public meeting on September 3, 2009, attended by the staff, Westinghouse, and the AP1000 COL applicants. Westinghouse committed to provide an acceptable setpoint control program in the AP1000 DC amendment application, which would then be adoptable by any COL applicants. This program was submitted to the staff in a letter dated February 19, 2010, and revised on May 6, 2010. The review of this program is documented in a supplement to NUREG-1793.

The applicant, in its May 21, 2010, supplemental response to this open item, committed to calculate trip setpoints and allowable values using the approved methodology cited above and to incorporate the AP1000 DCD setpoint control program in the Administrative Controls section of its PTS. The staff finds this response acceptable, since it ensures the applicant will use approved methodologies and a comprehensive administrative program to calculate setpoint values. The incorporation of this program into the VEGP TS in a later revision is **Confirmatory Item 16.1-1.**

Resolution of Standard Content Confirmatory Item 16.1-1

Confirmatory Item 16.1-1 is an applicant commitment to revise its PTS to incorporate the AP1000 DCD setpoint control program in the Administrative Controls section of its PTS. The staff verified that the PTS was appropriately revised. As a result, Confirmatory Item 16.1-1 is now closed. [The Administrative controls section of the Turkey Point Units 6 and 7 PTS cites Revision 1 of WCAP-16361, consistent with the GTS in the AP1000 certified design.]

16.1.4.3.4 Reactor Coolant System

The following portion of this technical evaluation section is reproduced from Section 16.1.4.7 of the BLN SER:

Section 3.4 of the BLN PTS and Bases include[s] requirements for various RCS parameters (i.e., pressure, temperature, flow, etc.) and subsystems (i.e., RCS loops, pressurizer, low-temperature overpressure protection, etc.) to ensure the fuel integrity and the RCPB [reactor coolant pressure boundary] integrity are preserved during all modes of plant operation. Section 3.4 of the BLN PTS and Bases are [is] identical to the AP1000 GTS and Bases. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.3.5 Emergency Core Cooling Systems

The following portion of this technical evaluation section is reproduced from Section 16.1.4.8 of the BLN SER:

Section 3.5 of the BLN PTS and Bases include[s] requirements for the safety-related passive core cooling system, which is designed to perform

emergency core decay heat removal, RCS emergency makeup and boration, and safety injection. Section 3.5 of the BLN PTS and Bases are [is] identical to the AP1000 GTS and Bases. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.3.6 Containment Systems

The following portion of this technical evaluation section is reproduced from Section 16.1.4.9 of the BLN SER:

Section 3.6 of the BLN PTS and Bases include[s] requirements for the containment systems, which are designed to shield [contain] fission products that may be in the containment atmosphere following accident conditions. Section 3.6 of the BLN PTS and Bases are [is] identical to the AP1000 GTS and Bases, except for the deletion of a reviewer's note. For TS 3.6.4, the reviewer's note is not applicable to the PTS, and the applicant has appropriately removed the information. This is acceptable to the staff. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.3.7 Plant Systems

The following portion of this technical evaluation section is reproduced from Section 16.1.4.10 of the BLN SER:

Section 3.7 of the BLN PTS and Bases include[s] requirements for various systems in the secondary side of the steam generators (i.e., the main steam safety valves, the main steam isolation valves, the main feedwater isolation valves, etc.), the spent fuel pool water level and makeup systems, and the main control room habitability system. Section 3.7 of the BLN PTS and Bases are [is] identical to the AP1000 GTS and Bases. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.3.8 Electrical Power Systems

The following portion of this technical evaluation section is reproduced from Section 16.1.4.11 of the BLN SER:

Section 3.8 of the BLN PTS and Bases include[s] requirements for the plant electrical systems that provide redundant, diverse and dependable power sources for all plant operating conditions. In the event of a total loss of off-site power, batteries and back-up on-site diesel generators are provided to supply electrical power equipment necessary for the safe shutdown of the plant. Section 3.8 of the BLN PTS and Bases are [is] identical to the AP1000 GTS and Bases. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.3.9 Refueling Operations

The following portion of this technical evaluation section is reproduced from Section 16.1.4.12 of the BLN SER:

Section 3.9 of the BLN PTS and Bases include[s] requirements for boron concentration, unborated water sources, nuclear instrumentation, containment penetrations, and water inventory in the refueling pool during Mode 6.
Section 3.9 of the BLN PTS and Bases are [is] identical to the AP1000 GTS and Bases. There is no site-specific information that the applicant needed to provide to complete this section.

16.1.4.4 Design Features

Section 4.0 of the Turkey Point Units 6 and 7 PTS includes other design features not covered elsewhere in the PTS such as the site location, the site maps, and other information related to core design and fuel storage design. Section 4.0 of the Turkey Point Units 6 and 7, PTS is identical to the AP1000 GTS except for site-specific information provided by the applicant. In PTS Section 4.1, the applicant provided the Turkey Point Units 6 and 7 site location information to replace the bracketed information in the GTS. The staff found the added information acceptable since it is consistent with related information found in FSAR Chapter 2, and in accordance with guidance provided in the GTS. In FSAR Section 2.1.1.1 the applicant describes its site location and figure 2.1-201 shows the site and the surrounding area. Figure 2.1-202 illustrates the general location of the Turkey Point plant property and surrounding sites within 10 miles. FSAR Section 2.1.2 also includes information regarding the exclusion area boundary, which is provided on Figure 2.1-204. The staff found the added information acceptable since it is consistent with related information found in Turkey Point Units 6 and 7 COL FSAR Chapter 2, and in accordance with the guidance provided in the GTS. In Section 4.1.2 of the Turkey Point Units 6 and 7 PTS, the applicant also provided the site location in Figure 4.1-1 and a description of the radius, which establishes its low population zone. The staff found the added information acceptable since it is consistent with related information found in Turkey Point Units 6 and 7 COL FSAR Section 2.1.3.4, and is in accordance with the guidance provided in the GTS.

The following portion of this technical evaluation section is reproduced from Section 16.1.4.5 of the VEGP SER:

16.1.4.5 Administrative Controls

The following portion of this technical evaluation section is reproduced from Section 16.1.4.14 of the BLN SER:

This section of the BLN PTS includes provisions, which address various administrative controls related to plant key personnel responsibilities, plant procedures, special programs and reports, etc., to ensure the plant is safely operated. As discussed in Section 16.1.4.6 above, [SER Section 16.1.4.3.3 for Turkey Point Units 6 and 7] the BLN instrumentation will be selected after COL issuance, and therefore, in accordance with COL/DC-ISG-8, all trip setpoints and allowable values must be established through a staff-approved administrative control TS that specifies use of an NRC-approved methodology for determining the trip setpoints and allowable values, and a document controlled by 10 CFR 50.59 for recording this information. The trip setpoints and allowable values, referred to in Tables 3.3.1-1 and 3.3.2-1, will be determined after selection of specific instrumentation.

*The staff issued RAI 16-1 and requested that the applicant identify the method of determining the trip setpoints and allowable values, as well as establish an associated document in which to record the site-specific values and other restrictions necessary to satisfy 10 CFR 50.36. The applicant should clarify that after selection of specific instrumentation, the trip setpoints and allowable values, referred to in Tables 3.3.1-1 and 3.3.2-1, will be calculated using the setpoint control program that specifies the approved methodology (i.e., WCAP-16361, APP-PMS-JEP-001, Revision 0, May 2006, "Westinghouse Setpoint Methodology for Protection Systems – AP1000"). In addition, the applicant should propose a setpoint control program to be added in the Administrative Control section of the TS, as stipulated in COL/DC-ISG-8. **This is identified as Open Item 16.1-1.***

Resolution of Standard Content Open Item 16.1-1

*The resolution of this issue is discussed in the evaluation of Section 16.1.4.3.3, "Instrumentation," above. The applicant committed to adopting the setpoint control program approved in the AP1000 DC, which will be verified in a future revision of the VEGP TS. This is **Confirmatory Item 16.1-1.***

Resolution of Confirmatory Item 16.1-1

Confirmatory Item 16.1-1 is an applicant commitment to revise its PTS to incorporate the AP1000 DCD setpoint control program in the Administrative Controls section of its PTS. The staff verified that the PTS was appropriately revised. As a result, Confirmatory Item 16.1-1 is now closed. [The Administrative controls section of the Turkey Point Units 6 and 7 PTS cites Revision 1 of WCAP-16361, consistent with the GTS in the AP1000 certified design.]

The following portion of this technical evaluation section is reproduced from Section 16.1.4.14 of the BLN SER:

In Section 5.3.1 of the BLN PTS, the applicant replaced the GTS bracketed information, clarifying that each member of the unit staff shall meet or exceed minimum qualifications of RG [Regulatory Guide] 1.8, Revision 3 except for during cold license operator training where portions of RG 1.8, Revision 2 will apply. The staff finds this acceptable because RG 1.8, Revision 3 does not address cold license operator training. In other respects, Sections 5.0, 5.1.1, 5.1.2, 5.2.1a, 5.2.1b, 5.2.2, 5.3, 5.6.1, and 5.6.2 of the BLN PTS are identical to the AP1000 GTS, except for site-specific information provided by the applicant to replace the bracketed information in the GTS. The site-specific information provided was administrative in nature and the staff found it acceptable.

In Section 5.2.2 of the VEGP PTS, the applicant proposed to remove the brackets around the COL item related to unit staff organization, as well as removing work hour restrictions in TS 5.2.2.d. The applicant refers to 73 Federal Register (FR) 79923 which provides the NRC's model application for adopting TSTF-511, Revision 0, "Eliminate Working Hour Restrictions from TS 5.2.2 to Support Compliance with 10 CFR Part 26 ["Fitness for Duty Programs"]." The staff finds this deletion acceptable since it conforms to the guidance provided in

the TSTF and working hour restrictions in 10 CFR Part 26, and therefore, is no longer required to be in the TS. This appropriately meets the intent of completing this bracketed information.

16.1.5 Post Combined License Activities

There are no post-COL activities related to this section.

16.1.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements. The staff based its conclusions on the following:

- PTN DEP 3.2-1, related to design modifications to the condensate return portion of the Passive Core Cooling System, is reviewed and found acceptable by the staff in Section 21.1 of this SER.
- PTN DEP 6.4-1, related to design changes affecting habitability of the main control room and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.
- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the main control room are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.
- PTN DEP 7.3-1, related to required design changes for the PMS source range neutron flux doubling logic to comply with the requirements of IEEE Std. 603-1991, Clause 6.6, is reviewed and found acceptable by the staff in Section 21.5 of this SER.
- PTN COL 16.1-1, related to PTS and their Bases, is acceptable because the site-specific information is either identical to the GTS or will be completed using NRC-approved methodologies.

For the reasons set forth above, the staff finds that Section 16.1 of the Turkey Point Units 6 and 7 COL FSAR and Part 4 of the Turkey Point Units 6 and 7 COL application are acceptable and satisfy the requirements of 10 CFR 50.36; 10 CFR 50.36a, "Technical specifications on effluents from nuclear power reactors"; and 10 CFR 52.79(a)(30).

16.2 Design Reliability Assurance Program (Related to RG 1.206, Section C.III.1, Chapter 17, C.I.17.4, "Reliability Assurance Program Guidance")

The D-RAP comprises the reliability assurance activities that assure that the plant is consistent with the certified design when fuel is loaded for the first time.

Section 16.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 16.2, "Design Reliability Assurance

Program,” of Revision 19 of the AP1000 DCD, which in turn refers to Section 17.4 for a description of the program. The results of the NRC staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The NRC staff’s review of the applicant’s D-RAP is documented in Section 17.4 of this SER.

16.3 Investment Protection

16.3.1 Introduction

The AP1000 design includes active systems that provide defense-in-depth capabilities (identified as “investment protection” by the applicant) for RCS makeup and decay heat removal. These active systems are the first line of defense in reducing challenges to the passive systems in the event of transients or plant upsets. Most active systems in the AP1000 design are designated as nonsafety-related. Because some active systems reduce challenges to safety-related systems to a significant degree, short-term availability controls are necessary to provide reasonable assurance that these SSCs are operable during anticipated events.

A detailed evaluation of the regulatory treatment of nonsafety systems for the AP1000 design, and the concept of investment protection, is addressed in Chapter 22 of NUREG-1793.

16.3.2 Summary of Application

Section 16.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 16.3 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 16.3, the applicant provided the following:

AP1000 COL Information Item

- STD COL 16.3-1

The applicant provided additional information in Standard (STD) COL 16.3-1 to address COL Information Item 16.3-1. This item is related to the development of a procedure to control the operability of investment protection SSCs.

16.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference, and the additional information presented in this application, is addressed in the Final Safety Evaluation Report (FSER) related to the DCD.

16.3.4 Technical Evaluation

The NRC staff reviewed Section 16.3 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff’s review confirmed that the information in the application and incorporated by reference addresses the required information relating to SSCs required for defense-in-depth. The results

of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 16.3.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 16.3-1*

The applicant provided supplemental information by adding the following statement to DCD Section 16.3-1:

Station procedures govern and control the operability of investment protection systems, structures, and components in accordance with Table 16.3-2 of the DCD, and provide the operating staff with instruction for implementing required actions when operability requirements are not met. Procedure development is addressed in FSAR Section 13.5.

Section 22.5.9 of the NRC staff's FSER related to the DCD (NUREG-1793) evaluated the short-term availability controls proposed by Westinghouse for important non-safety-related SSCs. The NRC staff concluded that the administrative controls for the SSCs required for defense in depth, listed in Table 16.3-2 of the AP1000 DCD, were acceptable. COL applicants referencing the AP1000 are responsible for developing a procedure to control the operability

of these SSCs in accordance with DCD Table 16.3-2 (COL Information Item 16.3.2-1 [16.3-1]).

The applicant's response to STD COL 16.3-1 is acceptable because there were no exceptions taken to the list of SSCs required for defense in depth nor to the administrative procedures included in AP1000 DCD Table 16.3-2. The applicant also committed to place this information in station procedures. The information in DCD Table 16.3-2 also provides the operating staff with instruction for implementing required actions when operability requirements are not met.

16.3.5 Post Combined License Activities

There are no post-COL activities related to this section.

16.3.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable based on the regulatory basis addressed in NUREG-1793. The staff based its conclusion on the following:

- STD COL 16.3-1, as related to SSCs required for defense-in-depth, is acceptable because it states that station procedures will govern and control the operability of these SSCs, in accordance with Table 16.3-2 of the AP1000 DCD, without exceptions. The information in DCD Table 16.3-2 also provides the operating staff with guidance for taking required actions when operability requirements are not met.

17.0 QUALITY ASSURANCE (RELATED TO RG 1.206, SECTION C.III.1, CHAPTER 17, C.I.17, “QUALITY ASSURANCE AND RELIABILITY ASSURANCE”)

The quality assurance (QA) program for design, fabrication, construction, testing, and operation, design reliability program, and maintenance rule (MR) program are discussed in this chapter.

17.1 Quality Assurance During the Design and Construction Phases

17.1.1 Introduction

The QA program related to design and construction activities are discussed in this section. It addresses the QA program implemented during combined license (COL) application development, including site characterization activities, design and construction phases.

17.1.2 Summary of Application

Section 17.1 of the Turkey Point Units 6 and 7 COL Final Safety Analysis Report (FSAR), Revision 8, incorporates by reference Section 17.1 of the AP1000 Design Control Document (DCD), Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 17.1, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 17.5-1

The applicant provided additional information in PTN COL 17.5-1 to address COL Information Item 17.5-1. In PTN COL 17.5-1, the applicant addresses the quality assurance program description (QAPD) under which the COL application was developed for the design and construction phases up until COL issuance. Section 17.5 of the Turkey Point Units 6 and 7 COL FSAR addresses the QA program for the remaining portion of the design and construction phases following COL issuance.

17.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design,” and its supplements.

In addition, the relevant requirements of the Commission regulations for the resolution of PTN COL 17.5-1 are established in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “Domestic licensing of production and utilization facilities,” Appendix B, “Quality assurance criteria for nuclear power plants and fuel reprocessing plants,” as required by 10 CFR 52.79(a)(25).

17.1.4 Technical Evaluation

The Nuclear Regulatory Commission (NRC) staff reviewed Section 17.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to QA during design and construction phases. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the design certification (DC) and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant (VEGP), Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER. Confirmatory items that are first identified in this SER section have a Turkey Point Units 6 and 7 designation (e.g., Confirmatory Item 17.1-1).

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 17.5-1

The NRC staff reviewed the partial resolution of PTN COL 17.5-1 related to QA during the design and construction phases until COL issuance included under Section 17.1 of the

¹ See Section 1.2.2 for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a DC.

Turkey Point Units 6 and 7 COL FSAR. The remaining information for PTN COL 17.5-1 is included in Section 17.5 of the Turkey Point Units 6 and 7 COL FSAR. The staff's review of PTN COL 17.5-1 is a combination of plant-specific evaluation and standard content evaluation.

The applicant replaced information in the AP1000 DCD, Section 17.1 with new text to address the QA program requirements for design and construction activities implemented from COL application development through operations. Upon review of the additional text provided by the applicant, the NRC staff identified areas where additional information was needed.

In RAI 6297, Question 17.01-1, dated January 27, 2012, the NRC staff requested that the applicant describe who is responsible for the establishment and execution of the quality assurance requirements during the design construction, and operations phases of the Turkey Point Units 6 and 7, including a description of the delegation for establishing and executing the quality assurance program and who has responsibility for the quality assurance program. In its letter dated February 27, 2012, the applicant agreed to include in Section 17.1 of the Turkey Point Units 6 and 7 COL FSAR, the following; "FPL is responsible for the establishment and execution of quality assurance program requirements during the design, construction, and operations phases of Turkey Point, Units 6 and 7. FPL may delegate the work of establishing and executing the quality assurance program, or any parts thereof, but retains responsibility for the quality assurance program. The NRC staff reviewed the proposed change to Section 17.1, and found it acceptable. Finally, the staff confirmed that the proposed change was included in Section 17.1 of the Turkey Point Units 6 and 7 COL FSAR, Revision 4. This item is now closed.

The NRC staff also reviewed Appendix 1AA of the Turkey Point Units 6 and 7 COL FSAR, which lists Turkey Point Units 6 and 7's conformance with NRC regulatory guides (RGs) and provides any exceptions to conformance with those RGs.

The following portion of this technical evaluation section is reproduced from Section 17.1.4 of the VEGP SER:

In addition, the applicant proposed revisions to Appendix 1AA in its letter, dated August 19, 2008, in response to the NRC staff's RAI 1-5. In its response, the applicant proposed to change the exception statements to address the version of NQA-1 instead of addressing the QAPD included in Part 11 of the BLN COL application. The NRC staff has verified that the proposed revision was incorporated into Revision 1 of the BLN COL FSAR for those RGs with QA requirements. RAI 1-5 is closed for all RGs that contain exception statement referencing NQA-1 (i.e., RG 1.28, 1.30, 1.38, 1.39, 1.94, and 1.116) except for RG 1.33.

*In RAI 01-11, dated December 16, 2008, the NRC staff requested that the applicant document the mechanism for incorporation of the requirements of RG 1.33 since these requirements are not covered by NQA-1. In its letter, dated January 27, 2009, the applicant stated that conformance with RG 1.33 will be supplemented in a future amendment to include a reference to Nuclear Energy Institute (NEI) 06-14A. The NRC staff has addressed this issue with NEI since NEI 06-14A does not commit to RG 1.33. This issue will remain open until closure is reached with NEI 06-14A or the applicant. This is identified as **Open Item 17.1-1.***

Resolution of Standard Content Open Item 17.1-1

*In its letter, dated December 31, 2009, the applicant proposed to revise VEGP COL FSAR Section 1.9, Table 1.9-201, "Regulatory Guide/FSAR Section Cross-References," to document that RG 1.33, "Quality Assurance Program Requirements (Operation)," Revision 2, is addressed in Section IV of the QAPD. Additionally, the applicant proposed to revise Appendix 1AA of the VEGP COL FSAR to document conformance to RG 1.33. Therefore, Open Item 17.1-1 is resolved for VEGP and the proposed revisions are identified as **Confirmatory Item 17.1-1**, pending formal revision of the VEGP COL FSAR.*

Resolution of Standard Content Confirmatory Item 17.1-1

Confirmatory Item 17.1-1 is an applicant commitment to revise its FSAR Table 1.9-201 and Appendix 1AA to document conformance to RG 1.33. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 17.1-1 is now closed.

PTN 6 and 7 COL FSAR, Appendix 1AA conforms to the resolution discussed above for VEGP for standard content item 17.1-1.

From February 28, 2011 through March 4, 2011, the NRC staff conducted a limited scope inspection at the Florida Power and Light Company (FPL) facility in Juno Beach, Florida, as documented in inspection report numbers 05200040/2011-201 and 05200041/2011-201 dated April 4, 2011. The purpose of the NRC inspection was to verify that the QA processes and procedures were effectively implemented with regards to the Turkey Point Units 6 and 7 COL application. During this inspection, the NRC inspectors identified two violations of NRC requirements related to the QA program and 10 CFR Part 21. FPL responded to the Notice of Violation (NOV) in a letter dated May 4, 2011. FPL identified its actions to correct and prevent recurrence of the violations and noted that full compliance was achieved. Based on the NOV and FPL's response, the staff does not intend to conduct a follow-up inspection as part of licensing.

17.1.5 Post Combined License Activities

There are no post-COL activities related to this section.

17.1.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to QA during the design and construction phase, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Based on the information provided by the applicant, the staff concludes that PTN COL 17.5-1 meets Appendix B to 10 CFR Part 50 and 10 CFR 52.79(a)(25) requirements.

17.2 Quality Assurance During the Operations Phase

Section 17.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 17.2 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

17.3 Quality Assurance During Design, Procurement, Fabrication, Inspection, and/or Testing of Nuclear Power Plant Items (Related to RG 1.206, Section C.III.1, Chapter 17, C.I.17.3, "Quality Assurance Program Description")

Section 17.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 17.3 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

17.4 Design Reliability Assurance Program (Related to RG 1.206, Section C.III.1, Chapter 17, C.I.17.4, "Reliability Assurance Program Guidance")

17.4.1 Introduction

This reliability assurance program (RAP) provides reasonable assurance that a plant is designed, constructed, and operated in a manner that is consistent with the assumptions and risk insights related to structures, systems, and components (SSCs) that are identified as being significant contributors to plant safety as determined by using probabilistic, deterministic, or other methods of analysis. The information is obtained from sources such as the plant- and site-specific probabilistic risk assessment (PRA), industry operating experience, relevant component failure databases, and expert panels.

The RAP is implemented in two stages. The first stage, the design reliability assurance program (D-RAP), comprises the reliability assurance activities providing confidence that the plant is consistent with the certified design when fuel is loaded for the first time. The second stage comprises the operational phase reliability assurance activities (OPRAAs) that are to be integrated into other programs.

17.4.2 Summary of Application

Section 17.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 17.4 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 17.4, the applicant provided the following:

Supplemental Information

- STD SUP 17.4-1

The applicant provided supplemental (SUP) information in standard (STD) SUP 17.4-1 regarding the QA requirements for nonsafety-related SSCs within the scope of D-RAP.

17.4.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the D-RAP are given in Section 17.4 of NUREG-0800. The staff requirements memorandum (SRM) on SECY-95-132, "Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs," states the following:

An application for advanced reactor DC or a COL must include: (1) the description of the RAP used during the design that includes, scope, purpose, and objectives; (2) the process used to evaluate and prioritize the SSCs in the design, based on their degree of risk significance; (3) a list of the SSCs designated as risk significant; and (4) for those SSCs designated as risk significant: (i) a process to determine dominant failure modes that considered industry experience, analytical models, and applicable requirements; and (ii) key assumptions and risk insights from probabilistic, deterministic, or other methods that considered operations, maintenance, and monitoring activities.

Each licensee that references the advanced reactor design must implement the design reliability assurance program approved by the NRC.

The Commission approved this position in the associated SRM dated June 28, 1995.

RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," describes an acceptable way to satisfy these requirements.

17.4.4 Technical Evaluation

The NRC staff reviewed Section 17.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the D-RAP. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP

Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 17.4.4 of the VEGP SER:

Supplemental Information

- *STD SUP 17.4-1*

The applicant provided supplemental information in STD SUP 17.4-1 to describe the QA requirements for nonsafety-related SSCs within the scope of D-RAP.

The following portion of this technical evaluation section is reproduced from Section 17.4.4 of the BLN SER:

No site specific structures, systems, and components (SSCs) have been added to the D-RAP. The applicant asserts that the AP1000 DCD and PRA bound all site specific hazards and associated risks. The staff's evaluation of the probabilistic methods used to reach this conclusion is documented in Chapter 19 of this safety evaluation. The staff concludes that the list of SSCs incorporated by reference to the DCD is an acceptable list for the BLN COL.

The staff noted that risk metrics may change with modifications to the plant design or other new information and requested additional information on how the applicant would address risk significant SSCs that are identified after the COL is issued (RAI 17.4-1). In its response dated September 17, 2008, the applicant stated that such changes would be captured and included in the appropriate OPRAAs in accordance with procedures developed under the QA program. In addition, the response states that the [Maintenance Rule] MR program is to be consistent with NEI 07-02A, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed under 10 CFR Part 52," which has been endorsed by the staff in a letter to NEI, dated January 24, 2008.

The MR program description calls for establishment of an expert panel prior to fuel load. As additional information is developed, such a panel alters the scope of OPRAAs as appropriate. Because this provides assurance that changes will receive appropriate review, the staff finds it acceptable; therefore, RAI 17.4-1 is closed.

*However, the staff requested that the applicant supplement the BLN COL FSAR to describe the organizational and process aspects of the RAP that will be performed by the COL holder (RAI 17.4-2). In its response dated April 9, 2009, the applicant proposed to revise the BLN COL FSAR Section 17.4 to include a standard supplement identifying the quality assurance requirements for non-safety-related SSCs within the scope of D-RAP. This is consistent with RG 1.206 and is therefore an acceptable method for meeting the Commission's policy for RAP. The staff identifies the need for a revision to the BLN COL FSAR as **Confirmatory Item 17.4-1**.*

Resolution of Standard Content Confirmatory Item 17.4-1

Confirmatory Item 17.4-1 required the applicant to update its FSAR to include a standard supplement identifying the QA requirements for non-safety-related SSCs within the scope of D-RAP. The NRC staff verified that the VEGP COL FSAR was appropriately updated with STD SUP 17.4-1. As a result, Confirmatory Item 17.4-1 is resolved.

17.4.5 Post Combined License Activities

There are no post-COL activities related to this section.

17.4.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the D-RAP, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff concludes that the relevant information presented in Section 17.4 of the Turkey Point Units 6 and 7 COL FSAR is consistent with the guidance provided in SECY-95-132, and the requirements of 10 CFR 52.47(b)(1) and 10 CFR 52.80(a). Therefore, the Turkey Point Units 6 and 7 D-RAP is acceptable.

17.5 Quality Assurance Program Description – New License Applicants (Related to RG 1.206, Section C.III.1, Chapter 17, C.I.17.5, “Quality Assurance Program Guidance”)

17.5.1 Introduction

The QA program during the design, fabrication, construction, testing, and operation phases of a nuclear power plant is discussed in this section. Implementation of the applicable portions of the QAPD referenced in Section 17.5 begins at COL issuance with full implementation of the operations-related requirements consistent with Turkey Point Units 6 and 7 COL FSAR Table 13.4-201, "Operational Programs Required by NRC Regulations."

17.5.2 Summary of Application

In Part 11 of the Turkey Point Units 6 and 7 COL application, the applicant provided a QAPD to be in place during the design, construction, and operations phases. This QAPD will be incorporated by reference in Section 17.5 of the Turkey Point Units 6 and 7 COL FSAR.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 17.5, the applicant provided the following:

AP1000 COL Information Items

- PTN COL 17.5-1

The applicant provided additional information in PTN COL 17.5-1 to address COL Information Item 17.5-1. PTN COL 17.5-1 addresses the QA program in place during the design, construction, and operations phases.

- STD COL 17.5-2

The applicant provided additional information in STD COL 17.5-2 to address COL Information Item 17.5-2. STD COL 17.5-2 addresses QA programs for procurement, fabrication, installation, construction, and testing of SSCs in the plant.

- STD COL 17.5-4

The applicant provided additional information in STD COL 17.5-4 to address COL Information Item 17.5-4. STD COL 17.5-4 addresses the QA program for operations.

- STD COL 17.5-8

The applicant provided additional information in STD COL 17.5-8 to address COL Information Item 17.5-8. STD COL 17.5-8 addresses operational RAP integration with the QA program.

17.5.3 Regulatory Basis

The acceptance criteria associated with the relevant requirements of the Commission regulations for the QAPD are given in Section 17.5 of NUREG-0800.

The applicable regulatory requirements for the QAPD are as follows:

Appendix B to 10 CFR Part 50, requires that the application include a description of the QA program to be applied to the design, fabrication, construction, and testing of the SSCs of the facility and establishes QA requirements for the design, construction, and operation of those SSCs. The pertinent requirements of Appendix B apply to all activities affecting the

safety-related functions of the SSCs, including designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, and modifying.

Section 10 CFR 52.79(a)(17) requires that the application include information with respect to compliance with technically relevant positions of the Three Mile Island requirements of 10 CFR 50.34(f).

Section 10 CFR 52.79(a)(25) requires that the description of the QA program include a discussion of how the applicable requirements of Appendix B have been and will be satisfied, and also include a discussion of how the QA program will be implemented.

Further, 10 CFR 52.79(a)(27) requires that the application include information on the managerial and administrative controls to be used for a nuclear power plant and include a discussion of how the applicable requirements of Appendix B will be satisfied.

17.5.4 Technical Evaluation

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER.

Although the staff concluded that the evaluation performed for the standard content is directly applicable to the Turkey Point Units 6 and 7 COL application, there were differences between the information provided by the Turkey Point Units 6 and 7 applicant and that provided by the VEGP applicant regarding details in the FSAR and the QAPD. The resolutions of these differences for Turkey Point Units 6 and 7 are evaluated by the staff following the standard content material to which they apply.

The following portion of this technical evaluation section is reproduced from Section 17.5.4 of the VEGP SER:

The NRC staff reviewed Section 17.5 of the BLN COL FSAR and the QAPD provided in Part 11 of the BLN COL application. In RAI 17.5-9, dated May 12, 2008, the NRC staff requested that the applicant explain why the QAPD provided in Part 11 of the BLN COL application is not referenced or incorporated by reference in the BLN COL FSAR Section 17.5. In its letters, dated June 26, 2008, and October 16, 2008, the applicant proposed to revise Section 17.5 of the BLN COL FSAR to state that the QAPD is incorporated by reference. In addition, the applicant proposed to revise Section 17.5 of the BLN COL FSAR to provide the title of the QAPD that is incorporated by reference. The NRC staff has reviewed the proposed revisions to Section 17.5 and concluded that the proposed changes are responsive to RAI 17.5-9. The NRC staff has verified that the proposed revision was incorporated into Revision 1 of the BLN COL FSAR. RAI 17.5-9 is closed.

*The NRC staff has verified that the proposed revision to incorporate the QAPD by reference was incorporated into the VEGP COL FSAR. In its letter dated January 29, 2010, the applicant proposed to revise Section 17.5 of the VEGP COL FSAR to provide the title of the QAPD that is incorporated by reference. This item is identified as **Confirmatory Item 17.5-1**, pending formal revision of the VEGP COL FSAR.*

Resolution of Standard Content Confirmatory Item 17.5-1

Confirmatory Item 17.5-1 is an applicant commitment to revise its FSAR Section 17.5 to specify the title of the QAPD. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 17.5-1 is now closed.

In a letter dated October 5, 2010, the applicant noted that the standard content material provided by VEGP in its letters dated January 29, 2010, and April 2, 2010, with reference to BLN's response to RAI 17.5-9 as standard, was not applicable since the Turkey Point Units 6 and 7 FSAR Section 17.5 currently incorporates the QAPD by reference and provides the title of the QAPD that is incorporated by reference.

In addition, the NRC staff reviewed the resolution of COL information items STD COL 17.5-2, STD COL 17.5-4, STD COL 17.5-8, and PTN COL 17.5-1, which are addressed in the Turkey Point Units 6 and 7 QAPD. The FPL-2 QAPD is based on NEI 06-14A, "Quality Assurance Program Description," Revision 7, which was approved by the NRC staff by letter, dated July 13, 2010 using Section 17.5 of NUREG-0800. The staff's review of these four COL items is a combination of plant-specific evaluation and standard content evaluation.

AP1000 COL Information Items

- STD COL 17.5-2, STD COL 17.5-4, STD COL 17.5-8 and PTN COL 17.5-1

The following portion of this technical evaluation section is reproduced from Section 17.5.4 of the VEGP SER:

The NEI 06-14A template provided generic information and format for QAPDs with bracketed areas for applicants to provide plant-specific information. The generic information in NEI 06-14A provides the information required for STD COL 17.5-2, 17.5-4, and 17.5-8. In its review of TVA QAPD, the NRC staff used Section 17.5 of NUREG-0800 and RG 1.206 as guidance. The NRC staff developed Section 17.5 of NUREG-0800 using American Society of Mechanical Engineers (ASME) standard ASME NQA-1-1994, "Quality Assurance Requirements for Nuclear Facility Applications," as supplemented by additional regulatory and industry guidance for nuclear operating facilities.

Further NRC staff evaluation of the COL review items and the FPL QAPD, "New Nuclear Projects Quality Assurance Program Description, FPL-2," Revision 3, dated September 30, 2012, (FPL-2 QAPD) is provided in the following sections.

17.5.4.1 Organization

The following portion of this technical evaluation section is reproduced from Section 17.5.4.1 of the VEGP SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.A. The QAPD describes and defines the responsibility and authority for planning, establishing, and implementing an effective overall QA program. The QAPD provides a description of an organizational structure, functional responsibilities, levels of authority, and interfaces for establishing, executing, and verifying QAPD implementation. The QAPD establishes independence between the organization responsible for checking a function and the organization that performs the function. In addition, the QAPD allows TVA management to size the QA organization commensurate with the duties and responsibilities assigned.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 1 and Supplement 1S-1.

The applicant stated in Turkey Point Units 6 and 7 COL FSAR, Section 17.5 that the FPL QAPD is based on NEI 06-14A, "Quality Assurance Program Description." The NRC staff reviewed FPL-2 QAPD Part II, Section 1, "Organization," and finds it consistent with NEI 06-14A, Revision 7.

17.5.4.2 Quality Assurance Program

The following portion of this technical evaluation section is reproduced from Section 17.5.4.2 of the VEGP SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.B. The QAPD establishes measures to implement a QA program to ensure that the design, construction, and operation of a nuclear power plant are in accordance with governing regulations and license requirements. The QA program comprises those planned and systematic actions necessary to provide confidence that SSCs will perform their intended safety function, including certain

non-safety-related SSCs and activities that are significant contributors to plant safety, as described in the applicant's FSAR. The QA program requires that a list or system identifying SSCs and activities to which the QAPD applies be maintained.

The QAPD provides measures to assess the adequacy of the QAPD and to ensure its effective implementation at least once each year or at least once during the life of the activity, whichever is shorter. The program allows the period for assessing the QAPD during the operations phase to be extended to once every 2 years. In addition, consistent with Section 17.5 of NUREG-0800, paragraph II.B.8, the QAPD applies a grace period of 90 days to activities that must be performed on a periodic basis. The next due date for the performance of an activity that invokes the 90-day grace period remains unchanged. The next due date for an activity performed before the scheduled due date is moved backwards so that the interval prescribed for the performance of the activity is not exceeded.

The QAPD also follows the guidance of Section 17.5 of NUREG-0800, paragraphs II.S and II.T. The QAPD describes measures to establish and maintain formal indoctrination and training programs for personnel performing, verifying, or maintaining activities within the scope of the QAPD to ensure that they achieve and maintain suitable proficiency. The plant's technical specifications delineate the minimum qualifications for plant and support staff. Personnel are required to complete the training for positions identified in 10 CFR 50.120, "Training and Qualification of Nuclear Power Plant Personnel," according to programs accredited by the National Nuclear Accrediting Board of the National Academy for Nuclear Training. The QAPD also provides the minimum training requirements for managers responsible for QAPD implementation, in addition to the minimum training requirements for the individuals responsible for planning, implementing, and maintaining the QAPD.

The QAPD also follows Section 17.5 of NUREG-0800, paragraph II.W. The QAPD provides measures for establishing an independent review program for activities occurring during the operational phase. In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 2 and Supplements 2S-1, 2S-2, 2S-3, and 2S-4, with the following alternatives:

- *NQA-1-1994, Supplement 2S-1, includes NQA-1-1994, Appendix 2A-1. The QAPD proposes the following alternatives to the implementation of Supplement 2S-1 and Appendix 2A-1:*
 - *NQA-1-1994, Supplement 2S-1, states that the organization designate those activities that require qualified inspectors and test personnel and establish written procedures for the qualification of these personnel. As an alternative to this requirement, the QAPD proposes that a qualified engineer may plan inspections, evaluate the capabilities of an inspector, or evaluate the training program for inspectors. For the purposes of these functions, a qualified engineer is one who has a baccalaureate degree in engineering in a discipline*

related to the inspection or test activity (i.e., electrical, mechanical, or civil engineering) and has at least 5 years of engineering work experience, with at least 2 years of this experience regarding nuclear facilities. The NRC staff evaluated this proposed alternative and determined that the designation of a qualified engineer to plan inspections, evaluate inspectors, or evaluate the inspector qualification programs is consistent with the training and qualification criteria of 10 CFR Part 50, Appendix B, Criterion II, "Quality Assurance Program," and NQA-1-1994, Supplement 2S-1. Therefore, the NRC staff concluded that this alternative is acceptable.

- *NQA-1-1994, Appendix 2A-1 provides guidance for qualifying inspection and test personnel as Level I, II, or III. As an alternative to this guidance, the QAPD proposes that personnel performing independent quality verification inspections, examinations, measurements, or tests will be required to possess qualifications equal to or better than those required for performing the task being verified. In addition, the verification performed must be within the skills of these personnel and addressed by procedures. These personnel will not be responsible for planning quality verification inspections or tests (i.e., establishing hold points and acceptance criteria in procedures, and determining responsibility for performing the inspection), evaluating inspection training programs, or certifying inspection personnel. The NRC staff evaluated this proposed alternative and determined that it is consistent with inspection and test personnel initial qualification requirements specified in Section 17.5 of NUREG-0800, paragraph II.T.5. Therefore, the NRC staff concluded that this alternative is acceptable.*
- *NQA-1-1994, Supplement 2S-2, states that nondestructive examination personnel must be qualified. As an alternative to this requirement, the QAPD proposes to follow the applicable standard cited in Sections III and XI of the ASME Boiler and Pressure Vessel Code. 10 CFR 50.55a, "Codes and Standards," also requires the use of the latest Edition and Addenda of Sections III and XI of the ASME Code. The NRC staff evaluated this proposed alternative and determined that it is consistent with the regulation in 10 CFR 50, Appendix B, Criterion II, "Quality Assurance Program." Therefore, the NRC staff concluded that this alternative is acceptable.*
- *NQA-1-1994, Supplement 2S-3, states that the prospective lead auditors must have participated in a minimum of five audits in the previous 3 years. As an alternative to this requirement, the QAPD proposes to follow the guidance provided in Section 17.5 of NUREG-0800, paragraph II.S.4.c, which states that prospective lead auditors shall demonstrate their ability to properly conduct the audit process, as implemented by the company, to effectively lead an audit team, and to effectively organize and report results, including participation in at least one nuclear audit within the year preceding the date of qualification. The NRC staff evaluated this proposed alternative and determined that it is*

consistent with the regulation in 10 CFR Part 50, Appendix B, Criterion II. Therefore, the NRC staff concluded that this alternative is acceptable.

The following portion of this technical evaluation section is reproduced from Section 17.5.4.2 of the VEGP SER:

*In RAI 17.5-5, dated May 12, 2008, the NRC staff requested that the applicant revise the TVA QAPD Part II, Section 2.5 to cite the correct regulation of 10 CFR 52.79(a)(27) versus 10 CFR 50.34(b)(6)(ii). In its response dated June 26, 2008, the applicant proposed to revise the TVA QAPD Part II, Section 2.5 consistent with the proposed wording in NEI Technical Report 06-14A, "Quality Assurance Program Description," Revision 5, dated May 2008. Revision 5 of NEI 06-14A has not been approved by the NRC staff; therefore, this issue will remain open until Revision 5 of NEI 06-14A is approved and TVA has incorporated the approved changes into the TVA QAPD. This is identified as **Open Item 17.5-1**.*

Resolution of Standard Content Open Item 17.5-1

*Revision 7 of NEI 06-14A was approved by the NRC staff in a letter dated November 3, 2009, and adequately addressed RAI 17.5-5. In a letter dated December 31, 2009, the VEGP applicant provided a markup of Revision 9 of the SNC QAPD. The NRC staff has reviewed the markup of SNC QAPD, Revision 9, and determined that conforming changes have been proposed to Section 2.5 consistent with NEI 06-14A, Revision 7. On this basis, Open Item 17.5-1 is **Confirmatory Item 17.5-7** for the VEGP COL application.*

Resolution of Standard Content Confirmatory Item 17.5-7

*Confirmatory Item 17.5-7 is an applicant commitment to revise its QAPD. The staff verified that the VEGP COL application was appropriately updated. As a result, **Confirmatory Item 17.5-7** is now closed.*

Resolution of Standard Content Confirmatory Item 17.5-7

In Revision 4 of the Turkey Point Units 6 and 7 COL application, which included Revision 3 of the FPL-2 QAPD, the applicant addressed the information related to citation of correct regulations. Specifically, the NRC staff has confirmed through review of Revision 3 of the Turkey Point Units 6 and 7 QAPD that the applicant has incorporated the applicable changes in Section 2.5 of the QAPD, and is consistent with NEI 06-14A, Revision 7; therefore, Confirmatory Item 17.5-7 is resolved for the Turkey Point Units 6 and 7 COL application.

The following portion of this technical evaluation section is reproduced from Section 17.5.4.2 of the VEGP SER:

In RAI 17.5-6, the NRC staff requested that the applicant explain how the discussion of the Independent Review Committee responsibilities in Part II, Section 2.7 of the TVA QAPD is consistent with the requirements of American National Standards Institute (ANSI) N18.7. In its response dated June 26, 2008,

*the applicant proposed to revise the TVA QAPD Part II, Section 2.7 consistent with the proposed wording in NEI 06-14A, Revision 5. This issue will remain open until Revision 5 of NEI 06-14A is approved and TVA has incorporated the approved changes into the TVA QAPD. This is identified as **Open Item 17.5-2**.*

Resolution of Standard Content Open Item 17.5-2

*NEI 06-14A, Revision 7, adequately addressed RAI 17.5-6. In a letter dated December 31, 2009, the applicant provided a markup of Revision 9 of the SNC QAPD. The NRC staff has reviewed the markup of SNC QAPD, Revision 9, and determined that conforming changes have been proposed to Section 2.7 consistent with NEI 06-14A, Revision 7. On this basis, Open Item 17.5-2 is **Confirmatory Item 17.5-8** for the VEGP COL application.*

Resolution of Standard Content Confirmatory Item 17.5-8

Confirmatory Item 17.5-8 is an applicant commitment to revise its QAPD. The staff verified that the VEGP COL application was appropriately updated. As a result, Confirmatory Item 17.5-8 is now closed.

Resolution of Standard Content Confirmatory Item 17.5-8

The NRC staff has confirmed through review of the Revision 3 of the FPL-2 QAPD that the applicant has incorporated the applicable changes in Section 2.7 of the QAPD, and is consistent with NEI 06-14A, Revision 7; therefore, confirmatory Item 17.5-8 is resolved for the Turkey Point Units 6 and 7 COL application.

The following portion of this technical evaluation section is reproduced from Section 17.5.4 of the VEGP SER:

17.5.4.3 Design Control

The following portion of this technical evaluation section is reproduced from Section 17.5.4.3 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.C. The QAPD establishes the necessary measures to control the design, design changes, and temporary modifications (e.g., temporary bypass lines, electrical jumpers and lifted wires, and temporary setpoints) of items that are subject to the provisions of the QAPD. The QAPD design process includes provisions to control design inputs, outputs, changes, interfaces, records, and organizational interfaces with the applicant and its suppliers. These provisions ensure that the design inputs (i.e., design bases and the performance, regulatory, quality, and quality verification requirements) are correctly translated into design outputs (i.e., analyses, specifications, drawings, procedures, and instructions). In addition, the QAPD provides for individuals knowledgeable in QA principles to review design documents to ensure that they contain the necessary QA requirements.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 3 and Supplement 3S-1, to establish the program for design control and verification, Subpart 2.20 for the subsurface investigation requirements, and Subpart 2.7 for the standards for computer software QA controls.

17.5.4.4 Procurement Document Control

The following portion of this technical evaluation section is reproduced from Section 17.5.4.4 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.D. The QAPD establishes the necessary administrative controls and processes to ensure that procurement documents include or reference applicable regulatory, technical, and QA program requirements. As noted in Section 17.5 of NUREG-0800, paragraph II.D.1, applicable technical, regulatory, administrative, quality, and reporting requirements (such as specifications, codes, standards, tests, inspections, special processes, and the regulation in 10 CFR Part 21, "Reporting of Defects and Noncompliance") are invoked for procurement of items and services.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 4 and Supplement 4S-1, with the following alternatives and commitment:

- *NQA-1-1994, Supplement 4S-1, Section 2.3, states that procurement documents must require suppliers to have a documented QA program that implements NQA-1-1994, Part I.*
 - *As an alternative to this requirement, the QAPD proposes that suppliers have a documented QA program that meets Appendix B to 10 CFR Part 50, as applicable to the circumstances of the procurement. The NRC staff evaluated this proposed alternative and determined that it is consistent with Appendix B, Criterion IV, "Procurement Document Control." Therefore, the NRC staff concluded that this alternative is acceptable.*
 - *As an alternative to this requirement, the QAPD proposes that procurement documents allow suppliers to work under TVA's QAPD, including implementing procedures, if suppliers do not have their own QA program. The NRC staff evaluated this proposed alternative and determined that TVA's QAPD follows the guidance in Section 17.5 of NUREG-0800, paragraph II.G, regarding "Control of Purchased Material, Equipment, and Services." Specifically, the QAPD provides measures to evaluate prospective suppliers so that only qualified suppliers are selected, acceptance actions are performed for procured products and services, and suppliers are periodically audited and evaluated to ensure that qualified suppliers continue to provide acceptable products and services. Therefore, the NRC staff concluded that this alternative is acceptable.*

- *NQA-1-1994, Supplement 4S-1, Section 3, states that procurement documents are to be reviewed before award of the contract. As an alternative to this requirement, the QAPD proposes to conduct the QA review of procurement documents through review of the applicable procurement specification, including the technical and quality procurement requirements, before contract award. In addition, procurement document changes (e.g., scope, technical, or quality requirements) will also receive QA review. The NRC staff evaluated this proposed alternative and determined that it provides adequate QA review of procurement documents before awarding the contract and after any change. Therefore, the NRC staff concluded that this alternative is acceptable.*
- *In the QAPD, TVA commits that procurement documents prepared for commercial-grade items, procured as safety-related items, shall contain technical and quality requirements such that the procured item can be appropriately dedicated. The NRC staff evaluated this proposed commitment and determined that it is consistent with NRC staff guidance in Generic Letter (GL) 89-02, "Actions to Improve the Detection of Counterfeit and Fraudulently Marked Products," dated March 21, 1989, and GL 91-05, "Licensee Commercial-Grade Procurement and Dedication Programs," dated April 9, 1991, as delineated in Section 17.5 of NUREG-0800, paragraphs II.U.1.d and II.U.1.e. Therefore, the NRC staff concluded that this commitment is acceptable.*

*In RAI 17.5-7, dated May 12, 2008, the NRC staff requested that the applicant revise TVA QAPD Part II, Section 4 to substitute "TVA's" for "licensee's" to make it clear that a supplier may work under TVA's approved QA program. In its response dated June 26, 2008, the applicant stated that current use of "licensee's" is consistent with the wording in NEI 06-14A, Revision 4, which has been approved by the NRC staff. In a letter, dated September 17, 2008, the NRC staff requested NEI to address this question as part of a future revision to NEI 06-14A. This issue will remain open until Revision 5 of NEI 06-14A is approved and TVA has incorporated the approved changes into the TVA QAPD. This is identified as **Open Item 17.5-3**.*

Resolution of Standard Content Open Item 17.5-3

*NEI 06-14A, Revision 7, adequately addressed RAI 17.5-7. In a letter dated December 31, 2009, the applicant provided a markup of Revision 9 of the SNC QAPD. The NRC staff has reviewed the markup of SNC QAPD, Revision 9, and determined that conforming changes have been proposed to Section 4 consistent with NEI 06-14A, Revision 7. On this basis, Open Item 17.5-3 is **Confirmatory Item 17.5-9** for the VEGP COL application.*

Resolution of Standard Content Confirmatory Item 17.5-9

Confirmatory Item 17.5-9 is an applicant commitment to revise its QAPD. The staff verified that the VEGP COL application was appropriately updated. As a result, Confirmatory Item 17.5-9 is now closed.

17.5.4.5 Instructions, Procedures, and Drawings

The following portion of this technical evaluation section is reproduced from Section 17.5.4.5 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.E. The QAPD establishes the necessary measures and governing procedures to ensure that activities affecting quality are prescribed by and performed in accordance with documented instructions, procedures, and drawings.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 5, to establish procedural controls.

17.5.4.6 Document Control

The following portion of this technical evaluation section is reproduced from Section 17.5.4.6 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.F. The QAPD establishes the necessary measures and governing procedures to control the preparation, review, approval, issuance, and changes of documents that specify quality requirements or prescribe measures for controlling activities affecting quality, including organizational interfaces. The QAPD provides measures to ensure that the same organization that performed the original review and approval also review and approve revisions or changes to documents, unless other organizations are specifically designated.

A listing of all controlled documents identifying the current approved revision or date is maintained so personnel can readily determine the appropriate document for use. To ensure effective and accurate procedures during the operational phase, applicable procedures are reviewed and updated as necessary, consistent with NRC staff guidance provided in Section 17.5 of NUREG-0800, paragraph II.F.8.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 6 and Supplement 6S-1, to establish provisions for document control.

17.5.4.7 Control of Purchased Material, Equipment, and Services

The following portion of this technical evaluation section is reproduced from Section 17.5.4.7 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.G. The QAPD establishes the necessary measures and governing

procedures to control the procurement of items and services to ensure conformance with specified requirements. The program provides measures to evaluate prospective suppliers so that only qualified suppliers are selected. In addition, the program requires that suppliers be periodically audited and evaluated to ensure that qualified suppliers continue to provide acceptable products and services.

The program provides for acceptance actions, such as source verification, receipt inspection, pre- and post-installation tests, and review of documentation, such as certificates of conformance, to ensure that procurement, inspection, and test requirements have been satisfied before relying on the item to perform its intended safety function. Purchased items (such as components, spares, and replacement parts necessary for plant operation, refueling, maintenance, and modifications) and services are subject to quality and technical requirements at least equivalent to those specified for original equipment or by properly reviewed and approved revisions to ensure that the items are suitable for the intended service and are of acceptable quality, consistent with their effect on safety.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 7 and Supplement 7S-1, to establish procurement verification control, with the following exceptions and alternatives:

- *NQA-1-1994, Basic Requirement 7 and Supplement 7S-1, state that procurement sources and suppliers' performance are to be evaluated. As an exception to these requirements, the QAPD proposes that other 10 CFR Part 50 licensees (other than TVA), authorized nuclear inspection agencies, the National Institute of Standards and Technology (NIST), and other State and Federal agencies that may provide items or services to TVA are not required to be evaluated or audited.*

The NRC staff acknowledges that 10 CFR Part 50 licensees, authorized nuclear inspection agencies, the National Voluntary Laboratory Accreditation Program (NVLAP) administered by NIST, and other state and federal agencies perform work under quality programs acceptable to the NRC, and that no additional audits or evaluations are required. However, TVA remains responsible for ensuring that procured items or services conform to its Appendix B program, applicable ASME Boiler and Pressure Vessel Code requirements, and other regulatory requirements and commitments. TVA also remains responsible for ensuring that the items or services are suitable for the intended application and for documenting the evaluation that supports this conclusion. The proposed exception provides an appropriate level of quality and safety. The NRC staff determined that this exception is acceptable as documented in a previous SE.

- *Section 17.5 of NUREG-0800, paragraph II.L.8, establishes provisions for the procurement of commercial-grade calibration services for safety-related applications. As an exception to these provisions, the QAPD proposes that procurement source evaluation and selection*

measures not be required, provided all of the following conditions are met:

- Purchase documents impose additional technical and administrative requirements to satisfy any licensee-specific QAPD and technical requirements.*
- Purchase documents require reporting as-found calibration data when calibrated items are found to be out of tolerance.*
- A documented review of the supplier's accreditation will be performed and will include a verification of the following:*
 - o The calibration laboratory holds a domestic accreditation by any one of the following accrediting bodies, which are recognized by the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA):*
 - National Voluntary Laboratory Accreditation Program (NVLAP), administered by the National Institute of Standards & Technology,*
 - American Association for Laboratory Accreditation (A2LA).*
 - o The accreditation encompasses ANSI/ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories."*
 - o The published scope of accreditation for the calibration laboratory covers the necessary measurement parameters, range, and uncertainties.*

*The NRC staff evaluated and found to be acceptable the NVLAP and A2LA accreditation programs. In RAI 17.5-13, dated May 12, 2008, the NRC staff requested that the applicant justify the wording discrepancy between TVA QAPD Part II, Section 7.2 and Section 17.5 of NUREG-0800, Section II.L.8.c, regarding the NRC approved alternative for commercial grade calibration services. In its response dated June 24, 2008, the applicant stated that wording is consistent with the wording in NEI 06-14A, Revision 4, which has been approved by the NRC staff. In a letter, dated September 17, 2008, the NRC staff requested NEI to address this question as part of Revision 5 to NEI 06-14A. This issue will remain open until Revision 5 of NEI 06-14A is approved and TVA has incorporated the approved changes into the TVA QAPD. This is identified as **Open Item 17.5-4**.*

Resolution of Standard Content Open Item 17.5-4

NEI 06-14A, Revision 7, adequately addressed RAI 17.5-13. In a letter dated December 31, 2009, the VEGP applicant provided a markup of Revision 9 of the SNC QAPD. The NRC staff has reviewed the markup of SNC QAPD, Revision 9,

and determined that conforming changes have been proposed to Section 7.2 consistent with NEI 06-14A, Revision 7. On this basis, Open Item 17.5-4 is **Confirmatory Item 17.5-10** for the VEGP COL application.

Resolution of Standard Content Confirmatory Item 17.5-10

Confirmatory Item 17.5-10 is an applicant commitment to revise its QAPD. The staff verified that the VEGP COL application was appropriately updated. As a result, Confirmatory Item 17.5-10 is now closed.

The following portion of this technical evaluation section is reproduced from Section 17.5.4.7 of the BLN SER:

- NQA-1-1994, Supplement 7S-1, Section 8.1, states that documentary evidence that items conform to procurement documents shall be available at the nuclear facility site prior to installation or use. As an alternative to the requirement for procurement documentary evidence to be available at the nuclear facility site during construction. The QAPD proposes that documentary evidence may be stored in physical form or in electronic media, under the control of TVA or its supplier(s), at a location(s) other than the nuclear facility site, as long as the documents can be accessed at the nuclear facility site during construction. After completion of construction, TVA will have sufficient documentary evidence to support operations. The NRC staff determined that implementation of this alternative would allow access to and review of the necessary procurement documentary evidence at the nuclear facility site, both before installation and use. Therefore, the NRC staff concluded that this alternative is acceptable.
- As an alternative to the requirements for the control of commercial-grade items and services in NQA-1-1994, Supplement 7S-1, Section 10, TVA commits in the QAPD to follow NRC guidance discussed in GL 89-02 and GL 91-05. In addition, TVA commits to establish and describe special quality verification requirements in applicable documents to assure that the commercially procured items will perform satisfactorily in service. In addition, the documents should provide for determining critical characteristics, technical evaluation, receipt requirements, and quality evaluation of the items to ensure that the items are suitable for their intended use. The NRC staff determined that this alternative will improve detection of counterfeit and fraudulently marked products and will improve the commercial-grade dedication programs. This alternative is consistent with the guidance of Section 17.5 of NUREG-0800, paragraphs II.U.1.d and II.U.1.e. Therefore, the NRC staff concluded that this alternative is acceptable.
- As an alternative to the requirements for the control of commercial-grade items and services in NQA-1-1994, Supplement 7S-1, Section 10, TVA commits to use other appropriate approved regulatory means and controls to support TVA commercial grade dedication activities. One example of this is NRC Regulatory Issue Summary (RIS) 2002-22, "Use of EPRI/NEI Joint Task Force Report, 'Guideline on Licensing Digital Upgrades: EPRI TR-102348, Revision 1, NEI 01-01: A Revision of EPRI TR-102348 to Reflect Changes to

the 10 CFR 50.59 Rule.” TVA will assume 10 CFR Part 21 reporting responsibility for all items that TVA dedicates as safety-related.

*In RAI 17.5-14, the NRC staff requested that the applicant provide an explanation as to how RIS 2002-22 represents an example of other approved regulatory means for commercial grade dedication activities. In its response dated June 24, 2008, the applicant stated that wording is consistent with the wording in NEI 06-14A, Revision 4, which has been approved by the NRC staff. In a letter, dated September 17, 2008, the NRC staff requested NEI to address this question as part of Revision 5 to NEI 06-14A. This issue will remain open until Revision 5 of NEI 06-14A is approved and TVA has incorporated the approved changes into the TVA QAPD. This is identified as **Open Item 17.5-5**.*

Resolution of Standard Content Open Item 17.5-5

*NEI 06-14A, Revision 7, adequately addressed RAI 17.5-14. In a letter dated December 31, 2009, the VEGP applicant provided a markup of Revision 9 of the SNC QAPD. The NRC staff has reviewed the markup of SNC QAPD, Revision 9, and determined that conforming changes have been proposed to Section 7.2 consistent with NEI 06-14A, Revision 7. On this basis, Open Item 17.5-5 is **Confirmatory Item 17.5-11** for the VEGP COL application.*

Resolution of Standard Content Confirmatory Item 17.5-11

Confirmatory Item 17.5-11 is an applicant commitment to revise its QAPD. The staff verified that the VEGP COL application was appropriately updated. As a result, Confirmatory Item 17.5-11 is now closed.

17.5.4.8 Identification and Control of Materials, Parts, and Components

The following portion of this technical evaluation section is reproduced from Section 17.5.4.8 of the BLN SER:

TVA’s QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.H. The QAPD establishes the necessary measures for the identification and control of items such as materials, including consumables and items with limited shelf life, parts, components, and partially fabricated subassemblies. The identification of items is maintained throughout fabrication, erection, installation, and use so that the item can be traced to its documentation, consistent with the item’s effect on safety.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 8 and Supplement 8S-1, to establish provisions for identification and control of items.

17.5.4.9 Control of Special Processes

The following portion of this technical evaluation section is reproduced from Section 17.5.4.9 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.I. The QAPD establishes programs, procedures, and processes to ensure that special processes requiring interim process controls to ensure quality, such as welding, heat treating, chemical cleaning, and nondestructive examinations are implemented and controlled in accordance with applicable codes, specifications, and standards.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 9 and Supplement 9S-1, to establish measures for the control of special processes.

17.5.4.10 Inspection

The following portion of this technical evaluation section is reproduced from Section 17.5.4.10 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.J. The QAPD establishes the necessary measures to implement inspections that ensure items, services, and activities affecting safety meet established requirements and conform to applicable documented specifications, instructions, procedures, and design documents. The inspection program establishes requirements for planning inspections, determining applicable acceptance criteria, setting the frequency of inspection, and identifying special tools needed to perform the inspection. Properly qualified personnel independent of those who performed or directly supervised the work are required to perform the inspections.

In the QAPD, TVA commits to comply with NQA-1-1994, Basic Requirement 10, Supplement 10S-1, and Subparts 2.4, 2.5, and 2.8, to establish inspection requirements, with the following commitment and alternative:

- NQA-1-1994, Subpart 2.4, requires the use of the Institute of Electrical and Electronic Engineers (IEEE) Standard 336-1985, "IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities." IEEE Standard 336-1985 refers to IEEE 498-1985, "IEEE Standard Requirements for the Calibration and Control of Measuring and Test Equipment Used in Nuclear Facilities." Each of these standards uses the definition of safety systems equipment from IEEE Standard 603-1980, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations." IEEE Standard 603-1980 defines "safety system" as:*

Those systems (the reactor trip system, an engineered safety feature, or both, including all their auxiliary supporting features and other auxiliary feature) which provide a safety function. A safety system is comprised of more than one safety group of which any one safety group can provide the safety function.

The QAPD must commit to the definition of safety systems equipment from IEEE Standard 603-1980 to appropriately implement NQA-1-1994, Subpart 2.4. In the QAPD, TVA commits to the definition of safety systems equipment from IEEE Standard 603-1980, but does not commit to the balance of IEEE Standard 603-1980. This definition applies only to equipment in the context of Subpart 2.4. The NRC staff determined that the use of the definition of safety systems equipment is acceptable because it is consistent with the requirements of NQA-1-1994, Subpart 2.4.

- *NQA-1-1994, Supplement 10S-1, Section 3.1, states that inspection personnel shall not report to the immediate supervisor who is responsible for performing the work being inspected. As an alternative to this requirement, the QAPD proposes that QA inspectors will report to quality control management while performing such inspections. The NRC staff determined that the use of this alternative is consistent with guidance provided in Section 17.5 of NUREG-0800, paragraph II.J.1. Therefore, the NRC staff concluded that this alternative is acceptable.*

*In a letter dated December 31, 2009, the VEGP applicant provided a markup of Revision 9 of the SNC QAPD that includes the alternative to NQA-1-1994, Supplement 10S-1, Section 3.1, discussed above. The NRC staff has reviewed the markup of SNC QAPD, Revision 9, and determined that the proposed changes are consistent with the alternative evaluated in the BLN SER. These items are identified as **Confirmatory Item 17.5-12**, pending NRC review of the revised QAPD as referenced in Section 17.5 of the VEGP COL FSAR.*

Resolution of Standard Content Confirmatory Item 17.5-12

Confirmatory Item 17.5-12 is an applicant commitment to revise its QAPD. The staff verified that the VEGP COL application was appropriately updated. As a result, Confirmatory Item 17.5-12 is now closed.

The following portion of this technical evaluation section is reproduced from Section 17.5.4 of the VEGP SER:

17.5.4.11 *Test Control*

The following portion of this technical evaluation section is reproduced from Section 17.5.4.11 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.K. The QAPD establishes the necessary measures and governing provisions to demonstrate that items subject to the provisions of the QAPD will perform satisfactorily in service, that the plant can be operated safely as designed, and that the operation of the plant, as a whole, is satisfactory.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 11 and Supplement 11S-1, to establish provisions for testing.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Supplement 11S-2 and Subpart 2.7, to establish provisions to ensure that computer software used in applications affecting safety be prepared, documented, verified, tested, and used such that the expected outputs are obtained and configuration control maintained.

17.5.4.12 Control of Measuring and Test Equipment

The following portion of this technical evaluation section is reproduced from Section 17.5.4.12 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.L. The QAPD establishes the necessary measures to control the calibration, maintenance, and use of measuring and test equipment that provide information important to safe plant operation.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 12 and Supplement 12S-1, to establish provisions for control of measuring and test equipment, with the following clarification and exception:

- The QAPD clarifies that the out-of-calibration conditions, described in paragraph 3.2 of Supplement 12S-1 of NQA-1-1994, refer to cases where the measuring and test equipment are found to be out of the required accuracy limits (i.e., out of tolerance) during calibration. The NRC staff determined that the clarification for the out-of-calibration conditions is consistent with Supplement 12S-1. Therefore, the NRC staff concluded that this clarification is acceptable.*
- As an alternative to the NQA-1-1994, Subpart 2.4, Section 7.2.1, calibration labeling requirements, the QAPD proposes that, when it is impossible or impractical to mark equipment with required calibration information because of equipment size or configuration, the required calibration information will be documented and traceable to the equipment. The NRC staff determined that this alternative is consistent with NRC staff guidance provided in Section 17.5 of NUREG-0800, paragraph II.L.3. Therefore, the NRC staff concluded that this alternative is acceptable.*

17.5.4.13 Handling, Storage, and Shipping

The following portion of this technical evaluation section is reproduced from Section 17.5.4.13 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.M. The QAPD establishes the necessary measures to control the handling, storage, packaging, shipping, cleaning, and preservation of items to prevent inadvertent damage or loss and to minimize deterioration.

In the QAPD, TVA commits to comply with NQA-1-1994, Basic Requirement 13 and Supplement 13S-1, and to establish provisions for handling, storage, and shipping. In the QAPD, TVA also commits to comply with NQA-1-1994, Subparts 2.1 and 2.2 during the construction and pre-operations phase of the plant, as applicable, with the following alternative:

- *NQA-1-1994, Subpart 2.2, Section 6.6, states that the preparation of records must include information on personnel access to QA records. The QAPD establishes the necessary measures to document personnel authorized to access storage areas and recording personnel access. However, the QAPD proposes to not consider these documents as quality records. As an alternative, SNC will retain these documents in accordance with plant administrative controls. The NRC staff determined that these records do not meet the classification of a quality record as defined in NQA-1-1994, Supplement 17S-1, Section 2.7. Therefore, the NRC staff concluded that this alternative is acceptable.*
- *NQA-1-1994, Subpart 2.2, Section 7.1, refers to Subpart 2.15 for requirements related to handling of items. The QAPD clarifies that the scope of Subpart 2.15 includes hoisting, rigging and transporting of items for nuclear power plants during construction. The NRC staff has determined that this clarification is acceptable because it distinguishes between the requirements for construction and operation.*

NQA-1-1994, Subpart 3.2, Appendix 2.1, Section 3, provides cleaning recommendations and precautions. In a letter dated December 31, 2009, the VEGP applicant proposed a revision to the SNC QAPD to clarify that only the precautions in Section 3 are committed to in accordance with RG 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants," Revision 1. The NRC staff has determined that this clarification is acceptable because commitment to Subpart 3.2,

Appendix 2.1, Section 3 is consistent with Regulatory Position 3 of RG 1.37. These items are identified as Confirmatory Item 17.5-13, pending NRC review of the revised QAPD as referenced in Section 17.5 of the VEGP COL FSAR.

Resolution of Standard Content Confirmatory Item 17.5-13

Confirmatory Item 17.5-13 is an applicant commitment to revise its QAPD. The staff verified that the VEGP COL application was appropriately updated. As a result, Confirmatory Item 17.5-13 is now closed.

17.5.4.14 Inspection, Test, and Operating Status

The following portion of this technical evaluation section is reproduced from Section 17.5.4.14 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.N. The QAPD establishes the necessary measures to identify the

inspection, test, and operating status of items and components subject to the provisions of the QAPD to maintain personnel and reactor safety and avoid inadvertent operation of equipment.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 14, for identifying inspection, test, and operating status.

17.5.4.15 Nonconforming Materials, Parts, or Components

The following portion of this technical evaluation section is reproduced from Section 17.5.4.15 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.O. The QAPD establishes the necessary measures to control items, including services that do not conform to specified requirements to prevent inadvertent installation or use. Nonconformances are evaluated for their impact on operability of quality SSCs to ensure that the final condition does not adversely affect safety, operation, or maintenance of the item or service. The results of evaluations of conditions adverse to quality are analyzed to identify quality trends, documented, and reported to upper management in accordance with applicable procedures.

In addition, the QAPD provides for establishing the necessary measures to implement the requirements of Subparts A and C of 10 CFR Part 52, 10 CFR 50.55(e), and 10 CFR Part 21, as applicable.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 15 and Supplement 15S-1, to establish measures for nonconforming material.

17.5.4.16 Corrective Action

The following portion of this technical evaluation section is reproduced from Section 17.5.4.16 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.P. The QAPD establishes the necessary measures to promptly identify, control, document, classify, and correct conditions adverse to quality. The QAPD requires personnel to identify known conditions adverse to quality. Reports of conditions adverse to quality are analyzed to identify trends. Significant conditions adverse to quality are documented and reported to responsible management. In the case of suppliers working on safety-related activities or similar situations, TVA may delegate specific responsibility for the corrective action program, but TVA maintains responsibility for the program's effectiveness.

In addition, the QAPD provides for establishing the necessary measures to implement a reporting program in accordance with the requirements of 10 CFR Part 21.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 16, to establish a corrective action program.

17.5.4.17 Quality Assurance Records

The following portion of this technical evaluation section is reproduced from Section 17.5.4.17 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.Q. The QAPD establishes the necessary measures to ensure that sufficient records of items and activities affecting quality are generated, identified, retained, maintained, and retrievable.

Concerning the use of electronic records storage and retrieval systems, the QAPD complies with the NRC guidance given in RIS 2000-18, "Guidance on Managing Quality Assurance Records in Electronic Media," dated October 23, 2000, and associated Nuclear Information and Records Management Association (NIRMA) guidelines TG 11-1998, TG 15-1998, TG 16-1998 and TG 21-1998.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 17 and Supplement 17S-1, to establish provisions for records, with the following alternative:

- *NQA-1-1994, Supplement 17S-1, Section 4.2(b) states that records must be firmly attached in binders or placed in folders or envelopes for storage in steel file cabinets or on shelving in containers. As an alternative to this requirement, the QAPD proposes that hard-copy records be stored in steel cabinets or on shelving in containers, except that methods other than binders, folders, or envelopes may be used to organize records for storage. The NRC staff determined that this alternative is acceptable as documented in an SER dated September 1, 2005 for Nuclear Management Company.*

17.5.4.18 Quality Assurance Audits

The following portion of this technical evaluation section is reproduced from Section 17.5.4.18 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.R. The QAPD establishes the necessary measures to implement audits to verify that activities covered by the QAPD are performed in conformance with documented requirements. The audit program is reviewed for effectiveness as part of the overall audit process.

The QAPD provides for the applicant or holder to conduct periodic internal and external audits. Internal audits are conducted to determine that the program and procedures being audited comply with the QAPD. Internal audits, conducted after placing the facility in operation, are performed with a frequency

commensurate with safety significance and in such a manner as to ensure that an audit of all applicable QA program elements is completed for each functional area within a period of 2 years. External audits determine the adequacy of a supplier's or contractor's QA program.

TVA ensures that audits are documented and reviews audit results. TVA responds to all audit findings and initiates appropriate corrective actions. In addition, where corrective actions are indicated, TVA documents follow-up of applicable areas through inspections, review, re-audits, or other appropriate means to verify implementation of assigned corrective actions.

In the QAPD, TVA commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 18 and Supplement 18S-1, to establish the independent audit program.

17.5.4.19 Nonsafety-Related SSCs Quality Assurance Control

17.5.4.19.1 Nonsafety-Related SSCs - Significant Contributors to Plant Safety

The following portion of this technical evaluation section is reproduced from Section 17.5.4.19.1 of the BLN SER:

TVA's QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.V.1. The QAPD establishes program controls applied to non-safety-related SSCs that are significant contributors to plant safety and to which Appendix B does not apply. The QAPD applies specific controls to these items in a selected manner, targeting the characteristics or critical attributes that render the SSC a significant contributor to plant safety consistent with applicable sections of the QAPD.

*In RAI 17.5-7, dated November 25, 2008, the NRC staff requested that the applicant provide additional description for SNC simultaneous and similar processes and the qualifications for personnel performing these inspections. In its response, dated December 17, 2008, the applicant stated that conforming changes to the SNC QAPD will be made consistent with NEI 06-14A after the revision has been formally approved by the NRC. In a letter dated December 31, 2009, the applicant proposed a markup of Revision 9 of the SNC QAPD. The NRC staff has verified that the SNC QAPD, Revision 9, markup has deleted the language. These items are identified as **Confirmatory Item 17.5-14**, pending NRC review of the revised QAPD as referenced in Section 17.5 of the VEGP COL FSAR.*

Resolution of Standard Content Confirmatory Item 17.5-14

Confirmatory Item 17.5-14 is an applicant commitment to revise its QAPD. The staff verified that the VEGP COL application was appropriately updated. As a result, Confirmatory Item 17.5-14 is now closed.

17.5.4.19.2 Nonsafety-Related SSCs Credited for Regulatory Events

FPL-2 QAPD follows the guidance of Section 17.5 of NUREG-0800; paragraph II.V.2, to establish the quality requirements for nonsafety-related SSCs credited for regulatory events. In the QAPD, FPL commits to comply with the following regulatory guidance:

- FPL implements quality provisions for the fire protection system in accordance with Regulatory Position 1.7, "Quality Assurance," in RG 1.189, "Fire Protection for Operating Nuclear Power Plants," issued April 2001.
- FPL implements quality provisions for anticipated transient without scram (ATWS) equipment in accordance with Generic Letter 85-06, "Quality Assurance Guidance for ATWS Equipment that is not Safety Related."
- FPL implements quality requirements for Station Blackout (SBO) equipment in accordance with Regulatory Position 3.5, "Quality Assurance and Specific Guidance for SBO Equipment that is not safety related," and Appendix A, "Quality Assurance Guidance for Nonsafety Systems and Equipment," in RG 1.155, "Station Blackout."

This section is consistent with NEI 06-14A, Revision 7.

17.5.4.20 Regulatory Commitments

Turkey Point Units 6 and 7 QAPD follows the guidance of Section 17.5 of NUREG-0800, paragraph II.U. The QAPD establishes QA program commitments. In Turkey Point Units 6 and 7 QAPD, Revision 3, FPL commits to comply with the following NRC regulatory guides and other QA standards to supplement and support the QAPD:

- RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," Revision 3.
- RG 1.26, "Quality Group Classification and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," Revision 4.
- RG 1.28, "Quality Assurance Program Requirements (Design and Construction)," Revision 3.
- RG 1.29, "Seismic Design Classification," Revision 4.
- RG 1.33, "Quality Assurance Program Requirements (Operations)," Revision 2.
- RG 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components for Water-Cooled Nuclear Power Plants," Revision 1.
- ASME NQA-1-1994, Parts I, II, and III.
- NIRMA technical guides, as described in Part II, Section 17 of the QAPD.

The following portion of this technical evaluation section is reproduced from Section 17.5.4.20 of the VEGP SER:

In RAI 17.5-15 dated May 12, 2008, the NRC staff requested that the applicant revise the TVA QAPD Part IV to commit to RG 1.37 Revision 1, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants," issued March 2007. In its response dated June 24, 2008, the applicant stated that Part IV of the TVA QAPD is consistent with Revision 4 of NEI 06-14A. In a letter, dated September 17, 2008, the NRC staff requested NEI to address this question as part of Revision 5 to NEI 06-14A. However, the applicant committed to RG 1.37, Revision 1, in Revision 1 of the BLN QAPD. RAI 17.5-15 is closed.

*In a letter dated December 31, 2009, the VEGP applicant provided a markup of Revision 9 of the SNC QAPD. The NRC staff has reviewed the markup of SNC QAPD, Revision 9, and determined that conforming changes have been proposed to Part IV consistent with NEI 06-14A, Revision 7. On this basis, the updating of the SNC QAPD for closure of standard content RAI 17.5-15 is **Confirmatory Item 17.5-16** for the VEGP COL application.*

Resolution of Standard Content Confirmatory Item 17.5-16

Confirmatory Item 17.5-16 is an applicant commitment to revise its QAPD. The staff verified that the VEGP COL application was appropriately updated. As a result, Confirmatory Item 17.5-16 is now closed.

The following portion of this technical evaluation section is reproduced from Section 17.5.4.20 of the VEGP SER:

*The NRC staff also reviewed Appendix 1AA of the BLN COL FSAR, which lists BLN's conformance with NRC RGs and provides any exceptions to conformance with those RGs. In RAI 17.5-17, the NRC staff requested that the applicant explain how the QAPD provides an acceptable exception to the RGs described in Appendix 1AA. In its response (ML081780171), the applicant stated that Part IV of the TVA QAPD is consistent with Revision 4 of NEI 06-14A. Additionally, the applicant provided further information addressing these RGs in response to RAIs 17.5-15 and 17.5-17. The response to RAI 17.5-15 proposed revisions to Appendix 1AA and Parts II and IV of the QAPD, whereas the response to RAI 17.5-17 provided further justification. The applicant provided a response to RAI 1-5 in a letter dated August 19, 2008, to address the discrepancies between the revisions of the RGs addressed in Appendix 1AA and those addressed in Westinghouse DCD Appendix 1A. The information in this letter appears to have superseded the changes that were proposed and acceptable to the NRC staff in the applicant's June 24, 2008 letter, thereby reopening the issue identified in RAI 17.5-17. This is identified as **Open Item 17.5-6**.*

Resolution of Standard Content Open Item 17.5-6

In a letter dated July 29, 2009, the VEGP applicant stated that the revisions to the COL application identified in the referenced TVA August 19, 2008, letter do

*supersede the changes identified in the referenced TVA June 24, 2008, letter, as shown in Revision 1 of the BLN COL application. In a letter dated December 31, 2009, the VEGP applicant proposed additional changes to FSAR Chapter 1, Appendix 1AA to address conformance to RG 1.33, Revision 2. The NRC staff has reviewed the proposed changes to VEGP COL FSAR Chapter 1, Appendix 1AA, and determined that the changes are responsive to RAI 17.5-17. On this basis, Open Item 17.5-6 is **Confirmatory Item 17.5-17** for the VEGP COL application.*

Resolution of Standard Content Confirmatory Item 17.5-17

Confirmatory Item 17.5-17 is an applicant commitment to revise its FSAR Appendix 1AA. The staff verified that the VEGP COL FSAR was appropriately updated. As a result, Confirmatory Item 17.5-17 is now closed.

17.5.5 Post Combined License Activities

There are no post-COL activities related to this section.

17.5.6 Conclusion

The NRC staff used the requirements of 10 CFR Part 50, Appendix B and the guidance of Section 17.5 of NUREG-0800 as the basis for evaluating the acceptability of Turkey Point Units 6 and 7 QAPD and concludes that:

- The QAPD provides adequate guidance for FPL to describe the authority and responsibility of management and supervisory personnel, performance/verification personnel, and self-assessment personnel.
- The QAPD provides adequate guidance for FPL to provide for organizations and persons to perform verification and self-assessment functions with the authority and independence to conduct their activities without undue influence from those directly responsible for costs and schedules.
- The QAPD provides adequate guidance for FPL to apply a QAPD to activities and items that are important to safety.
- The QAPD provides adequate guidance for FPL to establish controls that, when properly implemented, comply with 10 CFR Part 52, Appendix B to 10 CFR Part 50; 10 CFR Part 21; and 10 CFR 50.55(e), with the acceptance criteria associated with Section 17.5 of NUREG-0800, and with the commitments to applicable regulatory guidance.

The FPL QAPD addresses PTN COL 17.5-1, STD COL 17.5-2, STD COL 17.5-4, and STD COL 17.5-8.

Based on the information provided by the applicant, the staff concludes that Section 17.5 of the Turkey Point Units 6 and 7 COL FSAR and the FPL-2 QAPD meet the requirements of Appendix B to 10 CFR Part 50; 10 CFR 52.79(a)(17); 10 CFR 52.79(a)(25); and 10 CFR 52.79(a)(27).

17.6 Maintenance Rule Program (Related to RG 1.206, Section C.III.1, Chapter 17, C.I.17.6, “Description of the Applicant’s Program for Implementation of 10 CFR 50.65, The Maintenance Rule”)

17.6.1 Introduction

This section addresses the program for MR implementation. It is based on the requirements of 10 CFR Part 52 and the guidance provided to the industry by the Nuclear Management and Resources Council (NUMARC) and its successor, the NEI. NUMARC 93-01, “Industry Guidance for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” is endorsed by the staff in RG 1.160, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” Revision 2. Section 11.0 of NUMARC 93-01 was later revised; the revision, as modified by RG 1.182, “Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants,” is also endorsed by the staff. NEI 07-02A, “Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52,” provides a template for presenting this information that has also been endorsed by the staff in a letter to NEI, dated January 24, 2008.

17.6.2 Summary of Application

In Section 17.6 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, the applicant provided the following:

Supplemental Information

- STD SUP 17.6-1

The applicant provided additional information which incorporates, by reference, NEI 07-02A, “Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants License Under 10 CFR Part 52.” The applicant also identified where operational programs are described in the Turkey Point Units 6 and 7 COL FSAR, including a description of and milestones for the MR program.

- STD SUP 17.6-2

The applicant provided additional information to incorporate condition monitoring of underground or inaccessible cables into the maintenance rule program.

License Condition

- Part 10, License Condition 6, “Operational Program Readiness”

This license condition states that the COL holder shall provide an operational program schedule to support NRC inspections.

17.6.3 Regulatory Basis

Commission regulations for the MR program include the requirements of 10 CFR 50.65 and 10 CFR 52.79(a)(15). The staff reviews this part of the application in accordance with Section 17.6 of NUREG-0800.

The regulatory basis of the information incorporated by reference is addressed in the FSER for topical report NEI 07-02A, transmitted to NEI in a letter from the NRC staff, dated January 24, 2008.

SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria [ITAAC]," identifies schedule requirements and proposes a license condition to be satisfied by COL holders.

17.6.4 Technical Evaluation

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 17.6.4 of the VEGP SER.

The NRC staff reviewed conformance of Section 17.6 of the BLN COL FSAR, including the COL standard information item identified in Subsection 17.6.2, with the guidance in NUREG-0800, Section 17.6. The staff also compared it with RG 1.206, Section C.III.1, Chapter 17, C.I.17.6, "Description of the Applicant's Program for Implementation of 10 CFR 50.65, the Maintenance Rule."

In addition, the NRC staff reviewed the COL standard information item identified in Subsection 17.6.2 above. In its review, the staff used NUREG-0800, Section 17.6, "Maintenance Rule," as guidance.

Supplemental Information

- *STD SUP 17.6-1, which incorporated NEI 07-02A and identified where operational programs are described in the BLN COL FSAR, including a description of the MR program*

The applicant added the following text to Section 17.6 of the BLN COL FSAR:

This section incorporates by reference NEI 07-02A, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed under 10 CFR Part 52," with the following supplemental information. See Table 1.6-201.

Table 13.4-201 provides milestones for maintenance rule [MR] program implementation.

The applicant indicated where, in the BLN COL FSAR, the programs listed in Subsection 17.X.3 of NEI 07-02A are described:

- *MR program (Section 17.6)*
- *QA program (Section 17.5)*
- *inservice inspection program (Sections 5.2 and 6.6)*
- *inservice testing program (Section 3.9)*
- *technical specifications surveillance test program (Chapter 16)*

The NRC staff endorsed NEI 07-02A, stating that it provides an acceptable method:

- *for complying with the requirement in 10 CFR 52.79(a)(15) that FSARs contain a description of the program and its implementation*
- *for monitoring the effectiveness of maintenance to meet the requirements of Section 50.65*
- *for satisfying the acceptance criteria of NUREG-0800, Section 17.6*

Because STD SUP 17.6-1 incorporates NEI 07-02A by reference and identifies the relevant operational programs and milestones, the staff finds that the applicant has provided sufficient information to fully describe the maintenance rule program. This provides reasonable assurance that the program, when implemented, satisfies the requirements of 10 CFR 50.65.

- *STD SUP 17.6-2*

In response to RAI 8.2-14, the applicant incorporated cable monitoring into its maintenance rule program. The program will monitor the condition of inaccessible or underground cables, including all those that support SSCs within the scope of 10 CFR 50.65. The staff documented its evaluation of the cable monitoring program in SER Section 8.2.4.

License Condition

- *Part 10, License Condition 6*

The applicant proposed a license condition to provide a schedule to support NRC inspection of operational programs including the MR program. The proposed license condition is consistent with the policy established in SECY-05-0197 and is acceptable.

17.6.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff proposes to include the following license condition to address the MR program:

- License Condition (17-1) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of Office of New Reactors (NRO), a schedule that supports planning for and conduct of NRC inspections of the Maintenance Rule (MR) program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the MR program has been fully implemented.

17.6.6 Conclusion

The NRC staff reviewed the application and confirmed that the applicant addressed the required information relating to the MR program. STD SUP 17.6-1 incorporated NEI 07-02A by reference; identified where operational programs are described in the Turkey Point Units 6 and 7 COL FSAR, including a description of the MR program; and provided a schedule for implementation of the MR program. STD SUP 17.6-2 incorporated condition monitoring of inaccessible or underground cables into the maintenance rule program. The staff concludes that the relevant information presented in Section 17.6 of the Turkey Point Units 6 and 7 COL FSAR meets the requirements of 10 CFR 50.65 and 10 CFR 52.79(a)(15) and is, therefore, acceptable.

18.0 HUMAN FACTORS ENGINEERING

18.1 **Overview (No Corresponding Section in Regulatory Guide (RG) 1.206)**

Section 18.1 of the Turkey Point Units 6 and 7 combined license (COL) Final Safety Analysis Report (FSAR), Revision 8, incorporates by reference, with no departures or supplements, Section 18.1 of Revision 19 of the AP1000 Design Control Document (DCD). The Nuclear Regulatory Commission (NRC) staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793, "Final Safety Evaluation Report [FSER] Related to Certification of the AP1000 Standard Design," and its supplements.

18.2 **Human Factors Engineering Program Management (Related to RG 1.206, Section C.I.18.1, "HFE Program Management")**

18.2.1 **Introduction**

The Human Factors Engineering (HFE) Program Management plan describes the HFE program in sufficient detail to ensure that all aspects of the human-system interfaces (HSIs), procedures, staffing, and training are developed, designed, and evaluated on the basis of a structured top-down systems analysis using accepted HFE guidance.

18.2.2 **Summary of Application**

Section 18.2 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 18.2 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 18.2.1.3, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 18.2-2

The applicant provided additional information in PTN COL 18.2-2, addressing Emergency Operations Facility (EOF) and Technical Support Center (TSC) communications and HFE design.

License Condition

- License Condition 1, regarding the HFE inspections, tests, analyses and acceptance criteria (ITAAC).

¹ See Section 1.2.2 for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a design certification (DC).

18.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for PTN COL 18.2-2 are given in Chapter 18 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)."

The applicable regulatory requirements for PTN COL 18.2-2 are as follows:

- Title 10 of the *Code of Federal Regulations* (10 CFR) 52.79(c)

The related acceptance criteria are as follows:

- NUREG-0711, "Human Factors Engineering Program Review Model," Revision 2, Section 2.4
- NUREG-0696, "Functional Criteria for Emergency Response Facilities"

18.2.4 Technical Evaluation

The NRC staff reviewed Section 18.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the HFE program management. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant [VEGP], Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER

provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 18.2-2

The information provided in the Turkey Point Units 6 and 7 COL application, Revision 2, regarding PTN COL 18.2-2 did not address the changes that were made to the information item in AP1000 DCD, Revision 18. The revised COL information item no longer includes the EOF location but includes the additional areas bolded below:

“Specific information regarding EOF and TSC communications, and EOF and TSC human factors attributes will be provided by the Combined Operating License applicant to address the Combined License information requested in this subsection.”

In RAI 6176, Question 18-1, the staff requested the applicant revise the COL information item response to reflect the latest AP1000 DCD revision. In their RAI response of January 18, 2012, the applicant stated that the Turkey Point Unit 6 and 7 COL Application, Revision 3, was submitted to the NRC on December 16, 2011 and incorporated AP1000 DCD, Revision 19. The staff finds that the COL application, Revision 3 satisfactorily addresses the AP1000, Revision 19 COL information item described above as it specifically addresses TSC communications and the EOF and TSC human factors attributes. The applicant stated that additional changes would be made to this COL information item to match the language used by other COL applicants. These changes have been made in the Turkey Point Units 6 and 7 COL application, Revision 4. RAI 6176, Question 18-1 is closed.

The effectiveness of human factors attributes and communications must be demonstrated as part of ITAAC closure for Emergency Planning following the same protocol as applied to the referenced COL. This protocol is described below.

The following portion of this technical evaluation section is reproduced from Section 18.2.4 of the VEGP SER:

The following portion of this technical evaluation section is reproduced from Section 18.2.4 of the BLN SER:

In its September 2, 2008, response to RAI 18-3, the applicant stated that the scope of the HFE design includes implementation and verification of applicable EOF/Technical Support Center (TSC) displays consistent with the AP1000 HFE program. TR-136 [Technical Report] (APP-GW-GLR-136, Revision 1, “AP1000 Human Factors Program Implementation for the Emergency Operations Facility and Technical Support Center”) indicates that the Westinghouse DCD does not cover all aspects of the HSI design (such as panel layouts, room configuration, and indications/controls) for the EOF/TSC. The applicant states that the EOF/TSC functions and tasks that are not within the scope of the AP1000 HFE Program will be subject to HFE principles and practices as described in

NUREG-0737, "Clarification of TMI [Three Mile Island] Action Plan Requirements."

The staff was concerned that, since NUREG-0737 does not have HFE guidance comparable to that of NUREG-0711, EOF/TSC design elements would fall outside the scope of the HFE program. The applicant addressed this concern in its RAI 18-4 response dated February 23, 2009, stating that the HSI design will meet the data and availability criteria in NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, Section II.H, 'Emergency Facilities and Equipment,'" which states that the TSC and the EOF will be established in accordance with NUREG-0696.

The staff agrees that NUREG-0696 describes an acceptable method for meeting EOF/TSC requirements and contains guidance for managing the EOF/TSC HFE design based on the following:

- NUREG-0696, Section 2.8, states, "The design of the TSC data system equipment shall incorporate human factors engineering with consideration for both operating and maintenance personnel."*
- NUREG-0696, Section 4.7, states, "The design of the EOF data system equipment shall incorporate human-factors engineering with consideration for both operating and maintenance personnel."*
- NUREG-0696, Section 4.8, states, "Human-factors engineering shall be incorporated in the design of the EOF." This section of the NUREG also addresses data availability and human factors design criteria.*
- The AP1000 DCD includes a structured approach for identifying data needed to support the EOF/TSC functions.*
- The guidance in NUREG-0696 addresses information usability. While some guidance is generic, the staff concludes APP-OCS-J1-002, "AP1000 HSI Design Guidelines," which is included by reference in Chapter 18 of the AP1000 DCD, is applicable to the definition of more explicit, measurable design acceptance criteria. Use of these guidelines will ensure that general design principles, such as "callup, manipulation, and presentation of data can be easily performed," and, "display formats shall present information so that it can be easily understood," will be subject to more explicit design acceptance criteria.*

Emergency planning drills and inspections provide repeated opportunities to identify improvements to HSIs. In the case of BLN, for which a common EOF will be used, EOF design improvements have already been implemented based on operating experience.

HFE design verification and validation (V&V) is a second area of NUREG-0711 guidance that is not being directly applied by the applicant. As an alternative, the applicant states in their RAI 18-4 response dated February 23, 2009, that V&V of

the EOF HFE design is achieved by the evaluation of equipment and personnel performance during drills and exercises. The staff concludes that although the specific guidance in NUREG- 0711 for V&V is not being applied, the alternative V&V approach provides reasonable assurance that the HFE aspects of the EOF and TSC will be acceptably designed based on the following:

- *NUREG-0696 contains guidance on V&V. Section 9 states, “The design, development, qualification, and installation of the SPDS [safety parameter display system], TSC, EOF, and NDL [nuclear data link] facilities and systems shall be independently verified and validated by qualified personnel other than the original designers and developers.”*

The RAI 18-4 response indicates both equipment and personnel performance will be evaluated during drills and exercises.

- *Exercises and drills are conducted on a periodic basis, and therefore, provide repeated opportunities to test and improve the HSIs.*
- *The first exercise is included as an inspection, test, analysis and acceptance criterion (ITAAC) that ensures EOF/TSC functionality prior to fuel load. The BLN COL application Part 10, “Proposed License Conditions,” Revision 1, Table 3.8-1, ITAAC contain the following inspections, tests and analyses:*

ITAAC 1.1: An inspection of the control room, TSC, and CECC [Central Emergency Control Center] will be performed to verify that they have displays for retrieving facility system and effluent parameters in specific emergency action levels (EALs).

ITAAC 8.1: A full-participation exercise (test) will be conducted within the specified time periods of Appendix E to 10 CFR Part 50.

- *Exercises and drills are conducted in the actual facilities, (vice a simulator), allowing direct observation of the HSI.*

Evaluation of Site-Specific Information Related to Standard Content

Turkey Point COL Application, Part 10, “License Conditions and ITAAC,” Table 3.8-1 includes the following relevant site-specific ITAAC for Turkey Point Units 6 and 7 that address a verification inspection to ensure functionality of the EOF, and TSC prior to fuel load:

ITAAC 1.1: An inspection of the Control Rooms, Technical Support Center (TSC), and Emergency Operations Facility (EOF) will be performed to verify that they have displays for retrieving facility system and effluent parameters that are specified in the Emergency Classification and EAL scheme and the displays are functional.

ITAAC 8.1: A full-participation exercise (test) will be conducted within the specified time periods of Appendix E, [“Emergency Planning and Preparedness for Production and Utilization Facilities”] to 10 CFR Part 50.

The staff finds that Turkey Point Units 6 and 7 ITAAC 1.1 and Turkey Point Units 6 and 7 ITAAC 8.1 are comparable to those proposed by VEGP and concludes that the site-specific ITAAC provide an acceptable V&V approach to ensure functionality of the EOF and TSC from an HFE perspective.

The staff further concludes that the applicant has appropriately addressed PTN COL 18.2-2. The HFE design of the EOF and TSC conforms to the HFE related design guidance provided in NUREG-0696 and this design will be verified and validated via the activities addressed in ITAAC 1.1 and 8.1.

18.2.5 Post Combined License Activities

For the reason discussed in the technical evaluation section above, the staff proposes to include the following Emergency Planning ITAAC to ensure functionality of the EOF and TSC HFE design.

- The Licensee shall perform the following ITAAC:
 - ITAAC 1.1: An inspection of the Control Rooms, Technical Support Center (TSC), and Emergency Operations Facility (EOF) will be performed to verify that they have displays for retrieving facility system and effluent parameters that are specified in the Emergency Classification and EAL scheme and the displays are functional.
 - ITAAC 8.1: A full-participation exercise (test) will be conducted within the specified time periods of Appendix E to 10 CFR Part 50.

18.2.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to HFE program management, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR 52.79, "Contents of applications; technical information in final safety analysis report," and meets the guidance in Chapter 18 of NUREG-0800. The staff based its conclusion on the following:

- PTN COL 18.2-2 is acceptable because the applicant will design the EOF/TSC in accordance with appropriate elements of the AP1000 HFE program and NUREG-0696 and will verify and validate that design as part of activities performed to address emergency planning ITAAC 1.1 and 8.1.

18.3 Operating Experience Review (Related to RG 1.206, Section C.I.18.2, “Operating Experience Review”)

Operating experience review (OER) identifies and analyzes HFE-related problems and issues in previous designs. In this way, negative features associated with predecessor designs may be avoided in the current one, while retaining positive features. This section describes the applicant's OER and how it was used to identify HFE-related safety issues. OER includes a summary discussion of the source materials, such as documents, event reports, and personnel interviews. OER-identified issues are included along with their resolution.

Section 18.3 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 18.3 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

18.4 Functional Requirements Analysis and Allocation (Related to RG 1.206, Section C.I.18.3, “Functional Requirements Analysis and Function Allocation”)

Functional requirements analysis and function allocation demonstrate that functions are allocated to human and system resources in a manner that takes advantage of human strengths and avoids human limitations. The scope includes identification and analysis of those functions that must be performed to satisfy the plant's safety objectives that is, to prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public.

Section 18.4 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 18.4 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

18.5 AP1000 Task Analysis Implementation Plan (Related to RG 1.206, Section C.I.18.4, “Task Analysis”)

Task analyses identify the specific tasks that are needed for function accomplishment and their information, control, and task support requirements. The analyses address how representative and important operations, maintenance, test, inspection, and surveillance tasks are selected, as well as the range of operating modes included in the analyses. This includes the use of probabilistic risk assessment (PRA)/human reliability analysis (HRA) for the identification of the risk-important human actions, including the monitoring and backup of automatic actions. The task analysis results are used as input to the design of HSIs, procedures, and training programs.

Section 18.5 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 18.5 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no

issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point COL application are documented in NUREG-1793 and its supplements.

18.6 Staffing (Related to RG 1.206, Section C.I.18.5, "Staffing and Qualifications")

18.6.1 Introduction

Staffing and qualification analyzes the requirements for the number and qualifications of personnel in a systematic manner that includes a thorough understanding of task requirements and applicable regulatory requirements.

This section is coordinated with Section 13.1 of this SER, which also relates to organization and staffing. The staffing analysis is iterative in nature and discusses how the initial staffing goals have been reviewed and modified as the analyses associated with other HFE elements are complete. Staffing and qualifications are also shown to be in compliance with 10 CFR 50.54(m).

18.6.2 Summary of Application

Section 18.6 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 18.6 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 18.6, the applicant provided the following:

AP1000 COL Information Item

- STD COL 18.6-1

The applicant provided additional information in Standard (STD) COL 18.6-1 to resolve COL Information Item 18.6-1, addressing staffing level and qualification of plant personnel.

18.6.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for STD COL 18.6-1 are given in Chapter 18 of NUREG-0800.

The applicable regulatory requirements for STD COL 18-1 are as follows:

- 10 CFR 52.79(c)
- 10 CFR 50.54(m)

The related acceptance criterion is as follows:

- NUREG-0711, Section 6.4

18.6.4 Technical Evaluation

The NRC staff reviewed Section 18.6 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to staffing and qualification. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

Although the staff concluded that the evaluation performed for the standard content is directly applicable to the Turkey Point Units 6 and 7 COL application, there was a difference in the information provided by the Turkey Point Units 6 and 7 applicant from that provided by the VEGP applicant regarding the plant operating experience. This difference is evaluated by the staff below, following the standard content material.

The following portion of this technical evaluation section is reproduced from Section 18.6.4 of the VEGP SER:

AP1000 COL Information Item

The following portion of this technical evaluation section is reproduced from Section 18.6.4 of the BLN SER:

- *STD COL 18.6-1, addressing staffing level and qualification of plant personnel.*

The applicant provided additional information in STD COL 18.6-1 to resolve COL Information Item 18.6-1. COL Information Item 18.6-1 states:

Combined License applicants referencing the AP1000 design will address the staffing levels and qualifications of plant personnel including operations, maintenance, engineering, instrumentation and control technicians, radiological protection technicians, security, and chemists. The number of operators needed to directly monitor and control the plant from the main control room, including the staffing requirements of 10 CFR 50.54(m), will be addressed.

The commitment was also captured as COL Action Item 18.6.3-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant will address the staffing level and qualifications of plant personnel including operations, maintenance and control technicians, radiological protection technicians, security, and chemists. Specifically, the COL applicant will (1) address the staffing considerations in NUREG-0711, and (2) identify the minimum documentation that is necessary for the staff to complete the review.

Information pertaining to the staffing level and qualifications is contained in BLN COL FSAR Chapter 13 and is summarized here. The applicant provided the estimated staffing levels for different categories of personnel that are addressed by the HFE program in accordance with NUREG-0711. The minimum staffing level for control room personnel is also stated. Information about the staffing level of security personnel is contained in the separately submitted physical security plan. Qualification requirements of Technical Support Personnel, Nuclear Plant Personnel, and Security Personnel are also included.

The baseline level of staffing is derived from experience from current operating nuclear power plants. Iterative adjustments are implemented with input from other elements of the HFE program.

The NRC staff reviewed the resolution to COL Information Item 18.6-1 related to staffing and qualifications included under Section 18.6 of the BLN COL FSAR, Revision 1.

NUREG-0711 states that satisfying criterion 4 for the staffing and qualifications should be in part based on an operating experience review. The applicant addresses this in Chapter 13, Conduct of Operations, by stating:

The Tennessee Valley Authority (TVA) has over 30 years of experience in the design, construction and operation of nuclear generating stations. TVA has designed, constructed, and operates six nuclear units at three sites: Browns Ferry Nuclear Plant Units 1, 2, and 3; Watts Bar Nuclear Plant Unit 1; and Sequoyah Nuclear Plant Units 1 and 2.

NUREG-0711, Criterion 1 states that the staffing and qualifications should address applicable guidance in NUREG-0800, Section 13.1 and 10 CFR 50.54.

Section 18.6 references BLN COL FSAR Section 13, which discusses staffing levels that meet the requirements in 10 CFR 50.54.

NUREG-0711, Criterion 2 states that the staffing analysis should determine the number and background of personnel for the full range of plant conditions including operational tasks, plant maintenance, and plant surveillance and testing.

Section 18.6 of the COL states that Table 13.1-201 of the COL application contains the estimated staffing levels for those categories of personnel that are addressed in NUREG-0711, as follows:

1) licensed operators, 2) shift supervisors, 3) non-licensed operators, 4) shift technical advisors, 5) instrumentation and control technicians, 6) mechanical maintenance technicians, 7) electrical maintenance technicians, 8) radiation protection technicians, 9) chemistry technicians, and 10) engineering support.

The applicant states that the minimum level of control room staffing is also stated in Table 13.1-201 and meets the requirements of 10 CFR 50.54(m).

The staff reviewed the requirements of 10 CFR 50.54, which state:

A senior operator licensed pursuant to Part 55 shall be present at the facility or readily available on call at all times during its operations, and shall be present at the facility during initial start-up and approach to power, recovery from an unplanned or unscheduled shut-down or significant reduction in power, and refueling.

This section of 10 CFR contains a table that describes the minimum staffing requirements in the control room for one, two and three unit sites. For example, a one unit site with one control room is required to maintain two Senior Operators, and two Operators at all times. Table 13.1-201 describes numbers for control room operators that meet these limits and, therefore, meet the requirements for operator staffing in 10 CFR 50.54.

NUREG-0711 states that the applicant should have systematically analyzed the need for the number and qualifications of personnel and have demonstrated a

thorough understanding of task requirements and regulatory requirements. NUREG-0711 also references NUREG-0800, Section 13.1 that describes the roles and responsibilities for design and construction activities and pre-operational activities. NUREG-0711 also spells out specific acceptance criteria for providing the NRC with specific information about qualification levels of the staff. In Section 13.1 of the BLN COL FSAR, the applicant describes in detail the organizational structure of the AP1000 plant. The roles and qualifications described include: Management and Technical Support Organization; Engineering; Quality Assurance; Chemistry; Radiation Protection; Fueling and Refueling Support; Training and Development; Maintenance Support; Operations Support; and Fire Protection. Each of these sections describes the applicant's commitment for maintaining qualified staff to carry out the responsibilities of each position. For example, in Section 13.1.1.2.1, "Engineering," the applicant states:

The engineering department consists of system engineering, design engineering, engineering programs, and safety and engineering analysis. These groups are responsible for performing the classical design activities as well as providing engineering expertise in other areas. Each of the engineering groups has a functional manager who reports to the manager in charge of engineering and site support.

The applicant then describes the overall roles that the engineering department is responsible for, such as:

Support of plant operations in the engineering areas of mechanical, structural, electrical, thermal-hydraulic, metallurgy and materials, electronic, instrument and control and fire protection. Priorities for support activities are established based on input from the plant manager with emphasis on issues affecting safe operation of the plant.

Review Criterion 3 in NUREG-0711 states that the staffing analysis should be iterative, meaning that staffing goals should be reviewed and modified as the analyses associated with other elements are completed. The applicant addresses this criterion by stating:

Iterative adjustments are implemented to the staffing, as necessary, based on findings and input from periodic reviews and staffing analysis. Input to this analysis includes information derived from the other elements of the human factors engineering program, particularly operating experience reviews, functional requirements analysis and function allocation, task analysis, human reliability analysis, human-system interface design, procedure development, and training program development.

The staff finds this information sufficient for meeting the criteria for the level and qualification of staffing contained in NUREG-0711, NUREG-0800, and 10 CFR 50.54.

Evaluation of Site-Specific Information Related to Standard Content

In Section 13.1.1 of the VEGP COL FSAR, the applicant provided site-specific information regarding its operating experience that the staff considered to address the staffing and qualifications basis for NUREG-0711 Criterion 4. The applicant stated:

Southern Nuclear Operating Company, Inc. (SNC) has over 30 years of experience in the design, construction, and operation of nuclear generating plants. SNC, with its architectural engineering predecessor Southern Company Services, Inc., has designed, constructed, and currently operates six nuclear units at three sites: Edwin I. Hatch Nuclear Plant Units 1 and 2, Joseph M. Farley Nuclear Plant Units 1 and 2, and Vogtle Electric Generating Plant Units 1 and 2.

The staff found the VEGP operating experience to be comparable to that described by BLN. Therefore, the Staff finds this information sufficient for meeting the criteria for the level and qualification of staffing described in NUREG-0711, NUREG-0800, and 10 CFR 50.54.

Evaluation of Site-Specific Information Related to Standard Content

In Section 13.1.1 of the Turkey Point Units 6 and 7 COL FSAR, the applicant provided site-specific information regarding its operating experience that the staff considered to address the staffing and qualifications basis for NUREG-0711 Criterion 4. The applicant stated:

FPL has more than 35 years of experience in the design, construction, and operation of nuclear generating units. The FPL Nuclear Fleet Organization operates 10 nuclear units at five sites: Duane Arnold, Seabrook, Turkey Point Units 3 & 4 and 6 & 7, Saint Lucie Units 1 & 2, and Point Beach Units 1 & 2. The Nuclear Fleet Organization includes, but is not limited to, nuclear extended power uprate, nuclear operations, nuclear fleet support, engineering support, fleet outages planning and execution, and nuclear assurance.

Because of FPL's 35-years of experience designing, constructing and operating nuclear units the staff finds that the Florida Power and Light operating experience is sufficient for meeting the criteria for the level and qualification of staffing described in NUREG-0711, NUREG-0800, and 10 CFR 50.54.

18.6.5 Post Combined License Activities

There are no post-COL activities related to this section.

18.6.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to staffing and qualification, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the acceptance criteria defined in NUREG-0711, Section 6.4. The staff based its conclusion on the following:

- STD COL 18.6-1 is acceptable because it meets the acceptance criteria described in NUREG-0711, NUREG-0800, and 10 CFR 50.54.

18.7 Integration of Human Reliability Analysis with Human Factors Engineering (Related to RG 1.206, Section C.I.18.6, “Human Reliability Analysis”)

HRA is an integral activity of a complete PRA. HRA seeks to evaluate the potential for, and mechanisms of, human error that may affect plant safety. Thus, it is an essential element in achieving the HFE design goal of providing a design that will minimize personnel errors, allow their detection, and provide recovery capability.

Section 18.7 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 18.7 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff’s review confirmed that there is no outstanding issue related to this section. The results of the NRC staff’s technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

18.8 Human-System Interface Design (Related to RG 1.206, Section C.I.18.7, “Human System Interface Design”)

18.8.1 Introduction

HSI design describes the design process and scope, including the translation of function and task requirements into the detailed design of alarms, displays, controls, and other aspects of the HSI through the systematic application of HFE principles and criteria. It also describes the process by which HSI design requirements are developed and HSI designs are identified and refined.

18.8.2 Summary of Application

Section 18.8 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 18.8 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 18.8, the applicant provided the following:

Tier 2 Departures

- PTN DEP 18.8-1 The OSC for Units 6 & 7 is located in the Maintenance Building within the Protected Area.

- PTN DEP 18.8-2 The TSC facility for units 6 & 7 is located in the Turkey Point Nuclear Training which is outside of the Protected Areas between the Control Room for Units 3 and 4 and the Control Rooms for Units 6 and 7.

The applicant proposed Tier 2 departures (DEP) from the AP1000 DCD related to the locations of the TSC and Operational Support Center (OSC).

18.8.3 Regulatory Basis

The HFE design was reviewed by the Staff in NUREG-1793. For the Turkey Point Units 6 and 7 COL FSAR, the only departures are for the location of the OSC and TSC. The HFE design of the TSC and OSC is independent of location; therefore, no further regulatory basis is needed for this section. The regulatory basis for the emergency planning review associated with these centers is addressed in Chapter 13.3.

18.8.4 Technical Evaluation

The NRC staff reviewed Section 18.8 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the HSI design. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Tier 2 Departures

- PTN DEP 18.8-1 (OSC)

The OSC facility is not addressed in the HFE regulatory guidance. Therefore, the OSC location is not evaluated from an HFE program perspective. The OSC location, as it relates to emergency preparedness, is evaluated in Section 13.3 of this SER.

- PTN DEP 18.8-2 (TSC)

HFE design implementation in the TSC is not location dependent. Therefore, the proposed location of the TSC in the Turkey Point Nuclear Training Building outside the protected area is acceptable from an HFE program perspective. HFE design elements applicable to the TSC are identified and implemented in accordance with AP1000 DCD, Chapter 18, which is addressed in Section 18.2.4 of this SER.

The TSC location has the potential to affect technical data availability, communications, power supply reliability, security, and habitability. The acceptability of this location relative to these attributes is addressed in Section 13.3 of this SER.

18.8.5 Post Combined License Activities

There are no post-COL activities related to this section.

18.8.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to HSI design, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the acceptance criteria defined in NUREG-0711, Section 8.4. The staff based its conclusion on the following:

- Implementation of HFE design in the TSC and OSC is not location dependent. The HFE design elements applicable to the TSC are in accordance with AP1000 DCD, Chapter 18. The OSC is not in the HFE program scope.

18.9 Procedure Development (Related to RG 1.206, Section C.I.18.8, "Procedure Development")

Procedure development documents, in coordination with Turkey Point Units 6 and 7 COL FSAR Section 13.5, ensure that the HFE principles and criteria, along with other design requirements, are incorporated in developing procedures that are technically accurate, comprehensive, explicit, easy to use, and validated. The procedure development program addresses the requirements specified in 10 CFR 50.34(f)(2)(ii) and describes the procedure writer's guide that establishes the process for developing technical procedures. The writer's guide ensures that procedures are consistent in organization, style, and content, and it also specifies which procedures fall within the purview of the guide.

Section 18.9 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 18.9 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding information related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point COL application are documented in NUREG-1793 and its supplements.

18.10 Training Program Development (Related to RG 1.206, Section C.I.18.9, "Training Program Development")

18.10.1 Introduction

Training programs help to provide reasonable assurance that plant personnel have the knowledge, skills, and abilities to properly perform their roles and responsibilities. The training program, as discussed in this section, is coordinated with the training discussions in Turkey Point Units 6 and 7 COL FSAR Section 13.2, and describes how the training program follows a systematic approach to training, and how it addresses the requirements of 10 CFR 50.120, "Training and qualification of nuclear power plant personnel," 10 CFR 52.79(a)(33), and 10 CFR Part 55, "Operators' Licenses."

18.10.2 Summary of Application

Section 18.10 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 18.10 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 18.10, the applicant provided the following:

AP1000 COL Information Item

- STD COL 18.10-1

The applicant provided additional information in STD COL 18.10-1 to resolve COL Information Item 18.10-1, addressing the execution of a training plan.

18.10.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for STD COL 18.10-1 are given in Chapter 18, Section II.A.9 of NUREG-0800.

The applicable regulatory requirements for STD COL 18.10-1 are as follows:

- 10 CFR 52.79(c)

The related acceptance criteria are as follows:

- NUREG-0711, Section 10.4
- Nuclear Energy Institute (NEI) 06-13A, "Template for an Industry Training Program Description," Revision 1

18.10.4 Technical Evaluation

The NRC staff reviewed Section 18.10 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to training program development. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 18.10.4 of the VEGP SER:

The following portion of this technical evaluation section is reproduced from Section 18.10.4 of the BLN SER:

AP1000 COL Information Item

- *STD COL 18.10-1, addressing execution of a training plan*

The applicant provided additional information in STD COL 18.10-1 to resolve COL Information Item 18.10-1. COL Information Item 18.10-1 refers to Section 13.2, where the COL information item in Section 13.2.1 states:

Combined License applicants referencing the AP1000 certified design will develop and implement training programs for plant personnel. This includes the training program for the operations personnel who participate as subjects in the human factors engineering verification and validation. These Combined License applicant training programs will address the scope of licensing examinations as well as new training requirements.

The commitment was also captured as COL Action Item 18.10.3-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

With regard to the training program development, the COL applicant will: (1) address the training program development in NUREG-0711; (2) address relevant concerns identified in NUREG-1793; and (3) identify the minimum documentation that the COL applicant will provide to enable the staff to complete its review.

The NRC staff reviewed the resolution to COL Information Item 18.10-1 related to staffing and qualifications included under Section 18.10 of the BLN COL FSAR, Revision 1. Section 18.10 in the BLN COL FSAR refers to Section 13.1, "Organizational Structure of Applicant," and Section 13.2, "Training," regarding the training program development. In Section 13.2 of the BLN COL FSAR, the applicant provided the referenced, NRC approved, NEI 06-13A [Revision 1], "Template for an Industry Training Program Description" to address COL Information Item 18.10-1. The applicant also noted that a systematic approach to training development will be conducted in accordance with the referenced staff approved WCAP-14655, "Designer's Input for the Training of the Human Factors Engineering Verification and Validation Personnel."

The applicant provided information for the operational programs relating to non-licensed plant staff training, reactor operator training, and reactor operator re-qualification, by referencing NEI 06-13A [Revision 1], "Template for an Industry Training Program Description."

NEI 06-13A was created to provide applicants with a generic program description for use with COL application submittals. In a letter dated March 7, 2007, the staff stated that the template was an acceptable means for describing reactor operator and non-licensed plant staff training programs. The staff finds this approach to be acceptable because NEI 06-13A addresses non-licensed plant staff training, reactor operator training, and reactor operator re-qualification.

18.10.5 Post Combined License Activities

There are no post-COL activities related to this section.

18.10.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to training program development, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and is sufficient to resolve COL Action Item 18.10-1. The staff based its conclusion on the following:

- COL Information Item 18.10-1, relating to training, appropriately references Section 13.2 "Training." In Section 13.2, the applicant has committed to using Westinghouse Commercial Atomic Power (WCAP)-14655 to ensure a systematic approach to training development, and the applicant has referenced the staff-endorsed NEI 06-13A, Revision 1.
- Information involving nonlicensed plant staff training, reactor operator training, and reactor operator requalification are acceptably addressed because the applicant referenced NEI 06-13A, Revision 1.

- The staff's review of the Turkey Point Units 6 and 7 training program is found in Sections 13.2 and 13.4 of this SER.

18.11 Human Factors Engineering Verification and Validation (Related to RG 1.206, Section C.I.18.10, "Verification and Validation")

Human factors V&V documents the V&V activities confirming that the HSI design conforms to HFE design principles and that it enables plant personnel to successfully perform their tasks to achieve plant safety and other operational goals.

Section 18.11 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 18.11 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

18.12 Inventory (No Corresponding Section in RG 1.206)

The specific sensors, instrumentation, controls, and alarms that are needed to operate the various plant systems constitute the inventory. The instruments, alarms, and controls for each system are documented in the piping and instrumentation diagrams. The minimum inventory required to safely shutdown the reactor and maintain it shutdown is also identified.

Section 18.12 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 18.12 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

18.13 Design Implementation (Related to RG 1.206, Section C.I.18.11, "Design Implementation")

Design implementation verifies that the as-built design conforms to the verified and validated design that resulted from the HFE design process. The scope of the design implementation includes the following considerations:

- V&V of design aspects that cannot be completed as part of the HSI V&V program
- confirmation that the as-built HSI, procedures, and training conform to the approved design
- confirmation that all HFE issues in the tracking system are appropriately addressed

Section 18.13 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference, with no departures or supplements, Section 18.13 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to

ensure that no issue relating to this section remained for review.¹ The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

18.14 Human Performance Monitoring (Related to RG 1.206, Section C.I.18.12, "Human Performance Monitoring")

18.14.1 Introduction

Human performance monitoring is used to assure that no significant safety degradation occurs because of any changes that are made in the plant and to confirm that the conclusions that have been drawn from the integrated system validation remain valid over time. Human performance monitoring is a program that begins after plant operation commences. Therefore, the applicant describes the documentation to be maintained after the program is implemented. The objective of this review is to verify that the applicant has prepared a human performance monitoring strategy for ensuring that no significant safety degradation occurs because of any changes that are made in the plant.

The program describes: (1) a human performance monitoring strategy; (2) how it trends human performance relative to changes implemented in the plant after startup; and (3) how it demonstrates that performance is consistent with that assumed in the various analyses conducted to justify the changes.

The program provides for specific cause determination, trending of performance degradation and failures, and determination of appropriate corrective actions. Detailed implementation plans and procedures for human performance monitoring remain available for NRC review.

18.14.2 Summary of Application

Section 18.14 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 18.14 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 18.14, the applicant provided the following:

AP1000 COL Information Item

- STD COL 18.14-1

The applicant provided additional information in STD COL 18.14-1 to resolve COL Information Item 18.14-1, addressing human performance monitoring after the plant is placed in operation.

18.14.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for STD COL 18.14-1 are given in Chapter 18, Section II A.12 of NUREG-0800.

The applicable regulatory requirements for STD COL 18.14-1 are as follows:

- 10 CFR 52.79(c)

The related acceptance criteria are as follows:

- NUREG-0711, Section 13.4

18.14.4 Technical Evaluation

The NRC staff reviewed Section 18.14 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to human performance monitoring. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) contains evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 18.14.4 of the VEGP SER:

The following portion of this technical evaluation section is reproduced from Section 18.14.4 of the BLN SER:

AP1000 COL Information Item

- *STD COL 18.14-1 (COL Action Item 18.13-1)*

The applicant provided additional information in STD COL 18.14-1 to resolve COL Information Item 18.14-1. COL Information Item 18.14-1 states:

Human performance monitoring applies after the plant is placed in operation, and is a Combined License Applicant responsibility.

The commitment was also captured as COL Action Item 18.13-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

The COL applicant is responsible for human performance monitoring after the plant is placed into operation. The human performance monitoring process implements the guidance and methods as described in DCD Section 18.14 Reference 1 (NUREG-0711).

The applicant noted that the human performance monitoring process implements the guidance and methods as described in DCD Section 18.14. The applicant defines a broad outline of the structure of the human performance monitoring process and the assurances that can be obtained through implementation of the process. The human performance monitoring process for risk-informed changes is integrated into the corrective action program, training program, and other programs as appropriate. The cause determination process is also defined. It states that monitoring strategies for human performance trending after the implementation of the design changes are capable of demonstrating that performance is consistent with that assumed in various analyses conducted to justify the changes. Risk-informed changes are screened commensurate with their safety importance to determine if the changes require monitoring.

The NRC staff reviewed the resolution of COL Information Item 18.14-1 relating to human performance monitoring included under Section 18.14 of the BLN COL FSAR, Revision 1.

The BLN COL FSAR describes the human performance monitoring program found in NUREG-0711. It also states:

The human performance monitoring process for risk-informed changes is integrated into the corrective action program, training program and other programs as appropriate. Identified human performance conditions/issues are evaluated for human factors engineering applicability.

Criterion 5 of NUREG-0711 states:

As part of the monitoring program, it is important that provisions for specific cause determinations, trending of performance degradation and

failures, and corrective actions be included. The cause determination should identify the cause of the failure or degraded performance to the extent that corrective action can be identified that would preclude the problem or provide adequate assurance that it is anticipated prior to becoming a safety concern.

The applicant's use of cause investigation:

- *Identifies the cause of the failure or degraded performance to the extent that corrective action can be taken consistent with the corrective action program requirements.*
- *Addresses failure significance, which includes the circumstances surrounding the failure or degraded performance, the characteristics of the failure, and whether the failure is isolated or has generic or common cause implications.*
- *Identifies and establishes corrective actions necessary to preclude the recurrence of unacceptable failures or degraded performance in the case of a significant condition adverse to quality.*

The staff has determined that the information included in Section 18.14 of the BLN COL FSAR is consistent with criteria found in NUREG-0711 and is sufficient for the staff to consider COL Information Item 18.14-1 closed.

18.14.5 Post Combined License Activities

There are no post-COL activities related to this section.

18.14.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to human performance monitoring, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the acceptance criteria defined in NUREG-0711. The staff based its conclusion on the following:

- STD COL 18.14-1, addressing human performance monitoring after the plant is placed in operation, outlines a structured approach for accomplishing this monitoring.

19.0 PROBABILISTIC RISK ASSESSMENT (RELATED TO RG 1.206, SECTION C.III.1, CHAPTER 19, C.I.19, “PROBABILISTIC RISK ASSESSMENT AND SEVERE ACCIDENT EVALUATION”)

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, “Licenses, certifications, and approvals for nuclear power plants,” Subpart C, Section 52.79, “Contents of applications; technical information in final safety analysis report,” requires applicants to submit a description of the plant-specific probabilistic risk assessment (PRA) and its results. The PRA provides an evaluation of the risk of core damage and release of radioactive material associated with both internal and external events that can occur during plant operation at power or while shut down.

Appendix 19A to this safety evaluation chapter evaluates the measures identified by the applicant needed to comply with requirements to address loss of large areas (LOLAs) of the plant due to explosions or fires from a beyond-design-basis event (BDBE). These requirements are specified in 10 CFR 50.54(hh)(2), while 10 CFR 52.80(d) states that an application for a combined license (COL) shall contain a description and plans for implementation of relevant guidance and strategies required by 10 CFR 50.54(hh)(2). It should be noted that the attachment to Appendix 19A (Attachment A), as well as some documents referenced in Appendix 19A, include security-related or safeguards information. Therefore, Attachment A to Appendix 19A and the references that include security-related or safeguards information, are withheld from the public in accordance with 10 CFR 2.390, “Public inspections, exemptions, requests for withholding.”

19.1–19.40, 19.42–19.54, 19.56–19.57, and Appendices 19A, 19B, 19C, and 19D, Probabilistic Risk Assessment

The Turkey Point Units 6 and 7 Combined License (COL) Final Safety Analysis Report (FSAR), Revision 8, incorporates by reference, with no departures or supplements, Sections 19.1 through 19.40, 19.42 through 19.54, 19.56, 19.57, and Appendices 19A, 19B, 19C, and 19D of the AP1000 Design Control Document Revision 19 (DCD):

- 19.1, “Introduction”
- 19.2, “Internal Initiating Events”
- 19.3, “Modeling of Special Initiators”
- 19.4, “Event Tree Models”
- 19.5, “Support Systems”
- 19.6, “Success Criteria Analysis”
- 19.7, “Fault Tree Guidelines”
- 19.8, “Passive Core Cooling System – Passive Residual Heat Removal”
- 19.9, “Passive Core Cooling System – Core Makeup Tanks”
- 19.10, “Passive Core Cooling System – Accumulator”
- 19.11, “Passive Core Cooling System – Automatic Depressurization System”
- 19.12, “Passive Core Cooling System – In-containment Refueling Water Storage Tank”
- 19.13, “Passive Containment Cooling”
- 19.14, “Main and Startup Feedwater System”
- 19.15, “Chemical and Volume Control System”
- 19.16, “Containment Hydrogen Control System”
- 19.17, “Normal Residual Heat Removal System”
- 19.18, “Component Cooling Water System”

- 19.19, "Service Water System"
- 19.20, "Central Chilled Water System"
- 19.21, "AC Power System"
- 19.22, "Class 1E DC and UPS System"
- 19.23, "Non-Class 1E DC and UPS System"
- 19.24, "Containment Isolation"
- 19.25, "Compressed and Instrument Air System"
- 19.26, "Protection and Safety Monitoring System"
- 19.27, "Diverse Actuation System"
- 19.28, "Plant Control System"
- 19.29, "Common Cause Analysis"
- 19.30, "Human Reliability Analysis"
- 19.31, "Other Event Tree Node Probabilities"
- 19.32, "Data Analysis and Master Data Bank"
- 19.33, "Fault Tree and Core Damage Quantification"
- 19.34, "Severe Accident Phenomena Treatment"
- 19.35, "Containment Event Tree Analysis"
- 19.36, "Reactor Coolant System Depressurization"
- 19.37, "Containment Isolation"
- 19.38, "Reactor Vessel Reflooding"
- 19.39, "In-Vessel Retention of Molten Core Debris"
- 19.40, "Passive Containment Cooling"

- 19.42, "Conditional Containment Failure Probability Distribution"
- 19.43, "Release Frequency Quantification"
- 19.44, "MAAP4.0 Code Description and AP1000 Modeling"
- 19.45, "Fission Product Source Terms"
- 19.46 Not used
- 19.47 Not used
- 19.48 Not used
- 19.49, "Offsite Dose Evaluation"
- 19.50, "Importance and Sensitivity Analysis"
- 19.51, "Uncertainty Analysis"
- 19.52, Not used
- 19.53, Not used
- 19.54, "Low Power and Shutdown PRA Assessment"

- 19.56, "PRA Internal Flooding Analysis"
- 19.57, "Internal Fire Analysis"

Appendix 19A, "Thermal Hydraulic Analysis to Support Success Criteria"
Appendix 19B, "Ex-Vessel Severe Accident Phenomena"
Appendix 19C, "Additional Assessment of AP1000 Design Features"
Appendix 19D, "Equipment Survivability Assessment"

The staff of the Nuclear Regulatory Commission (NRC) reviewed the application and checked the referenced DCD to ensure that no issue relating to these sections remained for review.¹

¹ See Section 1.2.2 for a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a design certification (DC).

The NRC staff's review confirmed that there are no outstanding issues related to these sections. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

For the remaining sections of Chapter 19, NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 19.0, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors," was the principal source of guidance for the review. NUREG-0800, Section 19.1, "Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," was also used. The acceptability of the risk to public health and safety was determined on the basis of the results and insights derived from the applicant's plant-specific internal events PRA, site-specific assessment of external events, and severe accident evaluations. The staff's evaluation of the remaining sections of Chapter 19 is described below.

19.41 Hydrogen Mixing and Combustion Analysis

In the course of a severe accident, the oxidation of the zirconium in the fuel cladding and other metals can generate a substantial amount of combustible gas in the reactor vessel. This gas will migrate to the containment. Section 19.41 presents the design features of the AP1000 containment that control the concentration of combustible gases, including hydrogen igniters. Section 19.41 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 19.41, "Hydrogen Mixing and Combustion Analysis," of the AP1000 DCD, Revision 19. Section 19.41 of the DCD provides a hydrogen analysis that quantifies the threat to containment integrity with and without hydrogen igniters (which are not safety-related).

In addition, in the Turkey Point Units 6 and 7 COL FSAR, the applicant provided the following:

Departures

- PTN DEP 6.2-1

The applicant provided additional information in Section 19.41 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.2-1 related to changes to the acceptance criteria applied to a specific inspection, test, analysis, and acceptance criteria (ITAAC) design commitment and associated inspection, test, or analysis in Tier 1 Table 2.3.9-3, Item 3 (for control of containment hydrogen concentration for beyond-design-basis accidents) to establish consistency with the current detailed design of the plant. This information, as well as related PTN DEP 6.2-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.4 of this safety evaluation report (SER).

The NRC staff reviewed Section 19.41 of the Turkey Point Units 6 and 7 COL FSAR and confirmed that the combination of the DCD and the COL application included sufficient information on this topic. As documented in Section 21.4 of this SER, the staff confirmed that with this departure, the evaluation criteria are still satisfied. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

19.55 Seismic Margin Analysis

19.55.1 Introduction

The NRC staff reviewed Section 19.55 of the Turkey Point Units 6 and 7 COL FSAR, which incorporated Section 19.55 of the DCD with no departures or supplements.

The seismic analysis and design of the AP1000 plant is based on the certified seismic design response spectra (CSDRS) shown in AP1000 DCD Tier 1, Figures 1.0-1 and 1.0-2. These spectra are based on Regulatory Guide (RG) 1.60, "Design Response Spectra for Seismic Design of Nuclear Power Plants," Revision 1, with an increase in the 25 Hz region to account for increased high frequency ground motion at some prospective sites. The CSDRS has its dominant energy content in the frequency range of 2 Hz to 10 Hz.

19.55.2 Summary of Application

Section 19.55 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 19.55 of the AP1000 DCD, Revision 19.

AP1000 COL Information Item

- PTN COL 19.59.10-6

In a letter dated September 15, 2011, the applicant proposed Turkey Point Units 6 and 7 COL 19.59.10-6, supplementing the Turkey Point Units 6 and 7 COL FSAR with a new Section 19.55.6.3, "Site-Specific Seismic Margin Analysis." This plant-specific COL item is in response to a COL Information Item 19.59.10-6 proposed for the AP1000 DCD in a letter from Westinghouse dated August 23, 2010, regarding confirmation that the seismic margin analysis (SMA) documented in the AP1000 DCD section is applicable to the Turkey Point Units 6 and 7 site. Specifically, Turkey Point Units 6 and 7 COL FSAR Section 19.55 describes features of the site and provides the applicant's basis for concluding that the seismic margin for Turkey Point Units 6 and 7 is bounded by the SMA for the certified design.

19.55.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the applicable regulatory requirements for the evaluation of plant-specific information evaluated in Section 19.55 of this SER are as follows:

- 10 CFR 52.79(a)(46), "The final safety analysis report shall include...at a level of information sufficient to enable the Commission to reach a final conclusion on all safety matters that must be resolved...before issuance of a combined license...[a] description of the plant-specific PRA and its results."
- 10 CFR 52.79(d)(1), "If the combined license application references a standard design certification, then the...final safety analysis report need not contain information or analyses submitted to the Commission in connection with the design certification,

provided, however, that the final safety analysis report must either include or incorporate by reference the standard design certification final safety analysis report and must contain, in addition to the information and analyses otherwise required, information sufficient to demonstrate that the site characteristics fall within the site parameters specified in the design certification. In addition, the plant-specific PRA information must use the PRA information for the design certification and must be updated to account for site-specific design information and any design changes or departures.”

Additional guidance is found in the following documents:

- Interim staff guidance (ISG) in the form of DC/COL-ISG-1, “Interim Staff Guidance on Seismic Issues of High Frequency Ground Motion in Design Certification and Combined License Applications,” provides clarifying guidance on implementation of the performance-based approach for determining site-specific ground motion. It also provides guidance on implementation of evaluation methodology to determine the effects of high-frequency ground motion.
- DC/COL-ISG-3, “Probabilistic Risk Assessment Information to Support Design Certification and Combined License Applications,” provides clarifying guidance regarding the scope and quality of PRAs being used to support COL applications, and documentation that must be submitted in support of these applications.

For external events analysis purposes, DC/COL-ISG-3 considers the requirements of 10 CFR 52.79(d)(1) met if the COL applicant compares the site’s characteristics to those assumed in the DCD bounding analyses to ensure that the site is enveloped. If the site is enveloped, the COL applicant need not perform further PRA evaluations for these external events. However, the COL applicant should perform site-specific PRA evaluations to address any site-specific hazards for which a bounding analysis was not performed or that are not enveloped by the bounding analyses to ensure that no vulnerabilities due to siting exist.

- DC/COL-ISG-20, “Implementation of a Probabilistic Risk Assessment-Based Seismic Margin Analysis for New Reactors,” provides guidance on plant-specific updates of the DC PRA-based seismic margin evaluation for COL applications.

19.55.4 Technical Evaluation

The NRC staff reviewed Section 19.55 of Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff’s review confirmed that the information in the application and incorporated by reference addresses the required information relating to SMA. The results of the NRC staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 19.59.10-6

The staff's review of the AP1000 PRA-based SMA is described in Section 19.1.5.1 of NUREG-1793 and its supplements. The AP1000 SMA estimated the high confidence in low probability of failure (HCLPF) capacity of the AP1000 plant in terms of a free-field peak ground acceleration (PGA) expressed in terms of g (the acceleration of gravity). Specifically, in a staff requirements memorandum dated July 21, 1993, the Commission approved the following staff recommendation specified in SECY-93-087, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs," Section II.N, "Site Specific Probabilistic Risk Assessments and Analysis of External Events," with a modification:

PRA insights will be used to support a margins type assessment of seismic events. A PRA based seismic margins analysis will consider sequence level HCLPFs and fragilities for all sequences leading to core damage or containment failures up to approximately one and two thirds the ground motion acceleration of the design-basis SSE [safe shutdown earthquake].

This has been incorporated in DC/COL-ISG-20. A review-level earthquake (RLE) equal to 0.5 g was established in the AP1000 DCD for the SMA and used to demonstrate a margin over the SSE of 0.3 g.

The NRC staff reviewed the proposed additions to Section 19.55 of the Turkey Point Units 6 and 7 COL FSAR outlined in the applicant's letter dated September 15, 2011. Chapter 3 of the FSAR presents the site's ground motion response spectra (GMRS). Because the GMRS is bounded by the CSDRS evaluated in the AP1000 DCD, the staff finds that using the SMA in the DCD is conservative and acceptable.

19.55.5 Post Combined License Activities

There are no post-COL activities identified in this section.

19.55.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to site-specific features that may affect seismic margins in the Turkey Point Units 6 and 7 COL FSAR. The information provides sufficient basis to conclude that the incorporation of the SMA documented in the AP1000 DCD is acceptable. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of 10 CFR 52.79(a)(46) and 10 CFR 52.79(d)(1). The staff based its conclusion on the following:

- PTN COL 19.59.10-6, as it relates to SMA, is acceptable because it conforms to the guidance in DC/COL-ISG-3 and -20.

19.58 Winds, Floods, and Other External Events

19.58.1 Introduction

Section 19.58 of the Turkey Point Units 6 and 7 COL FSAR discusses risks associated with external events other than earthquakes. The staff uses this information to confirm that the total risk represented by core damage frequency (CDF) and large release frequency (LRF) remains acceptably low when accounting for external events.

With respect to external events, the applicant's response to COL Information Item 19.59.10-2 may also affect Turkey Point Units 6 and 7 COL FSAR Section 19.58. Therefore, the staff's evaluation of this COL information item is discussed in Section 19.58.4 below.

19.58.2 Summary of Application

Section 19.58 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 19.58 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 19.58, the applicant provided the following:

Departure

- PTN DEP 19.58-1

In a letter dated September 8, 2011, as supplemented by letter dated March 15, 2012, the applicant provided supplemental information to address a portion of COL Information Item 19.59.10-2. Turkey Point Units 6 and 7 COL FSAR Table 19.58-202, "External Event Frequencies for Turkey Point Units 6 and 7," documents the site-specific external events evaluation that has been performed for Turkey Point Units 6 and 7. This table provides a general explanation of the evaluation and resultant conclusions and provides a reference to applicable sections of the COL where supporting information is located. The applicant concluded that the Turkey Point Units 6 and 7 site is bounded by the floods and other external events analysis documented in DCD Section 19.58 and no further evaluations are required at the COL application stage. With respect to high winds and nearby facility accidents, the applicant concluded that the risks are negligible.

19.58.3 Regulatory Basis

The regulatory basis for the evaluation of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the applicable regulatory requirements for the evaluation of PTN DEP 19.58-1 are as follows:

- 10 CFR 52.79(a)(46), "The final safety analysis report shall include...at a level of information sufficient to enable the Commission to reach a final conclusion on all safety matters that must be resolved...before issuance of a combined license...[a] description of the plant-specific PRA and its results."

- 10 CFR 52.79(d)(1), “If the combined license application references a standard design certification, then the...final safety analysis report need not contain information or analyses submitted to the Commission in connection with the design certification, *provided, however*, that the final safety analysis report must either include or incorporate by reference the standard design certification final safety analysis report and must contain, in addition to the information and analyses otherwise required, information sufficient to demonstrate that the site characteristics fall within the site parameters specified in the design certification. In addition, the plant-specific PRA information must use the PRA information for the design certification and must be updated to account for site-specific design information and any design changes or departures.”

Additional guidance is found in the following documents:

- RG 1.200, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities,” Revision 1, which provides guidance on determining whether a PRA used in support of a COL application is of sufficient technical adequacy.
- DC/COL-ISG-3, which provides clarifying guidance regarding the scope and quality of PRAs being used to support COL applications, and documentation that must be submitted in support of these applications.

For external events analysis purposes, DC/COL-ISG-3 considers the requirements of 10 CFR 52.79(d)(1) met if the COL applicant compares the site’s characteristics to those assumed in the DCD generic analyses to ensure that the site is bounded. If so, the COL applicant need not perform further PRA evaluations for these external events. However, the COL applicant should perform site-specific PRA evaluations to address any site-specific hazards for which a bounding analysis was not performed or the prior analysis is not bounding to ensure that no vulnerabilities due to siting exist.

19.58.4 Technical Evaluation

The NRC staff reviewed Section 19.58 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff’s review confirmed that the information in the application and incorporated by reference addresses the required information relating to winds, floods, and other external events. The results of the NRC staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Departure

- PTN DEP 19.58-1

In a letter dated September 8, 2011, as supplemented by letter dated March 15, 2012, the applicant provided a proposed revision to Section 19.58 of the Turkey Point Units 6 and 7 COL FSAR to address a portion of COL Information Item 19.59.10-2.

In support of the AP1000 DC amendment, and to address part of COL Information Item 19.59.10-2, the DC applicant submitted APP-GW-GLR-101, "AP1000 Probabilistic Risk Assessment Site-Specific Considerations." This technical report expanded Section 19.58 of the AP1000 DCD with descriptions of its analyses of selected external events at a hypothetical AP1000 site. The DC applicant gathered site-specific data for those external events hazards determined applicable to each of the sites proposing to build AP1000 plants. For each event, it used the most limiting of the parameters provided by the several sites to characterize the generic AP1000 site. This produced a set of bounding analyses for the selected external events. The DC applicant evaluated these limiting external events against the criteria of NUREG-1407, "Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities," suitably modified to account for significantly lower CDF in passive designs.

Section 19.58 of the AP1000 DCD provides an analysis of the capability of the AP1000 design to withstand external flooding, tornadoes, hurricanes, and other site-specific external events. The second portion of COL Information Item 19.59.10-2 in the AP1000 DCD makes the following statement:

[The] Combined License applicant will confirm that the High Winds, Floods, and Other External Events analysis documented in Section 19.58 is applicable to the COL site. Further evaluation will be required if the COL site is shown to be outside of the bounds of the High Winds, Floods, and Other External Events analysis documented in Section 19.58.

In Section 19.59 of the Turkey Point Units 6 and 7 COL FSAR, the applicant provided STD COL 19.59.10-2, which included the following paragraph:

It has been confirmed that the Winds, Floods, and Other External Events analysis documented in DCD Section 19.58 is applicable to the site. The site-specific design has been evaluated and is consistent with the AP1000 PRA assumptions. Therefore, Chapter 19 of the AP1000 DCD is applicable to this design.

Staff Requests for Additional Information

Although site-specific information at currently proposed AP1000 sites was considered in performing the generic analyses of AP1000 DCD Section 19.58, details were not made available to the staff in the initial application. The staff issued a request for additional information (RAI). RAI 5889, Question 19-1 asked for sufficient information to be able to confirm the basis for concluding that the Turkey Point Units 6 and 7 site was bounded by the

generic analysis. The staff also requested clarification on the adequacy of the sample for representing tornado activity in RAI 5889, Question 19-2.

In a letter dated September 8, 2011, the applicant responded to RAI 5889, Questions 19-1 and 19-2 by describing the methodology used to develop the generic external event analysis, providing a table of external event frequencies for Turkey Point Units 6 and 7, and providing additional discussion on the adequacy of the sample for representing tornado activity. This table documents the site-specific external events evaluation that has been performed for Turkey Point Units 6 and 7. It provides a general explanation of the evaluation and resultant conclusions.

Potential external events and hazards were first screened for applicability to the Turkey Point Units 6 and 7 site. For events that were judged applicable, the applicant developed an initiating event frequency and provided this information to Westinghouse for use in the bounding analysis of the generic AP1000 site. Westinghouse developed a limiting event to bound the severity and frequency of all reported events; a hypothetical site for the generic analysis was characterized by these limiting events.

To address the external events in the scope of the generic analysis, the applicant compared limiting events from the AP1000 DCD and site-specific events. In its response to RAI 5889, Question 19-1, the applicant included a tabular summary of external events relevant to the site as well as an estimate of applicable event frequencies. The applicant proposed to add Table 19.58-202, "External Event Frequencies for Turkey Point Units 6 and 7," in a plant-specific supplement to the FSAR.

The staff independently compared these inputs to the event frequencies assumed in the AP1000 DCD.

The staff reviewed the data, the applicability justifications, and the basis for event frequency estimations in this table. Events that were bounded by the external events documented in the AP1000 DCD (no more frequent and no more damaging) warranted no additional evaluation. Events that are predicted to occur no more than once in ten million years can be screened because they occur so infrequently (frequency less than 1×10^{-7} /year). Events that may occur more frequently are assessed to confirm that their consequences make a negligible contribution to core damage frequency (Δ CDF less than 1×10^{-8} /year). Other events, if any, are to be explicitly evaluated and included in the plant-specific PRA.

A question remained regarding whether the key site-related assumptions in the AP1000 DCD Section 19.58 external events analyses remain valid for the Turkey Point Units 6 and 7 site, and the staff issued RAI 6296, Question 19-4, requesting additional details and clarification to allow the staff to confirm this. RAI 6296, Question 19-4 requested clarification of the event frequencies for tornadoes.

In a letter dated March 15, 2012, the applicant responded to RAI 6296, Question 19-4 with the requested clarification and discussion. In addition, the applicant revised the table that had been submitted in response to RAI 5889, Question 19-1 and proposed to update Table 19.58-202, "External Event Frequencies for Turkey Point Units 6 and 7." The staff verified that Turkey Point Units 6 and 7 COL FSAR Table 19.58-202 was appropriately updated.

A summary of the staff's review of each of the external event categories follows.

Winds That Would Threaten Safety-Related SSCs (Exceed 300 mph)

Because Turkey Point Units 6 and 7 safety-related structures, systems, and components (SSCs) are designed to withstand winds of 300 miles per hour (mph), the COL applicant should confirm the assumption that high-wind events exceeding 300 mph are extremely rare (frequency $<1 \times 10^{-7}$ /year). Subsequent to certification of the AP1000 design, the staff issued RG 1.76, "Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants," Revision 1. This RG states that for the continental United States, the staff considers the highest tornado wind speed with a frequency as high as 1×10^{-7} /year to be 230 mph. The expected frequency of 300 mph tornadoes is significantly lower. On the basis that the proposed site is in the continental United States, the staff considers such events at the Turkey Point Units 6 and 7 site to be screened from further analysis on the basis of negligible frequency.

High Winds—Tornadoes

The applicant is expected to verify that the frequency of each of the six tornado classes at the proposed site is bounded by the frequency assumed in Section 19.58 of the AP1000 DCD.

In response to RAI 5889, Question 19-1, the applicant found this external event category applicable to the Turkey Point Units 6 and 7 site for tornadoes ranging from EF0 to EF3 on the enhanced Fujita scale. The applicant provided data on observed tornadoes striking all or portions of six nearby counties. The applicant used this data to estimate the frequency of each class of tornado (on the enhanced Fujita scale) using a methodology that is described in Table 19.58-202 of the Turkey Point Units 6 and 7 COL FSAR. In response to RAI 6296, Question 19-4, the applicant revised the scope of Table 19.58-202 to include E4 and E5 tornadoes. For each class of tornado, the frequency is less than the values assumed in Section 19.58 of the AP1000 DCD.

The staff finds that the method used to calculate tornado frequencies was conservative and, therefore, acceptable. The staff concludes that the risk from tornadoes at the Turkey Point Units 6 and 7 site is bounded by the risk identified in the AP1000 DCD and that no further analysis is required.

High Winds—Hurricanes and Extratropical Cyclones

The applicant is expected to verify that the frequency of each of the 12 high-wind categories at the proposed site is bounded by the frequency assumed in Section 19.58 of the AP1000 DCD.

In response to RAI 5889, Question 19-1, the applicant identified this external event category as applicable to the Turkey Point Units 6 and 7 site, and identified the sources of data on which their assessment was based and described their methodology for estimating event frequency. The applicant cited studies documented in Chapter 2 of the Turkey Point Units 6 and 7 COL FSAR and stated that the frequency of extratropical cyclones is bounded by the risk in the AP1000 DCD.

The staff evaluated the method used to calculate hurricane frequencies and finds that it was realistic and acceptable. In a letter dated September 8, 2011, responding to RAI 5889, Question 19-1, the applicant clarified the basis for estimating the frequency of hurricanes and cited studies documented in Chapter 2 of Turkey Point Units 6 and 7 COL FSAR. Although the

frequency of such storms exceeds that which was assumed in the AP1000 DCD, the consequences contribute so little to risk that they do not require further analysis.

The staff's evaluation of the applicant's high-wind analysis is presented in Chapter 2 of this SER. The staff concludes that the applicant has demonstrated that hurricanes and extratropical cyclones do not contribute to core damage and that no further evaluation of risk from these accidents is warranted.

External Floods

The applicant is expected to verify that the frequency of external flooding at the proposed site is bounded by the frequency assumed in Section 19.58 of the AP1000 DCD. The DCD states that the AP1000 is protected against floods up to the plant grade elevation. It includes an assessment of risk of flooding from hurricane storm surge. It calls for a site-by-site evaluation of susceptibility to dam failure or flash floods.

In response to RAI 5889, Question 19-1, the applicant identified this external event category as applicable to the Turkey Point Units 6 and 7 site and cited studies documented in Chapter 2 of the Turkey Point Units 6 and 7 COL FSAR. Assessments of storm surge, seiches, precipitation, tsunami, dam failure, and the effects of ice were addressed.

The staff's evaluation of the applicant's hydrologic analyses is presented in Chapter 2 of this SER. Given the information in SER Chapter 2, the staff concludes that the applicant has demonstrated that consequential flooding from external sources is so unlikely that it can be screened from further risk analysis.

Transportation and Nearby Facility Accidents—Aviation Accidents

The applicant is expected to demonstrate that it is bounded by Section 19.58 of the AP1000 DCD by limiting impact frequencies to 1.2×10^{-6} /year by small aircraft and 1.0×10^{-7} /year by commercial size aircraft. The bounding analysis for a small aircraft in the AP1000 DCD assumes that the impact would result in a loss of offsite power initiating event with subsequent loss of nonsafety-related systems. Larger (commercial) aircraft may have the capacity to challenge safety-related SSCs, although some safety-related systems are expected to survive and remain functional.

In response to RAI 5889, Question 19-1, the applicant identified this event category as applicable to the site, which provides details of aircraft impact analysis. The contribution to risk from flights using nearby airports was screened on the basis of criteria in NUREG-0800 Section 3.5.1.6, "Aircraft Hazards." The applicant computed the estimated frequency of an accident arising from aircraft using nearby airways would be 3.86×10^{-6} /year. Although the estimated frequency of aircraft hazards exceeds that which was assumed in the AP1000 DCD, the estimate is based on conservative assumptions. The consequences of aircraft impact contribute so little to risk that they do not require further analysis.

The staff concludes that they do not contribute to risk of core damage and that no further evaluation of risk from these accidents is required.

Transportation and Nearby Facility Accidents—Marine Accidents

There are two event subcategories of marine accidents: toxic materials and explosive hazards. The applicant is expected to verify that the limiting initiating event frequency of 1×10^{-6} /year is not exceeded for explosions that could affect the plant. Neither is this frequency to be exceeded for the release of toxic materials toward the plant (which can affect plant and control room habitability). The Florida Intracoastal Waterway is the only waterway near the site and is only used to supply Turkey Point Units 1–5. The applicant does not intend to transport toxic materials or explosives on this waterway and therefore determined that this event does not apply to the site.

The staff finds that because there is no commercial shipping or barge traffic on waterways near the site other than what is being shipped to Turkey Point Units 1–5, marine accidents need not be considered for the Turkey Point Units 6 and 7 site.

Transportation and Nearby Facility Accidents—Rail Accidents

There are two event subcategories of railway hazards: toxic materials and explosive hazards. In response to RAI 5889, Question 19-1, the applicant found that neither event category applies to the Turkey Point Units 6 and 7 site. Accordingly, the applicant does not further evaluate risk from rail-borne explosives or toxic materials because there are no railways in the vicinity of the site.

The staff finds that because there is no railway near the site, rail accidents need not be considered for the Turkey Point Units 6 and 7 site.

Transportation and Nearby Facility Accidents—Truck Accidents

There are two event subcategories of hazards from trucking: toxic materials and explosive hazards. In response to RAI 5889, Question 19-1, the applicant found that neither event category applies to the Turkey Point Units 6 and 7 site. Accordingly, the applicant does not further evaluate risk from explosives or toxic materials transported by truck. The safe standoff distance for an explosive hazard is less than the distance from the site boundary to the nearest highway. In any case, the consequence is bounded by that of an onsite explosion of a tank truck of gasoline, which does not contribute to risk of core damage.

The staff's assessment of these accident analyses is documented in Chapter 2 of this SER. The staff concludes that they do not contribute to risk of core damage and no further evaluation of risk from truck accidents is required.

Transportation and Nearby Facility Accidents—Pipelines

In response to RAI 5889, Question 19-1, the applicant states that there are two natural gas pipelines within 5 miles of the Turkey Point Units 6 and 7 site. The applicant states that these pipelines do not pose a credible risk to the site and cited studies in Chapter 2 of the Turkey Point Units 6 and 7 COL FSAR.

The staff's assessment of the applicant's analysis is documented in Chapter 2 of this SER. Because accidents at nearby facilities do not have consequences that contribute to risk, the staff finds that they can be screened from further analysis.

Transportation and Nearby Facility Accidents—Nearby Facilities

Section 19.58.2.3 of the AP1000 DCD, "Transportation and Nearby Facility Accidents," indicates that this section discusses events that "consist of accidents related to transportation near the nuclear power plant and accidents at industrial and military facilities in the vicinity."

Section 2.2 of the Turkey Point Units 6 and 7 COL FSAR states that there is a military facility within 20 miles of the Turkey Point Units 6 and 7 site. The applicant identifies all industrial facilities within five miles of the plant. Each of the explosive or hazardous materials associated with facilities within five miles were evaluated.

The staff's assessment of the applicant's analysis is documented in Chapter 2 of this SER. Because accidents at nearby facilities do not have consequences that contribute to risk, the staff finds that they can be screened from further analysis.

External Fires

The AP1000 DCD calls for the applicant to "reevaluate the qualitative screening of external fires" and perform a risk assessment if it cannot be demonstrated that the frequency of hazard is less than 1×10^{-7} /year.

External fires are discussed in Turkey Point Units 6 and 7 COL FSAR Chapter 2. On the basis of the distance separating the plant from potential external fires, the applicant concluded that safe operation of the plant is not jeopardized by external fires.

Because external fires do not contribute to risk, the staff finds that no further evaluation of risk from external fires is required.

Summary

On the basis of this additional information, the staff confirmed that for all external events that contribute to risk, the parameters used for the AP1000 DCD external events analysis bound the reported parameters of the Turkey Point Units 6 and 7 site. The staff concludes that the incorporation of AP1000 DCD Section 19.58 by reference with a departure to address certain categories of wind is acceptable.

19.58.5 Post Combined License Activities

There are no post-COL activities related to this section.

19.58.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to winds, floods, and other external events, and there is no outstanding information that remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section.¹ The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

The staff concludes, that the relevant information presented in STD COL 19.59.10-2 is consistent with the requirements of 10 CFR 52.79(a)(46) and 10 CFR 52.79(d)(1) and is, therefore, acceptable.

19.59 PRA Results and Insights

19.59.1 Introduction

This section describes the use of the PRA in the design process. It also provides an overall summary of PRA results, including those from the following analyses:

- full power, internal events PRA (both Level 1 and Level 2, providing information on CDF and LRF)
- shutdown and low power events PRA (both Level 1 and Level 2 PRA, with information on CDF and LRF)
- internal flooding assessment (both Level 1 and Level 2 PRA, with information on CDF and LRF for both full power and shutdown/low power conditions)
- internal fire assessment (both Level 1 and Level 2 PRA, with information on CDF and LRF for both full power and shutdown/low power conditions)
- SMA

In addition, this section discusses key insights from the PRA. It describes those plant features that are important to risk. It also provides information on where the PRA was used to support the certification of the AP1000 design, such as the assessment of design alternatives and scoping of the reliability assurance program.

19.59.2 Summary of Application

Section 19.59 of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Section 19.59 of the AP1000 DCD, Revision 19.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 19.59.10.5 the applicant provided the following:

Departure

- PTN DEP 6.3-1

The applicant provided additional information related to quantifying the duration that the passive residual heat removal system heat exchanger can maintain safe shutdown conditions. This information, as well as related PTN DEP 6.3-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.1 of this SER.

AP1000 COL Information Items

- STD COL 19.59.10-1

The applicant provided additional information in STD COL 19.59.10-1 to address COL Information Item 19.59.10-1. This item will evaluate any differences between the as-built plant and the certified design to confirm that seismic margins remain adequate.

- STD COL 19.59.10-2

The applicant provided additional information in STD COL 19.59.10-2 to address COL Information Item 19.59.10-2. The portion of this item dealing with evaluation of the as-built plant for conformance to the design modeled in the AP1000 PRA was originally identified in Revision 15 of the AP1000 DCD as a COL applicant's responsibility. It was subsequently identified as a COL holder's responsibility and is required in a license condition.

The portion of COL Information Item 19.59.10-2 dealing with the site-specific PRA for external events remains the responsibility of the COL applicant and is discussed in Section 19.58 of this SER.

- STD COL 19.59.10-3

The applicant provided additional information in STD COL 19.59.10-3 to address COL Information Item 19.59.10-3. This item will evaluate any differences between the as-built plant and the certified design to confirm that there are no significant adverse changes to the internal fire and internal flood analysis results. This evaluation is required in a license condition.

- STD COL 19.59.10-4

The applicant provided additional information in STD COL 19.59.10-4 to address COL Information Item 19.59.10-4. The COL applicant states that severe accident management guidance (SAMG) is implemented on a site-specific basis. SAMGs are required in a license condition.

- STD COL 19.59.10-5

The applicant provided additional information in STD COL 19.59.10-5 to address COL Information Item 19.59.10-5. This item, thermal lag assessment of the as-built equipment required to mitigate severe accidents, must be completed prior to initial fuel loading (for equipment that has not been tested at severe accident conditions). This assessment is required in a license condition.

- PTN COL 19.59.10-6

In a letter dated September 15, 2011, the applicant proposed to add Turkey Point Units 6 and 7 COL 19.59.10-6 to reflect a revision proposed by Westinghouse in a letter dated August 23, 2010, regarding confirmation that the SMA documented in the AP1000 DCD section is applicable to the Turkey Point Units 6 and 7 site. This COL information item is evaluated in SER Section 19.55.4.

Section 19.59 of the Turkey Point Units 6 and 7 COL FSAR added Section 19.59.10.6 to include the following:

Supplemental Information

- STD SUP 19.59-1

The applicant provided supplemental information on processes to accomplish the following:

- monitoring PRA inputs and collecting new information
- maintaining and updating the PRA to reflect the as-built, as-operated plant
- considering the cumulative impact of pending changes when applying the PRA
- evaluating the impact of changes on risk-informed decisions
- maintaining configuration control of the PRA, including computer codes used to support PRA quantification
- upgrading the PRA to meet NRC endorsed consensus standards
- maintaining the PRA documentation

In addition, the applicant describes where the plant-specific PRA is expected to provide input to other programs and processes.

License Conditions

- Part 10, License Condition 2

The proposed license condition identifies required actions that cannot be accomplished until a license is granted. It provides milestones for their completion.

- Part 10, License Condition 6

The proposed license condition requires submission of a schedule to support NRC inspections of operational programs, including those related to implementation of SAMG.

19.59.3 Regulatory Basis

The regulatory basis for the staff review of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the following regulations apply to Sections 19.59.10.5 and 19.59.10.6 of the Turkey Point Units 6 and 7 COL FSAR:

- 10 CFR 50.71(h)(1), "No later than the scheduled date for initial loading of fuel, each holder of a combined license under subpart C of 10 CFR Part 52 shall develop a level 1

and a level 2 probabilistic risk assessment (PRA). The PRA must cover those initiating events and modes for which NRC-endorsed consensus standards on PRA exist one year prior to the scheduled date for initial loading of fuel.”

- 10 CFR 50.71(h)(2), “Each holder of a combined license shall maintain and upgrade the PRA required by paragraph (h)(1) of this section. The upgraded PRA must cover initiating events and modes of operation contained in NRC-endorsed consensus standards on PRA in effect one year prior to each required upgrade. The PRA must be upgraded every four years until the permanent cessation of operations under 10 CFR 52.110(a) of this chapter.”
- 10 CFR 52.79(a)(46), “The final safety analysis report shall include...at a level of information sufficient to enable the Commission to reach a final conclusion on all safety matters that must be resolved...before issuance of a combined license:...[a] description of the plant-specific probabilistic risk assessment (PRA) and its results.”
- 10 CFR 52.79(a)(38), “The final safety analysis report shall include...at a level of information sufficient to enable the Commission to reach a final conclusion on all safety matters that must be resolved...before issuance of a combined license:...a description and analysis of design features for the prevention and mitigation of severe accidents....“
- 10 CFR 52.79(d)(1), “If the combined license application references a standard design certification, then the...final safety analysis report need not contain information or analyses submitted to the Commission in connection with the design certification, *provided, however*, that the final safety analysis report must either include or incorporate by reference the standard design certification final safety analysis report and must contain, in addition to the information and analyses otherwise required, information sufficient to demonstrate that the site characteristics fall within the site parameters specified in the design certification. In addition, the plant-specific PRA information must use the PRA information for the design certification and must be updated to account for site-specific design information and any design changes or departures.”

NUREG-0800 provides the following guidance:

- Section 19.0, Section III.1.C provides guidance for reviewing a COL application referencing a DC, with emphasis on documented assumptions and insights from the PRA.
- Section 19.0, Section III.3 provides guidance for reviewing COL action items.
- Section 19.1 provides information regarding the review of the technical adequacy of a design-specific, site-specific PRA.

Additional guidance is found in the following documents:

- RG 1.200, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities,” Revision 1 , which provides guidance on determining whether a PRA provides an adequate basis for issuing a COL.

- DC/COL-ISG-3, which clarifies the information that should be included in the COL application.
- SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," which identifies an acceptable method for reporting scheduled implementation of operational programs.

19.59.4 Technical Evaluation

The NRC staff reviewed Section 19.59 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.¹ The NRC staff confirmed that the information in the application and incorporated by reference addresses the required information relating to the PRA results and insights. The results of the NRC staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP, Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 19.59.4 of the VEGP SER:

AP1000 COL Information Items

- STD COL 19.59.10-1

The NRC staff reviewed STD COL 19.59.10-1, which is related to the seismic margin evaluation found in Section 19.55 of the AP1000 DCD, incorporated by reference into the BLN COL FSAR. RAI 19-1 requested justification of an apparent difference between STD COL 19.59.10-1 and the corresponding information item in the DCD. The applicant revised BLN COL FSAR Section 19.59.10.5 as follows:

The requirements to which the equipment is to be purchased are included in the equipment specifications. Specifically, the equipment specifications include:

- 1. Specific minimum seismic requirements [are] consistent with those used to define the Table 19.55-1 [high confidence, low probability of failure] HCLPF values. This includes the known frequency range used to define the HCLPF by comparing the required response spectrum (RRS) and test response spectrum (TRS). The range of frequency response that is required for the equipment with its structural support is defined.*
- 2. Hardware enhancements that were determined in previous test programs and/or analysis programs will be implemented.*

This is consistent with the AP1000 DCD, and is therefore acceptable to the staff. As a result, the staff considers RAI 19-1 to be closed.

STD COL 19.59.10-1 states that this should be completed prior to initial fuel load, rather than at the time of the COL application. The required comparison cannot be performed until completion of fabrication, installation, and construction of SSCs, and the as-built review of the seismic margin evaluation.

The NRC staff concluded in Section 19.1.5.1 of NUREG-1793 that the methodology for calculating the HCLPF values complied with the relevant regulatory requirements, based on the certified seismic design response spectra (CSDRS). The staff concludes that it is acceptable to complete the final verification of seismic margins when the walkdowns are performed after the plant is built.

- STD COL 19.59.10-2

As noted in SER Section 19.59.2 above, this COL information item has two parts. The first part requests the COL holder to compare the as-built plant to the design used as the basis for the AP1000 PRA and DCD Table 19.59-18 (which was incorporated by reference into Chapter 19 of

the applicant's FSAR). The COL holder updates the site-specific PRA to reflect differences if they potentially result in a significant increase in CDF or LRF.

Revisions to 10 CFR Part 52 and related rules were issued after Westinghouse submitted the initial AP1000 DC application, but prior to the submittal of the Turkey Point Units 6 and 7 COL application. Two of the revised regulations, 10 CFR 52.79(d)(1) and 10 CFR 50.71(h), require that a COL application provide a description of a site-specific PRA, and that this PRA must cover those initiating events and modes for which NRC-endorsed consensus standards on PRA exist one year prior to the scheduled date for initial loading of fuel. Additional guidance was provided in DC/COL-ISG-3, which states, "PRA maintenance should commence at the time of application for both DC and COL applicants. This means that the PRA should be updated to reflect plant modifications if there are changes to the design." DC/COL-ISG-3 also clarifies the staff position on what constitutes a significant change in PRA results.

The staff concludes that the applicant meets the 10 CFR 52.79(d)(1) requirement for a site-specific PRA, as well as the additional guidance described in DC/COL-ISG-3. STD COL 19.59.10-2 states that evaluation of the as-built plant should be completed prior to initial fuel load, rather than at the time of the COL application. The required updates cannot be finalized until completion of fabrication, installation, and construction.

The NRC staff concluded in Section 19.1.9 of NUREG-1793 that the quality and completeness of the AP1000 PRA are adequate and satisfy the regulatory requirements. The methodology for upgrading and updating the plant-specific PRA described in the Turkey Point Units 6 and 7 COL FSAR satisfies the guidance of RG 1.200 and is, therefore, acceptable to the staff. The staff concludes that it is acceptable to update the plant-specific PRA when walkdowns are performed after the plant is built. This is consistent with the 10 CFR 50.71(h) requirement that the plant-specific PRA reflect the risk profile of the as-built, as-operated plant.

The second portion of this COL information item involves a review of site-specific external events to confirm that they are bounded by the external events addressed in the generic risk assessment for the AP1000 design. The staff's evaluation of this review is documented in Section 19.58 of this SER.

The following portion of this technical evaluation section is reproduced from Section 19.59.4 of the VEGP SER:

- *STD COL 19.59.10-3*

In response to RAI 19-20, the applicant proposed a change to its response to STD COL 19.59.10-3 to the effect that plant-specific internal fire and internal flood analysis will be evaluated and the analysis modified as necessary to account for the plant-specific design, and any design changes or departures from the certified design.

The staff reviewed STD COL 19.59.10-3, which is related to the internal fire and internal flood analyses evaluation included under Sections 19.56 and 19.57 of the AP1000 DCD, incorporated by reference in the BLN COL FSAR.

The NRC staff discussed, in Sections 19.1.5.2 and 19.1.5.3 of NUREG-1793, the methodology for assessing the risk from internal fire and floods, respectively. In

Section 19.1.9, the staff concluded that the quality and completeness of the AP1000 PRA are adequate and satisfy the applicable regulatory requirements. Because the as-built configuration cannot be assessed until construction is complete, the staff finds that it is acceptable to update internal fire and flood analyses if the need to do so is identified when walkdowns are performed after the plant is built.

In a letter dated April 15, 2009 (ML091100173), the applicant proposed to revise its response to STD COL 19.59.10-1 through 19.59.10-3 and to revise License Condition 2 to conform to the revised wording of these three STD COL items. The staff identifies incorporation of these changes as Confirmatory Item 19.59-1.

Resolution of Standard Content Confirmatory Item 19.59-1

Confirmatory Item 19.59-1 required the applicant to revise the proposed License Condition 2 (in Part 10 of the application) to reflect the revised wording of STD COL 19.59.10-1 through 19.59.10-3. The NRC staff verified that the proposed License Condition 2 in Part 10 of the application was updated to reflect the above. As a result, Confirmatory Item 19.59-1 is resolved.

The following portion of this technical evaluation section is reproduced from Section 19.59.4 of the BLN SER:

- *STD COL 19.59.10-4*

The AP1000 DCD closed this COL information item with respect to the development of the SAMG. The COL holder will implement the AP1000 SAMG.

For STD COL 19.59.10-4 in Section 19.59.10 of the BLN COL FSAR, the applicant states, "The AP1000 Severe Accident Management Guidance (SAMG) from APP-GW-GLR-070, Reference 1 of DCD Section 19.59, is implemented on a site-specific basis." In Table 1.8-202 of the BLN COL FSAR, the applicant identifies this as a COL holder item. In response to RAI 19-3, the applicant revised its response to STD COL 19.59.10-4 in the BLN COL FSAR. The staff found this response incomplete and issued RAI 19-21.

In a letter dated April 15, 2009 (ML091100173), in response to RAI 19-21, the applicant proposed to revise License Conditions 2 and 6 to conform to the revised FSAR wording. Specifically, the applicant proposed to revise License Condition 2, Item 19.59.10-4 to reflect the fact that the SAMG development had been completed in the AP1000 DCD. In addition, the applicant proposed to revise License Condition 6 (Operational Program Readiness in Part 10 of the BLN COL application) to include a schedule for the implementation of site-specific SAMG, thereby supporting NRC inspections of operational programs in the period between issuance of a COL and authorization to load fuel in accordance with 10 CFR 52.103. This is consistent with the staff position documented in SECY-05-0197, and therefore, acceptable to the staff. The staff identifies the incorporation of these changes as Confirmatory Item 19.59-2.

Resolution of Standard Content Confirmatory Item 19.59-2

Confirmatory Item 19.59-2 required the applicant to revise the proposed License Condition 2 (in Part 10 of the application), Item 19.59.10-4, to reflect that the SAMG development was completed in the AP1000 DCD. In addition, the confirmatory item required that the applicant to revise the proposed License Condition 6 to [include] a schedule for the implementation of site-specific SAMG. The NRC staff verified that the proposed License Conditions 2 and 6 in Part 10 of the application were updated to reflect the above. As a result, Confirmatory Item 19.59-2 is resolved.

The following portion of this technical evaluation section is reproduced from Section 19.59.4 of the BLN SER:

- *STD COL 19.59.10-5*

The AP1000 DCD, Revision 17, changed the wording of COL Information Item 19.59.10-5 to clarify which equipment requires thermal lag assessment. STD COL 19.59.10-5 in Chapter 19 of the BLN COL FSAR, as well as the COL holder item listed in License Condition 2 (Part 10 of the BLN COL application) have been revised to conform with the AP1000 DCD.

The NRC staff concluded, in Section 19.2.3.3.7.3 of NUREG-1793, that the equipment and instrumentation identified as required to mitigate severe accidents meets the guidance of SECY-93-087 and 10 CFR 50.34(f). In addition, the staff required that the COL applicant referencing the AP1000 certified design perform a thermal response assessment of as-built equipment used to mitigate severe accidents. Since the as-built equipment and configuration are not available until after the COL is issued, the staff concludes that it is acceptable to complete thermal lag assessments prior to fuel load.

COL Action Items from Chapter 19 of NUREG-1793

The staff compared COL information items in Chapter 19 of the AP1000 DCD with the COL action items from NUREG-1793. The staff identified differences between them, which resulted in two RAIs:

RAI 19-6

Two items from NUREG-1793 relate to the training of operators to respond to certain conditions during shutdown. The first calls for the COL applicant to train operators to quickly close containment hatches and penetrations in the event of an accident during Modes 5 or 6. This must be completed before boiling begins in the reactor coolant system (RCS).

The BLN COL FSAR cited APP-GW-GLR-040, "Plant Operations, Surveillance, and Maintenance Procedures." This is the template document for AP1000 procedure generation. The applicant also noted that BLN COL FSAR Section 13.2 incorporates by reference NEI 06-13, "Template for an Industry Training Program Description." Sections 1.1.1.1, 1.1.1.2, 1.1.2, and 1.2.1 of this document focus on training for operations during shutdown, including abnormal

and emergency operations. Technical Specification 3.6.8 provides direction for maintaining containment closure capability prior to steaming during Modes 5 and 6, and it is expected that operators will be well versed in technical specification requirements.

The staff finds that this is an acceptable way to ensure that operators will be prepared to close containment hatches in the event of an accident during Mode 5 or 6.

The second calls for operator training in the use of the wide range pressurizer level indication to cross-check the safety-related narrow range hot-leg level instruments. This is to avoid inadvertent over-draining of the RCS, particularly during reduced inventory operation. The staff reviewed Table 19.59-18, "AP1000 PRA-Based Risk Insights." Item 62 of the table explicitly states, "It is important to maximize the availability of the non-safety-related wide range pressurizer level indication during RCS draining operations during cold shutdown. Procedures and training must be developed to encompass this item." BLN COL 19.59.10-2 includes verification of every item in this table by the COL holder, prior to fuel load. This is accomplished by comparing each item to the as-built (and as operated) plant.

The staff finds this to be an acceptable way to confirm that operators are adequately trained on the use of wide range pressurizer level indication as a cross-check on the safety-related narrow range hot-leg level instruments. Therefore, RAI 19-6 is closed.

RAI 19-7

The staff sought more specific information about compensatory measures used to maintain adequate internal fire and flooding detection and suppression capability during maintenance activities that may impair these features.

The applicant responded by indicating that compensatory measures for fire protection are addressed in BLN COL FSAR Section 9.5.1.8.1.2, which describes use of a permit system that controls and documents inoperability of fire protection systems and equipment, and establishes requirements to initiate proper notifications and compensatory actions, such as fire watches, when the inoperability of any fire protection system or component, such as detectors or suppression devices, is identified. The staff reviewed the cited section of the BLN COL FSAR, and found that it adequately addresses situations when maintenance activities potentially impair fire detection and suppression equipment.

The applicant also responded that flooding detection and suppression equipment, such as sump level indicators, are identified as specific design features in BLN COL FSAR Sections 3.4 and 9.3.5. The most important ones, containment sump level indicators, are controlled by technical specification limiting conditions for operations (LCOs) with required actions and completion times. In addition, flood control in other places is managed by a floor drain system, which provides level detection, as well as manual or automatic pump

down of the sumps, which collect water entering the floor drains. Administrative procedures described in BLN COL FSAR Section 13.5.1 control maintenance activities and provide for equipment control and, if needed, compensatory action when maintenance activities impair flooding control equipment.

The staff reviewed the references provided by the applicant and finds the applicant's responses provide adequate compensatory action; therefore, RAI 19-7 is closed.

Supplemental Information

- *STD SUP 19.59-1*

The applicant provided supplemental information in BLN COL FSAR Section 19.59.10.6, "PRA Configuration Controls." The applicant discusses how the BLN plant-specific PRA is developed and maintained to reflect the as-built and as-operated plant, as well as how it will be used to support other programs.

The applicant committed to upgrade the Level 1 and Level 2 PRA prior to fuel load to cover those initiating events and modes of operation set forth in NRC-endorsed consensus standards on PRA that are in effect one year prior to the scheduled date of the initial fuel load. In addition, upgrades are completed at least once every four years. This is consistent with 10 CFR 50.71(h) and, therefore, acceptable to the staff.

In addition, the applicant committed to monitor various information sources for changes or new information that could affect the model assumptions or quantification. Plant-specific design, procedure, and operational changes are reviewed for risk impact. A screening process determines whether a PRA update should be performed more frequently, and includes consideration of whether the changes affect the PRA insights. If the changes warrant a PRA update, the update is made as soon as practicable consistent with the importance of the change and the applications being used. Otherwise, changes are tracked and incorporated in the next regularly scheduled update. This is consistent with RG 1.200, Revision 1, and therefore acceptable to the staff.

PRA quality assurance (QA) provisions ensure that personnel involved in PRA are qualified, work is reviewed independently, documentation is adequately controlled, and upgrades to the PRA are peer-reviewed. When assumptions, analyses, or information used previously are changed or determined to be in error, potential impacts to the PRA model are tracked. If errors are found in the PRA model, they are tracked and appropriate corrective action governed by procedures is taken. This is consistent with RG 1.200 and, therefore, acceptable to the staff.

The PRA provides input to various programs and processes, such as implementation of the maintenance rule, reactor oversight process, the reliability assurance program, the program for regulatory treatment of non-safety systems, and the motor-operated valve (MOV) program. The staff agrees that a plant-specific, site-specific PRA, based on the generic PRA for the AP1000 and

maintained as described in the BLN COL FSAR, is an appropriate model to provide input to each of these risk-informed activities.

19.59.5 Post Combined License Activities

The license condition text in this section has been clarified from the previously considered text. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition text. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license condition acceptable:

- License Condition (19-1) – The licensee shall review differences between the as-built plant and the design used as the basis for the AP1000 SMA prior to initial fuel load. The licensee shall perform a verification walkdown to identify differences between the as-built plant and the design. The licensee shall evaluate any differences and shall modify the seismic margin analysis as necessary to account for the plant-specific design and any design changes or departures from the certified design. The licensee shall compare the as-built SSC HCLPFs to those assumed in the AP1000 seismic margin evaluation prior to initial fuel load. The licensee shall evaluate deviations from the HCLPF values or assumptions in the seismic margin evaluation due to the as-built configuration and final analysis to determine if vulnerabilities have been introduced.
- License Condition (19-2) – Before initial fuel load, the licensee shall review differences between the as-built plant and the design used as the basis for the AP1000 probabilistic risk assessment (PRA) and the AP1000 DCD, Revision 19, Table 19.59-18. The licensee shall evaluate the plant-specific PRA-based insight differences and shall modify the plant-specific PRA model as necessary to account for the plant-specific design and any design changes or departures from the design certified in Revision 19 of the AP1000 DCD.
- License Condition (19-3) – Before initial fuel load, the licensee shall review differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analysis. The licensee shall evaluate the plant-specific internal fire and internal flood analyses and shall modify the analyses as necessary to account for the plant-specific design and any design changes or departures from the design certified in Revision 19 of the AP1000 DCD.
- License Condition (19-4) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the site-specific severe accident management guidelines. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until this license condition has been fully implemented. The schedule shall identify the implementation of the site-specific severe accident management guidelines (before startup testing).
- License Condition (19-5) – Prior to initial fuel load, the licensee shall perform a thermal lag assessment of the as-built equipment listed in Tables 6b and 6c in Attachment A of APP-GW-GLR-069, "Equipment Survivability Assessment," to provide additional assurance that this equipment can perform its severe accident functions during

environmental conditions resulting from hydrogen burns associated with severe accidents. This assessment is required only for equipment used for severe accident mitigation that has not been tested at severe accident conditions. The licensee shall assess the ability of the as-built equipment to perform during accident hydrogen burns using the environment enveloping method or the test based thermal analysis method described in Electric Power Research Institute (EPRI) NP-4354, "Large Scale Hydrogen Burn Equipment Experiments."

19.59.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. As described above, the NRC staff confirmed that the applicant addressed the required information relating to PRA results and insights, and there is no outstanding information that remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements. In addition, the staff reviewed PTN DEP 6.3-1, related to quantifying the duration that the passive residual heat removal system heat exchanger can maintain safe shutdown conditions, and as documented in Section 21.1 of this SER, the staff finds that information acceptable.

The staff concludes that the relevant information presented in Section 19.59 of the Turkey Point Units 6 and 7 COL FSAR is consistent with the requirements of 10 CFR 52.79(a)(46) and 10 CFR 52.79(d)(1) and is, therefore, acceptable.

Appendix 19E Shutdown Evaluation

Appendix 19E presents the design features of the active systems and passive safety-related systems that address the issues of shutdown risk and shutdown safety. It also evaluates the design features with respect to their ability to reduce or mitigate the consequences of events that can occur during shutdown, including discussions of the following:

- Systems designed to operate during shutdown
- Shutdown operations (including maintenance insights, risk management, and Emergency Response Guidelines (ERGs))
- Safety analyses and evaluations for shutdown operations
- Chapter 16, "Technical Specifications"
- Shutdown risk evaluations (including shutdown PRA results and fire/flood risk)
- Consistency with the guidance in NUREG-1449

Appendix 19E of the Turkey Point Units 6 and 7 COL FSAR, Revision 8, incorporates by reference Appendix 19E, "Shutdown Evaluation," of the AP1000 DCD, Revision 19. Appendix 19E of the DCD provides a shutdown evaluation and includes Sections 19E.2.3, "Passive Core Cooling System," 19E.4.3, "Decrease in Heat Removal by the Secondary System," and 19E.4.10.2, "Shutdown Temperature Evaluation."

In addition, in the Turkey Point Units 6 and 7 COL FSAR, the applicant provided the following:

Departures

- PTN DEP 3.2-1 and PTN DEP 6.3-1

The applicant provided additional information in Appendix 19E of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 3.2-1 and PTN DEP 6.3-1 related to design modifications to the condensate return portion of the Passive Core Cooling System and quantifying the duration that the passive residual heat removal heat exchanger can maintain safe shutdown conditions. This information, as well as related PTN DEP 3.2-1 and PTN DEP 6.3-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.1 of this SER.

- PTN DEP 7.3-1

The applicant provided additional information in Appendix 19E of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 7.3-1 related to required design changes for the PMS source range neutron flux doubling logic to comply with the requirements of IEEE Std. 603-1991, Clause 6.6. This information, as well as related PTN DEP 7.3-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.5 of this SER.

The NRC staff reviewed Appendix 19E of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this section. The NRC staff confirmed that the applicant addressed the required information to satisfy the evaluation criteria. There is no outstanding information remaining to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

Appendix 19F Malevolent Aircraft Impact

Appendix 19F of the Turkey Point Units 6 and 7 COL FSAR addresses the requirements of 10 CFR 50.150, "Aircraft impact assessment." In FSAR Appendix 19F, the applicant incorporated by reference Appendix 19F of the AP1000 DCD, Revision 19.

In 2016, the staff concluded an inspection of the Westinghouse Electric Company, LLC, to examine recent design changes and the resolutions of 2010 notice of violations with respect to 10 CFR 50.150 (ADAMS Accession No. ML102980583). The April 19, 2016 inspection report identified two issues with the existing AP1000 aircraft impact assessment and the AP1000 DCD (ADAMS Accession No. ML16099A049).

The first issue involved the crediting of the Auxiliary Building in the aircraft impact assessment (AIA) as a key design feature for protecting the integrity of the spent fuel pool and for protecting from physical damage the equipment needed to maintain core cooling. In this regard, only the spent fuel pool integrity credit was translated into Appendix 19F of the AP1000 DCD incorporated by reference by the Turkey Point Units 6 and 7 COL applicant. Since the AP1000 DCD was missing the information about the Auxiliary Building credit to protect core cooling

equipment from physical damage, the Turkey Point Units 6 and 7 COL application also omitted this citation of the Auxiliary Building as a key design feature relied upon to ensure core cooling capability.

The second issue involved the failure to follow the methodology in NEI 07-13, "Methodology for Performing Aircraft Impact Assessments for New Plant Designs," Revision 7, in regard to the assessment of the spread of fire damage in certain plant areas. Fire protection features with specific ratings cited in the NEI 07-13 guidance had not been incorporated into Appendix 19F or Appendix 9A of the AP1000 DCD, and thus not incorporated into the Turkey Point Units 6 and 7 COL application.

To address and capture the missing information identified in the April 19, 2016, inspection report, the staff proposes the following license condition. This license condition would allow the staff to conclude that the Turkey Point Units 6 and 7 would be constructed and operate in compliance with the requirements of 10 CFR 50.150:

- License Condition (19-6) – At the first annual update of the Turkey Point Units 6 and 7 FSAR required by 10 CFR 50.71(e), Florida Power and Light shall include the following changes in the Updated Final Safety Analysis Report (UFSAR):
 - a) Revise FSAR Appendix 19F.4.1, "Malevolent Aircraft," to include the Auxiliary Building as a key design feature that also protects from physical damage the core cooling credited to meet 10 CFR 50.150(b)(2).
 - b) Revise the Turkey Point plant-specific DCD drawings to show the 5 psid and 3 hour fire rated doors that have been added to the inner portion (annulus side) of the shield building in accordance with final markups used to satisfy NRC Inspection Report No. 99900404/2015-203 and 10 CFR 50.150(a)(1). To satisfy this license condition, the licensee shall revise the following DCD figures:
 1. Figure 1.2-7 - Nuclear Island General Arrangement Plan at Elevation 107'-2" & 111'-0"
 2. Figure 1.2-10 - Nuclear Island General Arrangement Plan at El. 135'-3"
 3. Figure 9A-1 (Sheet 5 of 16) - Nuclear Island Fire Areas Plan at Elevation 100'-0" & 107'-2"
 4. Figure 9A-1 (Sheet 7 of 16) - Nuclear Island Fire Area Plan at Elevation 135'-3"
 5. Figure 12.3-1 (Sheet 6 of 16) - Radiation Zones, Normal Operations/Shutdown Nuclear Island, Elevation 100'-0" & 107'-2"
 6. Figure 12.3-1 (Sheet 8 of 16) - Radiation Zones, Normal Operations/Shutdown Nuclear Island, Elevation 135'-3"
 7. Figure 12.3-2 (Sheet 6 of 15) - Radiation Zones, Post-Accident Nuclear Island, Elevation 100'-0" & 107'-2"
 8. Figure 12.3-2 (Sheet 8 of 15) - Radiation Zones, Post-Accident Nuclear Island, Elevation 135'-3"
 9. Figure 12.3-3 (Sheet 6 of 16) - Radiological Access Controls, Normal Operations/Shutdown Nuclear Island, Elevation 100'-0" & 107'-2"
 10. Figure 12.3-3 (Sheet 8 of 16) - Radiological Access Controls, Normal Operations/Shutdown Nuclear Island, Elevation 135'-3"

The license condition part (a) requires the applicant to include, as an update to the applicant's UFSAR Appendix 19F, the Auxiliary Building as a structure to protect core cooling equipment from structural physical damage in addition to its role of protecting the spent fuel pool integrity as analyzed in the aircraft impact assessment. Therefore, the staff finds that with the incorporation of this change, the applicant meets the requirements of 10 CFR 50.150(b)(2) which require applicants to describe in their FSAR how each key design feature meets the acceptance criteria credited in 10 CFR 50.150(a) because UFSAR Appendix 19F will reflect that the Auxiliary Building is credited to protect from physical damage the core cooling equipment in the AIA.

The license condition part (b) requires the applicant to incorporate, as an update to the applicant's UFSAR, those design changes contained in the identified figures to be revised, and within Westinghouse's Design Change Proposal APP-GW-GEE-2450, "Relocation of AIA Blast Doors and Addition of Shielding Doors to Annulus Personnel Access Portals," Revision 0. Specifically, those changes, which address, in part, the specific 3-hour fire rated door additions and their proper pressure ratings. The staff reviewed these proposed changes during the Inspection 99900404/2015-203 and found them acceptable in accordance with the guidance in NEI 07-13, Revision 7. Therefore, the staff finds that with the incorporation of these changes, the applicant meets the requirements of 10 CFR 50.150(b)(1), which require the applicant to identify and describe in the FSAR those key design features required to satisfy 10 CFR 50.150(a)(1), because the revised figures will identify and describe the added key design features (i.e., fire doors).

APPENDIX 19.A – LOSS OF LARGE AREAS OF THE PLANT DUE TO EXPLOSIONS OR FIRES

19.A.1 Introduction

In a letter to the U.S. Nuclear Regulatory Commission (NRC), dated December 6, 2010, (Florida Power and Light (FPL) submitted Revision 0 of the “Loss of Large Areas of the Plant Due to Explosions or Fire Mitigative Strategies Description and Plans,” (MSD) for Turkey Point Units 6 and 7.

In the submittal, the applicant describes how the requirements to address loss of large areas (LOLAs) of the plant due to explosions or fires are met. These requirements are in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.54(hh)(2). It should be noted that Attachment A to this safety evaluation report (SER) section, as well as some documents here referenced, include security-related or safeguards information, and are not publicly available.

The provisions of 10 CFR 52.80(d) require an applicant for a combined operating license (COL) to submit a description and plans for implementation of the guidance and strategies intended to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities under the circumstances associated with the LOLAs of the plant due to explosions or fire as required by 10 CFR 50.54(hh)(2).

The provisions of 10 CFR 50.54(hh)(2) require licensees to develop and implement guidance and strategies for addressing the LOLAs of the plant due to explosions or fires. Specifically, guidance and strategies are intended to maintain or restore core cooling, containment, and SFP cooling capabilities including:

- fire fighting
- operations to mitigate fuel damage
- actions to minimize radiological release

19.A.2 Summary of Application

The applicant for the Turkey Point COL submitted its “Loss of Large Areas of the Plant Due to Explosions or Fire – Mitigative Strategies Description and Plans” and incorporated the full, non-redacted version of the MSD, including any applicable changes identified in response to NRC requests for additional information (RAIs), in Part 9 of the Turkey Point Units 6 and 7 COL application. The redacted version of this MSD has been incorporated in Part 11 of the Turkey Point Units 6 and 7 COL application. The applicant stated that the LOLA mitigative strategies, including implementation of operational and programmatic aspects of responding to loss of large area events, would be implemented prior to initial fuel load.

License Conditions

- Part 10, License Condition 6

The applicant proposed a license condition in Part 10 of the Turkey Point Units 6 and 7 COL application to provide a schedule to support the NRC's inspection of operation programs

including the programmatic elements of responding to an event associated with a loss of large areas of the plant due to explosions or fire, prior to initial fuel load.

19.A.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

The applicable regulatory requirements for loss of large areas of the plant due to explosions or fires are as follows:

- 10 CFR 50.54(hh)(2)
- 10 CFR 52.80(d)

The applicable regulatory guidance includes Interim Staff Guidance (ISG) DC/COL-ISG-016, "Compliance with 10 CFR 50.54(hh)(2) and 10 CFR 52.80(d) Loss of Large Areas of the Plant due to Explosions or Fires from a Beyond-Design Basis Event" (not publically available), which provides an acceptable means of meeting the requirements of 10 CFR 50.54(hh)(2) and 10 CFR 52.80(d). In addition, the Nuclear Energy Institute (NEI) issued industry guidance on this topic in NEI 06-12, "B.5.b Phase 2 & 3 Submittal Guideline," Revision 3. As further explained under the Technical Evaluation section below, NEI 06-12, Revision 3, describes three phases of response to an event resulting in LOLA of the plant, each of which is associated with specific requirements of § 50.54(hh)(2), namely, fire-fighting (Phase 1), SFP cooling (Phase 2), and reactor core cooling and fission product release mitigation (Phase 3). DC/COL-ISG-016 references a February 25, 2005, NRC guidance letter (not publically available) to operating reactor licensees for Phase 1, and references NEI 06-12, Revision 3, for Phase 2 and Phase 3. As stated in DC/COL-ISG-016, the NRC staff considers conformance with the guidance in NEI 06-12, Revision 3, an acceptable method for use by applicants for and holders of a license to operate a new power reactor facility in satisfying the Commission's requirements in 10 CFR 50.54(hh)(2) and 10 CFR 52.80(d) with some exceptions. DC/COL-ISG-016 takes exception to a few areas of NEI 06-12, and provides additional clarification and enhancement of NEI 06-12 and the NRC's February 25, 2005, guidance letter based on NRC inspections of operating reactor implementation. DC/COL-ISG-016 has two attachments: Attachment 1, "Supplementary Guidance for Implementing Mitigation Strategies," and Attachment 2, "Experience Gained from Implementation of Temporary Instruction 2515/171 at Currently Licensed Power Reactor Sites and Related Staff Positions."

19.A.4 Technical Evaluation

The staff reviewed the applicant's submittal consistent with the requirements of 10 CFR 52.80(d) and 10 CFR 50.54(hh)(2). The staff also used the guidance in DC/COL-ISG-016 to perform its review. The DC/COL-ISG-016 references the February 25, 2005, guidance letter for Phase 1, and NEI 06-12 for Phases 2 and 3. A discussion of the staff's technical evaluation of the Turkey Point Units 6 and 7 submittal is found in Attachment A to Appendix 19.A.

The Turkey Point COL applicant provided the LOLA event evaluation via a three-phased approach similar to that for existing plants and consistent with Phases 1, 2, and 3 in the NEI 06-12 guidance. The applicant's MSD, dated December 6, 2010, was written at the

programmatic level for licensing approval, and the implementation details and documentation will be made available for inspection by the NRC prior to initial fuel load.

In its submittal of the MSD, the applicant provided a Mitigative Strategies Table (MST), which follows the template guidance in Appendix D to NEI 06-12. The MST addresses various areas and issues pertinent to loss of large areas and describes commitments, including completion dates, for areas that are best resolved closer to the completion of building Turkey Point Units 6 and 7. All commitments made in the submittal will be implemented prior to the initial fuel load of the units.

The MST addresses the three phases considered in NEI 06-12. The phases, as described in the guidance documents, can be mapped to the regulatory requirements and are as follows:

- Phase 1 – Fire Fighting Response Strategy
- Phase 2 – Spent Fuel Pool Cooling
- Phase 3 – Reactor Core Cooling and Fission Product Release Mitigation

Phases 1, 2, and 3 of NEI 06-12 are similar to the three areas included as part of the requirements in 10 CFR 50.54(hh)(2): fire-fighting, operations to mitigate fuel damage, and actions to minimize radiological release. However, the three phases are categorized differently. In 10 CFR 50.54(hh)(2), the category of operations to mitigate fuel damage includes both the reactor core and the spent fuel pool, and the category of actions to minimize radiological release is separate. In NEI 06-12, spent fuel pool and reactor core cooling are found in separate phases, and reactor core cooling and fission product release mitigation are combined. Despite the change in the categorization of the phases in NEI 06-12 and the areas of the regulatory requirements, the staff finds all of the necessary information is included in the submittal.

The guidance for Phases 1, 2, and 3 suggests development of certain strategies or processes to mitigate the consequences of a LOLA event. The applicant addressed all of these suggested strategies or processes. In evaluating each plant specific mitigating strategy against its functional objective,¹ the staff weighed whether the strategy reasonably can be expected to successfully provide spent fuel pool cooling, or maintain or restore the key safety functions necessary to protect the reactor core and containment. The staff's review considered the expected effectiveness of strategies and the ease and timeliness of strategy implementation.

While some strategies needed to meet 10 CFR 50.54(hh)(2) can be developed and implemented in the near future, some strategies and planning efforts cannot be effectively determined or implemented until the plant is further along in construction. To identify such commitments for future action, the applicant documented areas that would be more appropriately completed prior to the initial fuel load. The staff reviewed the commitments made by the applicant in its submittal and is satisfied that the timing of all procedural or strategy development provides for appropriate completion of implementation prior to the initial fuel load.

The MSD has been reviewed by the NRC staff for content using DC/COL-ISG-016, and the staff finds that the MSD includes all strategies considered essential for such a program, and is acceptable. The staff finds that the regulatory requirements of 10 CFR 52.80(d) and 10 CFR 50.54(hh)(2) are met.

¹ As used here, the functional objective is the basic description of the capabilities of the conceptual strategy or strategies as proposed for Phase 2 and 3 by NEI and accepted by NRC.

License Conditions

- Part 10, License Condition 6

In RAI 19-95, regarding the application for COLs for the Vogtle Electric Generating Plant (VEGP), Units 3 and 4, the staff asked the Southern Nuclear Operating Company, Inc. (SNC) to provide a draft license condition to be added to Part 10 of the VEGP Units 3 and 4 COL application related to implementation of mitigative strategies and to submitting schedules to support planning for and conduct of NRC inspections. In its response dated May 24, 2010, VEGP provided a license condition in Part 10 of the VEGP COL application to provide a schedule to support the NRC's inspection of operational programs, including the programmatic elements of responding to an event associated with a loss of large areas of the plant due to explosions or fire, prior to initial fuel load. Although this program is not identified as an operational program in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," the proposed license condition is consistent with the policy established in SECY-05-0197 for operational programs in general, and is acceptable. Accordingly, the staff closed the Vogtle RAI. In a letter dated November 15, 2010, the applicant (FPL) endorsed this VEGP response as standard material applicable to Turkey Point Units 6 and 7.

- Managing MSD Commitments

In RAI 19-96, the staff asked the SNC to describe its plans for managing changes to the commitments included in the MSD. In its response dated May 24, 2010, SNC included a revision to the MSD that states that commitments in the MSD will be captured in the licensee's commitment management program and managed in accordance with the guidance in NEI 99-04, Revision 0, "Guidelines for Managing NRC Commitment Changes," July 1999. This is similar to the approach followed by the operating fleet licensees commitments made under Section B.5.b of Order EA-02-026, "Order Modifying Licenses," the 2002 Interim Compensatory Measures.

The NRC staff reviewed specific commitments in the MSD and used these commitments as the basis for the staff's safety conclusion. The staff finds that a commitment management program conforming to the guidance in NEI 99-04, Revision 0, is appropriate for managing the commitments in the MSD. However, the staff proposed that a license condition be included requiring the licensee to use a commitment management program, which conforms to the guidance in NEI 99-04, Revision 0. Subsequently, the staff decided that the most appropriate way to handle the commitments and maintenance of the MSD was to ensure that the licensee maintains the guidance and strategies developed in accordance with 10 CFR 50.54(hh)(2). This language was included in the staff's proposed License Condition 19.A-1. Thus, this RAI is closed. In a letter dated November 15, 2010, the applicant (FPL) endorsed this VEGP response as standard material applicable to Turkey Point Units 6 and 7.

19.A.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff proposes to include the following license condition:

License Condition (19.A-1) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the operational and programmatic elements of the mitigative strategies for responding to circumstances associated with loss of large areas of the plant due to explosions or fire. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until each license condition has been fully implemented. The schedule shall identify the completion of or implementation of the operational and programmatic elements of the mitigative strategies for responding to circumstances associated with loss of large areas of the plant due to explosions or fire developed in accordance with 10 CFR 50.54(hh)(2) (before initial fuel load).

If the Commission determines to grant the application, the above condition will be modified to conform to the format and style of the license. In particular, the substance of the requirements of the above condition may be included in the license in a more general condition that covers the implementation of all programs, and each individual requirement of the condition may be combined with other similar requirements in separate conditions. Other changes may be made for clarity.

19.A.6 Conclusion

The NRC staff reviewed the information provided by the applicant under 10 CFR 52.80(d). The staff concludes that the applicant has adequately followed the guidance of DC/COL-ISG-016; NEI 06-12; and the February 25, 2005, NRC guidance letter. The staff finds that the applicant provided sufficient information at the COL application stage, including commitments made in the Turkey Point COL application, to meet the requirements of 10 CFR 52.80(d) and to provide reasonable assurance that the requirements in 10 CFR 50.54(hh)(2) will be met prior to the initial fuel load of Turkey Point Units 6 and 7.

Attachment A to Appendix 19.A, “Loss Of Large Areas of the Plant Due to Explosions or Fires”

Evaluation of the Turkey Point Units 6 and 7 Submittal to Meet the Requirements of 10 CFR 50.54(hh)(2)

Introduction

This attachment documents the evaluation by the Nuclear Regulatory Commission (NRC) staff of submittals made by Florida Power and Light (FPL) (the applicant) regarding how the Turkey Point Units 6 and 7 design and mitigation strategies meet the requirements of 10 CFR 50.54(hh)(2). The provisions of 10 CFR 50.54(hh)(2) require nuclear power plant utilities to develop and implement guidance and strategies for addressing the loss of large areas (LOLAs) of the plant due to explosions or fires from a beyond-design basis event. Specifically, licensees must develop and implement guidance and strategies intended to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities under the circumstances associated with LOLAs of the plant due to explosions or fire. The staff’s review is based on DC/COL-ISG-016 and its referenced documents.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the NRC staff to perform one technical review for each standard issue outside the scope of the design certification (DC) and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant (VEGP), Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP Mitigative Strategies Description and Plans (MSD) to the Turkey Point Units 6 and 7 MSD.
- The staff compared VEGP COL FSAR Section 9.5.1 and Appendix 9A to the Turkey Point Units 6 and 7 COL FSAR Section 9.5.1 and Appendix 9A.
- The staff confirmed that all responses to VEGP RAIs identified in the corresponding standard content evaluation were endorsed by FPL. Attachment A, Table 19-A-1 contains a list of the VEGP RAIs endorsed by FPL.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER.

Although the staff concluded that the evaluation performed for the standard content is directly applicable to the Turkey Point Units 6 and 7 COL application, there were differences in the

information provided by FPL from that provided by the VEGP applicant. These differences are evaluated by the staff below, following the standard content material.

The following portion of this technical evaluation section is reproduced from Attachment A to Appendix 19.A of the VEGP SER:

General Information on How the VEGP Units 3 and 4 Design and Mitigation Strategies Meet 10 CFR 50.54(hh)(2)

The following section discusses issues and areas that are general in nature and applicable to the applicant acceptably meeting 10 CFR 50.54(hh)(2):

The guidance in Nuclear Energy Institute's (NEI) 06-12 states that the pump(s) charging the fire protection system (FPS) header and the alternating current (ac)-independent portable pump should be housed in structures at least 100 yards from the nearest target building. The applicant's May 29, 2009, MSD submittal states that the pumps meet that criterion. The applicant has committed that the portable pump will have sufficient pump head and flow rate to deliver the flow necessary for the mitigating strategies for which it is credited. In response to request for additional information (RAI) 19-30, the applicant stated it would modify the submittal to stipulate that the detailed design of the portable pump would consider friction losses in the piping system and the needed pump head so that appropriate water flow is supplied to the SFP. This will be accomplished prior to the initial fuel load. The staff considers this RAI resolved pending the incorporation of this change in a future revision of the MSD. This is
Confirmatory Item 19.A-2.

Resolution of Standard Content Confirmatory Item 19.A-2

Confirmatory Item 19.A-2 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-2 is now closed.

As specified in NEI 06-12, the applicant committed to provide an ac-independent portable pump, which will have a fuel tank capacity of at least 12 hours. The portable pump is relied on by a number of mitigation strategies to meet 10 CFR 50.54(hh)(2) requirements. The applicant stated that the portable pump will deliver sufficient flow (as defined by the particular credited strategy), with sufficient head to overcome line losses between the source of water for the pump and delivery to the intended destination (e.g., the SFP) by the chosen path (e.g., through piping to wall-mounted nozzles surrounding the SFP). It can draw water from sources such as the redundant FPS storage tanks (each a minimum of 300,000 gallons), ancillary water storage tank (780,000 gallons), the condensate storage tank (325,000 gallons), the demineralized water storage tank (100,000 gallons), or the cooling tower basin (greater than 5,000,000 gallons).

The guidance in DC/COL-ISG-016 discusses the importance of clearly labeling or tagging plant equipment that would be used to implement B.5.b strategies. In

*RAI 19-17 the staff asked the applicant to address this issue. In its responses dated October 29, 2009, and December 23, 2009, the applicant stated it would modify its submittal to add a commitment to provide direction on unique identification of equipment, clearly marking the LOLA-specific equipment with reflective signs or other designators, and mapping the guidance to the items required to implement the LOLA strategies. This work will be completed prior to initial fuel load. The staff considers this to meet the guidance in DC/COL-ISG-016 and considers this RAI resolved pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-3**.*

Resolution of Standard Content Confirmatory Item 19.A-3

Confirmatory Item 19.A-3 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-3 is now closed.

*In RAI 19-20 the staff asked the applicant to commit to perform a walk-through of written procedures identified as applicable to 10 CFR 50.54(hh)(2) prior to the initial fuel load. In its response dated October 29, 2009, the applicant stated it would modify its submittal to add a commitment to perform a walk-through of the procedures that will be accomplished prior to the initial fuel load. The staff considers this commitment meets the guidance of DC/COL-ISG-016 and considers this RAI resolved pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-4**.*

Resolution of Standard Content Confirmatory Item 19.A-4

Confirmatory Item 19.A-4 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-4 is now closed.

*The guidance in NEI 06-12 specifies that evaluators, decision makers, and implementers (as well as operators) be appropriately trained for a LOLA event. In RAI 19-70 the staff asked the applicant to modify its submittal to address training for evaluators, decision makers, and implementers, not just plant licensed operators. In its response dated October 29, 2009, the applicant stated it would modify the submittal to add a commitment that training material for evaluators, decision makers, and implementers will be developed using the Systematic Approach to Training (SAT). The applicant stated that training on mitigation strategies is incorporated into initial and requalification licensed operator training programs. This training will be completed prior to initial fuel load. The staff finds the applicant followed the guidance in NEI 06-12, and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-5**.*

Resolution of Standard Content Confirmatory Item 19.A-5

Confirmatory Item 19.A-5 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-5 is now closed.

The staff asked the applicant in RAI 19-16 to address how the strategies and procedures proposed for core cooling and other areas apply for a plant in the shutdown mode. In its response dated November 13, 2009, the applicant stated the strategies discussed in the Mitigative Strategies Table (MST) in the MSD are flexible enough to be applicable in the shutdown mode. In its amended response on February 5, 2010, the applicant noted that the same key safety functions are required when the AP1000 is in shutdown mode as when it is in operation, and the same mitigating strategies also apply. The staff considers this RAI resolved.

The February 25, 2005, guidance letter calls for an evaluation of ways to limit the spread of combustible liquids. In response to RAI 19-65, dated November 13, 2009, as revised February 5, 2010, the applicant stated that the AP1000 equipment relied on for safe shutdown is located inside the Nuclear Island, which consists of the shield building and the auxiliary building. Also, the AP1000 design is extensively compartmentalized into separate fire areas and fire zones. The three-hour fire barriers that provide compartmentalization are reinforced concrete walls, many of which are 24-inches thick. The design is further compartmentalized to provide complete separation of the radiological and non-radiological portions of the Nuclear Island. In addition, the applicant stated that analysis of structural components did not predict perforation due to impact of a commercial airplane, and therefore assessment of the effects of burning jet fuel on equipment in the containment was not required. The design and location of 3-hour fire barriers, including fire doors and security doors, within the auxiliary building are key AP1000 design features for the protection of equipment to manually actuate the passive core cooling system from the impact of a large, commercial aircraft. The applicant's assessment credited the design and location of fire barriers (including doors) as described in Appendix 9A of VEGP COL FSAR Chapter 9 to limit the effects of internal fires created by the impact of a large, commercial aircraft. The staff considers this RAI resolved.

The February 25, 2005, guidance letter states that equipment relied upon to implement the strategies required by 10 CFR 50.54(hh)(2) should be maintained and periodically tested to ensure it will operate when called upon. In RAI 19-98, the staff asked the applicant to discuss the maintenance program and controls for equipment credited for meeting 10 CFR 50.54(hh)(2). In its response dated May 24, 2010, the applicant stated that maintenance activities for mitigative strategies equipment that is also used to support plant operations will be covered by established maintenance and testing requirements for the systems that include this equipment. The applicant stated it will revise the MSD to state that additional maintenance activities will be developed to cover active equipment that is only used to support mitigative strategies and is not used otherwise to support plant operations. The maintenance activities will include periodic surveillance

checks, start and run checks, and flow tests. The staff finds this acceptable because a maintenance program will exist for all active equipment credited in the strategies, and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-6**.

Resolution of Standard Content Confirmatory Item 19.A-6

Confirmatory Item 19.A-6 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-6 is now closed.

Guidance in NEI 06-12 specifies that an applicant include guidance or information in site procedures for operations staff or offsite resources so that they can mitigate or restore core cooling following a LOLA event. Since many LOLA procedures can only be completed as plant construction nears completion, in RAI 19-11 the staff asked the applicant to provide commitments to develop and implement these procedures prior to initial fuel load. In its response dated October 29, 2009, the applicant committed to develop and implement these procedures. The staff considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-7**.

Resolution of Standard Content Confirmatory Item 19.A-7

Confirmatory Item 19.A-7 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-7 is now closed.

NRC inspections at operating reactors have shown that some mitigating strategies may require connecting portable equipment, such as fire hoses or electrical devices that may not normally be connected or tested. They might also require connections between onsite equipment and equipment provided by offsite responders. In RAI 19-103, the staff asked the applicant to modify the commitment made in its October 29, 2009, response to RAI 19-20 by revising the commitment to confirm by engineering evaluation or a demonstration prior to the initial fuel load that: (1) hoses can be connected to each other and to pumps, adapters, and fittings; (2) electrical cables, connectors, and jumpers are compatible; and, (3) fire hoses and nozzles can be attached to lifting devices and/or secured in place as needed. In its response dated May 24, 2010, the applicant stated that the response to RAI 19-90 includes a revised commitment to verify these things. Additionally, in RAI 19-90, the staff asked the applicant to address suction supply piping. Various performance attributes in NEI 06-12 specify that an applicant should have an adequate amount of suction supply piping to allow the portable pump to be located as proposed in the mitigation strategies. In its response dated May 5, 2010, the applicant proposed a revision to the submittal and committed, as part of the walk-through that will be performed for each procedure to validate the guidance, to verify prior to initial fuel load that hose sizes and lengths, pumping capability, and availability of supply piping

*adequately support mitigative strategies. The staff finds that this commitment meets the guidance of NEI 06-12. The staff considers RAIs 19-90 and 19-103 resolved, pending the incorporation of these changes in a future revision of the MSD. This is **Confirmatory Item 19.A-8**.*

Resolution of Standard Content Confirmatory Item 19.A-8

Confirmatory Item 19.A-8 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-8 is now closed.

The guidance in NEI 06-12 specifies that an applicant address competing demands on the FPS, if the FPS is simultaneously required to fight a fire and also provide a suction source for SFP makeup, SFP spray, core cooling, containment cooling, or fission product release reduction. In RAI 19-14 the staff asked the applicant to address this concern for LOLA events. In its response dated October 29, 2009, the applicant stated that Section 5.1.4 of the MSD addresses fire protection management and states that procedures and guidelines will be developed to manage the FPS, including isolation of fire headers inside structures. In response to other RAIs (e.g. RAI 19-25) the applicant addressed pump flow and pump head adequacy as well as the capability of the FPS to operate for two hours using the diesel-driven fire pump, which is designed to provide sufficient water to supply the largest sprinkler header in the auxiliary building, the annex building, or the radwaste building; plus 500 gallons per minute (gpm) to feed fire hoses; and an additional 500 gpm that can provide makeup to the SFP. The staff considers that the guidance of NEI 06-12 is met and considers this RAI resolved.

*The guidance in NEI 06-12 specifies that an applicant address how it evaluated the effect of proposed strategies and procedures on the safety and security of the plant. This guidance was provided in recognition that strategies and procedures implemented in isolation can result in unintended consequences. In RAI 19-15 the staff asked the applicant to address this issue. In its response dated December 23, 2009, the applicant stated that it would modify the submittal to add a commitment that LOLA procedures and guidance will be walked down and validated prior to initial fuel load, and any negative impacts on security and/or operations that are identified will be corrected. The staff found this acceptable and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-9**.*

Resolution of Standard Content Confirmatory Item 19.A-9

Confirmatory Item 19.A-9 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-9 is now closed.

Guidance in NEI 06-12 specifies that an applicant discuss its search for area(s) in the plant where a LOLA event could cause damage such that both SFP cooling and reactor core cooling are simultaneously affected. In its response dated December 23, 2009, to RAI 19-64, the applicant stated that there were no areas identified in the AP1000 design where, based on the guidance in NEI 06-12, both the cooling for the SFP and for the reactor core could be affected. The primary components and water sources required for core cooling are contained within containment, and the primary components and water sources required for SFP cooling are located outside of containment. The staff finds the applicant's response to RAI 19-64, proposing to revise the MSD to state that there are no areas where a LOLA event would cause a simultaneous loss of coolant accident (LOCA) in the RCS and a loss of SFP cooling, meets the guidance of NEI 06-12. The staff considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is
Confirmatory Item 19.A-10.

Resolution of Standard Content Confirmatory Item 19.A-10

Confirmatory Item 19.A-10 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-10 is now closed.

Evaluation of Site-specific Response to Standard Content

The Staff verified that the Turkey Point Units 6 and 7 MSD incorporates the information identified in the Standard Content Confirmatory Items 19.A-2 through 19.A-10 identified above. Accordingly, FPL has resolved the Vogtle RAIs identified above as standard content. Further, the Staff did not pose any RAIs to FPL regarding the standard content described above. In addition, Section 4.1 of the Turkey Point Units 6 and 7 MSD, the applicant stated that external water sources that can be used as an alternate water source to supply the fire protection yard main loop are the makeup water reservoir, condensate storage tanks, and other tanks with stored water, whereas VEGP uses the cooling tower basin, condensate storage tanks, and other tanks with stored water. The makeup water reservoir is described in Section 2.4.8 of the Turkey Point Units 6 and 7 FSAR. Also, in Table 6-4 of the Turkey Point Units 6 and 7 MSD, the applicant stated that the nominal volume of the makeup water reservoir is greater than 275,000,000 gallons compared to the nominal volume of the VEGP cooling tower basin which is greater than 5,000,000 gallons. Because Turkey Point Units 6 and 7's makeup water reservoir is only replacing VEGP's cooling tower basin and has a larger nominal volume, the staff finds these differences do not affect its standard content conclusions.

The following portion of this technical evaluation section is reproduced from Attachment A to Appendix 19.A of the VEGP SER:

Phase 1 - Summary of Technical Information for Fire Fighting

The Phase 1 assessment under 10 CFR 50.54(hh)(2) focuses on enhancement of a plant's fire fighting response capability to respond to a LOLA event.

Enhancement is based, in part, on pre-thinking how plant operations staff, other plant staff (including security), the utility, and nearby resources (such as local fire departments and law enforcement) can work together to mitigate a LOLA event. Also included are consideration of communication enhancement, and command and control.

The details of the VEGP Units 3 and 4 fire fighting capabilities for design basis fire events are provided in Section 9.5.1 and Appendix 9A in the VEGP COL FSAR. These sections provide the following details regarding the fire protection program, including the FPS and the plant's fire brigade. The FPS is designed to be able to fight a design basis fire and simultaneously meet the needs of equipment relied upon in meeting the requirements of 10 CFR 50.54(hh)(2) for either SFP cooling or reactor core cooling. The FPS draws water from two large fire water storage tanks. The water is pumped by either of two 100-percent capacity pumps (motor-driven or diesel-driven). The FPS is sized so that it contains sufficient water for two-hour operation of the largest sprinkler system plus a 500 gpm manual hose stream allowance to support fire suppression activities plus 500 gpm flow for makeup to or spray of 400 gpm to the SFP [or the reactor core]. The underground fire water yard main loop supply piping has post indicator valves (exterior to structures) that allow sectionalized control and isolation of portions of the loop, standpipe, and hose stations. The motor-driven and diesel-driven pumps are in separate buildings. The FPS diesel-driven pump and water storage tanks are located greater than 100 yards from all target areas. There are redundant flow paths that are capable of supplying water from the yard main loop to each building.

One of the Phase 1 fire fighting strategies is to develop an alternate means to charge (i.e., fill and pressurize) the FPS yard main loop in the event the normal supply source (e.g., a fire water storage tank) is lost. The MSD submittal describes the underground yard ring header as designed to provide a minimum of two external connections that can be used to connect an external water source and pumping capability. For VEGP Units 3 and 4, the external water sources are identified as the cooling tower basins, condensate storage tanks, and other tanks with stored water. The portable pump or a fire truck will be used to take suction from the basins or tanks to pressurize the ring header.^[1]

The applicant identified the Production Warehouse and Fire Training Facility as the staging areas for the firefighting and operations staff.^[1] The applicant stated that the staging areas will be greater than 100 yards from all target areas and that additional staging areas will be established as necessary, and documented in its procedures. These staging areas would support offsite responders and a large number of vehicles. The applicant will also provide staging areas for triage of mass casualties. For VEGP Units 3 and 4, the applicant identified the primary assembly area for evacuated and responding plant personnel as the Training Facility, and an alternate assembly area as the Ebenezer Church parking lot.^[1]

¹ See site-specific discussion of this topic at the end of this section.

The applicant identified multiple onsite fire brigade equipment locations, each of which contains the necessary equipment for the brigade to dress out, communicate, and respond to a fire. Its procedures will maximize the survivability of fire brigade personnel by relocating them to a safe location if timely pre-event notification is made. The applicant identified the following training for firefighting personnel at VEGP Units 3 and 4. Fire brigade personnel will receive accelerant-fed fire training, and training on the coordinated fire response between onsite and offsite fire responders to help delineate roles and responsibilities during a response to a LOLA event. Site familiarization training will be provided to local offsite responders. Table top exercises postulating a LOLA event will be conducted prior to the initial fuel load and periodically thereafter involving offsite fire responders, onsite fire brigade, and operations staff.

The potential use of air-lifted resources located within two hours of the site was considered by the applicant and is documented in VEGP Units 1 and 2 letters NL-05-0946, 05-1859, 06-0333, and 06-0736.[¹]

The applicant stated that its command and control (C&C) protocols are in place and specify that the site maintains overall command authority for onsite fire fighting actions so that fire fighting priorities are defined by operations personnel (i.e., a licensed operator) and then communicated to the offsite incident commander. Its procedures integrate the onsite LOLA response strategies into the C&C protocols. The applicant stated that protocols have been or will be established with offsite resources (including at the county and state level) to obtain assistance and/or resources with skills and equipment not possessed by VEGP. A total 2-hour (door-to-door) response time was used by the applicant to screen potential assistance.

The applicant identified the following communication strategies. Callout procedures will be in place, and plant response personnel will be notified via autodialers, supplemented by pagers if there is a LOLA event. Radio interoperability is achieved between onsite and offsite responders by pairing site personnel with radios with offsite responders or by issuing site radios to offsite responders. Radios are located far enough from target areas for their survival and in an area where their access is convenient to offsite responders.

The applicant stated that the VEGP Units 3 and 4 design provides communication equipment, (such as radios, cell phones, etc.) to facilitate the response to a LOLA event and that radios are particularly important in implementing command and control. This design also includes the addition of items that would support internal communication systems(s) such as repeaters, antennas, backup power sources, leaky coax cables, etc.

Staff Evaluation of Fire Fighting Capabilities

The primary guidance for meeting the expectations of Phase 1 is provided by the February 25, 2005, letter to currently operating reactor licensees. The letter discusses firefighting guidance, which encompasses various fire fighting

response and support strategies including command and control, incident response training, and assurance of adequate resources to mitigate a LOLA event.

*In its submittal, the applicant identified the Production Warehouse and Fire Training Facility as the staging areas for the firefighting and operations staff.[¹] In RAI 19-47, the staff requested that the applicant clarify whether and where dispersal will be directed by procedure for each level of threat warning. In its response dated December 23, 2009, the applicant stated that the imminent threat procedure for VEGP Units 1 and 2 has guidance for the relocation of fire brigade personnel based on the level and timing of the threat warning, and the VEGP Units 3 and 4 imminent threat procedure will have similar relocation guidance. [For Turkey Point Units 6 and 7, site imminent threat procedures will have guidance for the relocation of the fire brigade personnel based on the level and timing of the threat warning] The applicant stated it would modify the submittal to stipulate the applicant would develop procedures that will include a requirement for dispersion of plant staff and list the locations of the staging areas. The staff finds the applicant's response follows the guidance of the February 25, 2005, letter and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-11**.*

Resolution of Standard Content Confirmatory Item 19.A-11

Confirmatory Item 19.A-11 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-11 is now closed.

*In its submittal, the applicant discussed how it met the guidance in the February 25, 2005, letter that helps ensure the licensee is aware of nearby offsite organization resources and how these resources fit into the coordinated response strategy including the use of "specialized capabilities" such as debris removal equipment (bulldozers, large cranes, etc.) and specialized firefighting equipment (e.g., aqueous film forming foam (AFFF)). In RAI 19-50, the staff requested that the applicant provide a commitment that prior to initial fuel load it will re-evaluate offsite organizations, including associated memoranda of understanding (MOUs), that could significantly enhance needed skills, equipment, or abilities should a LOLA event occur. The applicant stated it would modify the submittal to include this commitment in its October 29, 2009, response. The staff finds that the applicant met the guidance of the February 25, 2005, letter and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-12**.*

Resolution of Standard Content Confirmatory Item 19.A-12

Confirmatory Item 19.A-12 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff

verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-12 is now closed.

*In its submittal, the applicant discussed how it met the guidance in the February 25, 2005, letter that addresses the concern that a LOLA event could lead to a large enough number of casualties that it would challenge the established onsite medical/health services. In RAI 19-56, the staff requested that the applicant describe the location of the specific triage areas, and discuss their approximate size and capability to handle mass casualties and personnel assembly. In its response dated December 23, 2009, the applicant stated it would modify the submittal to add a commitment establishing procedures and guidance prior to initial fuel load with criteria for determining an appropriate site for triage area(s). The staff finds that the applicant met the guidance of the February 25, 2005, letter and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-13.***

Resolution of Standard Content Confirmatory Item 19.A-13

Confirmatory Item 19.A-13 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-13 is now closed.

*In its submittal, the applicant discussed how it met the guidance in the February 25, 2005, letter to identify a location(s) to be used for congregating offsite responding personnel. In RAI 19-57, the staff requested that the applicant document its criteria for these assembly area location(s). In its response dated December 23, 2009, the applicant stated it would modify the submittal to stipulate that the Training Facility is greater than 2 miles away from the plant site target areas and the Ebenezer Church is greater than 5 miles away^[1]. These assembly areas will not be impacted by a LOLA event because of their distance from the plant. The staff finds the locations of the assembly areas meet the guidance of the February 25, 2005, letter and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-14.***

Resolution of Standard Content Confirmatory Item 19.A14

Confirmatory Item 19.A-14 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-14 is now closed.

In its submittal, the applicant discussed how it met the guidance to develop a means to supply the fire protection ring header using off-site resources and a portable pump. Guidance in NEI 06-12 specifies that an applicant provide at least two locations, at least 100 yards apart, where the fire header can be charged by the portable pump drawing from a water source. The staff evaluated

the adequacy of water sources identified by the applicant, the proposed means for feeding the fire protection ring header, and procedure development. The staff finds the applicant's submittal meets the guidance of the February 25, 2005, letter.

In its submittal, the applicant discussed its assessment of mutual aid fire fighting assets and discussed how it met the guidance to identify airlifted resources (personnel and equipment) for fire fighting. The staff evaluated whether the applicant appropriately studied the use of airlifted resources via regional or local airports (in addition to reliance on ground response) and whether the evaluation looked beyond a 30-minute response time. In addition, the NRC considered whether there were additional regional or local airports not considered by the applicant. The applicant identified several facilities with airlift capability within a 2-hour response time. The identification and evaluation of these airports is documented in VEGP Units 1 and 2 letters NL-05-0946, NL-05-1859, NL-06-0333, and NL-06-0736. The staff finds the applicant has followed the guidance of the February 25, 2005, letter.[1]

Memoranda of Understanding (Letters of Agreement) with Mutual Aid Responders

The Staff verified that the Turkey Point Units 6 and 7 MSD incorporates the information identified in the Standard Content Confirmatory Items 19.A-11 through 19.A-14 identified above. Accordingly, FPL has resolved the Vogtle RAIs identified above as standard content. Further, the Staff did not pose any RAIs to FPL regarding the standard content described above. In addition the staff verified that the applicant has written agreements with other organizations that may be called upon to provide support to Turkey Point in the event of an emergency. Among the letters of agreement the following are for fire and law enforcement support: Monroe County Sheriff's office, Miami Dade Fire and Rescue Department, and Miami Dade Police Department.

The following portion of this technical evaluation section is reproduced from Attachment A to Appendix 19.A of the VEGP SER:

In RAI 19-61, the staff requested the applicant to provide assurance that protective measures and equipment have been specifically considered. This was to include the emergency planning (EP) program, which ensures that on-site and off-site responders will be protected in areas that have suffered a loss of a radiation barrier(s) and areas with a complete or partial loss of structural support capability. Assurance considerations included a list of equipment (e.g., poles for structural support, anti-radiation blankets for radiation protection, etc.) readily available onsite or easily attainable from off-site vendors within 30 minutes. In its response dated October 29, 2009, the applicant stated that in the event of a LOLA, the Emergency Director (ED) will utilize any materials onsite that could be used to erect temporary radiation shields for responders. Lead blankets, different length and size poles, steel framing, wooden and steel studs, dry wall, and other materials are typically in the warehouse and will be available to the ED. Also, the ED can request materials from offsite suppliers if it is determined that sufficient materials cannot be found onsite. The staff finds this response acceptable because it documents onsite/offsite resources that can protect responders to a LOLA event. The staff considers this RAI resolved.

*In its submittal the applicant discussed the role other regional resources would play in a fully preplanned mobilization effort. In RAI 19-52, the staff requested that the applicant clarify what was meant by the on-site firefighting equipment being staged in "appropriate locations obviating the need for pre-staging equipment at local fire departments." The staff also requested that the applicant provide the criteria used in determining why a chosen location is "appropriate." In its response dated October 29, 2009, the applicant stated that these "appropriate locations" are the dress-out locations for the fire brigade. The applicant stated it would modify the submittal to stipulate that these locations will be identified and established when the VEGP Units 3 and 4 procedures/guidance for mitigative strategies are developed. As stated in the response to RAI 19-48, Burke County EMA has extensive fire fighting resources, and they will bring those resources to the plant in response to a LOLA event. The applicant's response met the guidelines of the February 25, 2005, guidance letter. The staff considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-16**.*

Resolution of Standard Content Confirmatory Item 19.A-16

Confirmatory Item 19.A-16 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-16 is now closed.

*In RAI 19-53, the staff requested that the applicant provide a commitment to update the coordination with offsite local fire departments and other regional firefighting aid organizations. In its response dated October 29, 2009, the applicant stated it would modify the submittal to add a commitment to update the coordination prior to the initial fuel load for VEGP Units 3 and 4. The staff finds this response meets the guidance of NEI 06-12 and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-17**.*

Resolution of Standard Content Confirmatory Item 19.A-17

Confirmatory Item 19.A-17 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-17 is now closed.

In RAI 19-59, the staff requested that the applicant discuss whether protocols and procedures exist to mobilize additional response organizations, as necessary, at the county and state levels, or to make a commitment that these protocols and procedures will be put in place prior to the initial fuel load. In its response dated October 29, 2009, the applicant stated that these protocols are currently in place. The applicant also stated that each county surrounding VEGP Units 3 and 4 has mutual aid agreements in place to provide support to each other in case of an emergency, that this support aid reaches throughout the

state, and that there are agreements in place at the state level to share support resources with surrounding states during emergencies. The staff finds this response follows the guidance of NEI 06-12, and considers this RAI resolved.

Evaluation of Site-Specific Response to Standard Content

The Staff verified that the Turkey Point Units 6 and 7 MSD incorporates the information identified in the Standard Content Confirmatory Items 19.A-16 through 19.A-17 identified above. Accordingly, FPL has resolved the Vogtle RAIs identified above as standard content. Further, the Staff did not pose any RAIs to FPL regarding the standard content described above. In addition the Turkey Point 6 and 7 Part 5 "Emergency Plan," states that FPL has acquired letters of agreement with local and private agencies that can provide support during an emergency. These agencies have agreed to provide firefighting, medical, and resource support, as needed. The letters of agreement are listed in Appendix 2 of the Turkey Point Emergency Plan and are reviewed and updated as necessary.

The following portion of this technical evaluation section is reproduced from Attachment A to Appendix 19.A of the VEGP SER:

In RAI 19-45, the staff requested that the applicant state if procedures will require the fire fighting brigade to disperse at least 100 yards from all target areas and specifically not to return to target areas. In addition, the staff requested that the applicant address or commit to address the minimum performance-based number of fire brigade and operations personnel you plan to locate at each staging area. In its response dated December 23, 2009, the applicant stated that the fire brigade members will be directed to the staging areas identified in the MST in the MSD, and remain there until directed to respond. These staging areas are located more than 100 yards from target areas. The required number of fire brigade members (as defined in Section 13.1.2.1.5 of the VEGP COL FSAR) will respond to the appropriate staging areas. The staff finds the applicant's response follows the guidance of the February 25, 2005, letter and considers this RAI resolved.

Evaluation of Site-Specific Response to Standard Content

For Turkey Point Units 6 and 7 the required number of fire brigade members is defined in Section 13.1.2.1.6 of the Turkey Point Units 6 and 7 FSAR.

The following portion of this technical evaluation section is reproduced from Attachment A to Appendix 19.A of the VEGP SER:

The submittal addressed provisions for controlling a large number of emergency response vehicles that may arrive at the plant should a LOLA event occur. The staff reviewed whether: (1) staging areas for the offsite responders were identified; (2) provisions were made with the Local Law Enforcement Agency (LLEA) to ensure no restrictions are placed on emergency vehicle arrivals; (3) site familiarization or training was provided to the LLEA; (4) plant procedures document protocols with LLEA were or would be in place; and (5) sufficient dosimetry would be available for arriving offsite assets. In RAI 19-54, the staff

requested that the applicant further discuss the provisions for controlling a large number of emergency response vehicles that may arrive at the plant in response to a LOLA event. The applicant was also requested to provide the criteria for selecting each satisfactory staging area(s). In its response dated October 29, 2009, the applicant stated it would modify the submittal to add a commitment to establish and document staging areas prior to initial fuel load. It also provided the selection criteria, which are based on the expected volume and type of vehicles and the proximity of the areas to the plant. The applicant stated it has coordinated with LLEAs to ensure that access of responders is controlled. Local law enforcement is provided with site familiarization training (overall layout of site, access points, staging areas, etc.) and is kept informed of site LOLA response strategies. Protocols for interacting with LLEA are documented in site procedures. An evaluation will be performed by the applicant to determine the number of dosimeters needed for initial arriving offsite response personnel expected to be involved during a LOLA event. This resultant number of dosimeters will be staged at a location that is expected to survive a potential LOLA event. The staff finds the guidance of the February 25, 2005, letter is met and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-18**.

Resolution of Standard Content Confirmatory Item 19.A-18

Confirmatory Item 19.A-18 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-18 is now closed.

The applicant's submittal discussed meeting the guidance on command and control functions needed to ensure responding assets follow preplanned strategies. The staff evaluated whether: (1) command and control protocols are proceduralized; (2) the licensee maintains overall command authority at all times; (3) onsite and offsite response strategies are factored into the command and control protocol; and (4) the licensee provides technical assistance to the offsite responders. In RAI 19-49, the staff requested that the applicant discuss how the procedures provide a framework for providing technical direction to offsite responders. In its response dated October 29, 2009, the applicant stated it would revise the MSD to state that the firefighting priorities will be defined by operations. Command and control procedures will specify that the site maintains overall command authority for onsite firefighting actions at all times to ensure that firefighting priorities, as defined by operations (i.e., a licensed operator), are communicated to the [offsite] incident commander. The individual providing direction will be a licensed operator. The staff considers that the guidance of the February 25, 2005, letter is met and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-19**.

Resolution of Standard Content Confirmatory Item 19.A-19

Confirmatory Item 19.A-19 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-19 is now closed.

*The applicant's submittal addressed communication enhancements. Guidance in the February 25, 2005, letter applies specifically to the communications with the offsite responders for firefighting purposes. The applicant stated that plant response personnel are notified via autodialers and supplemented by pagers. Radio interoperability between onsite and offsite responders is achieved by pairing site personnel holding site radios with offsite responders. Radios needed to support firefighting response are provided in an appropriate location. These radios are not radios also earmarked for operational recovery response. At least one location where firefighting response radios are stored is expected to survive a potential LOLA event. At least one location where firefighting response spare batteries and chargers are stored is expected to survive a potential LOLA event. The criteria used to select the appropriate locations for staging the radios and batteries will be included in the VEGP MSD. The staff finds these strategies meet the guidance in the February 25, 2005, letter. However, in RAI 19-24 the staff asked the applicant, based on NEI 06-12 guidance, to provide a commitment that communication for responders who have to enter robust buildings following a LOLA event will be enhanced. In its response dated October 29, 2009, the applicant proposed modifications to the submittal to more clearly state that it would provide these enhancements. The staff considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-20**.*

Resolution of Standard Content Confirmatory Item 19.A-20

Confirmatory Item 19.A-20 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-20 is now closed.

In RAI 19-55, the staff requested that the applicant (a) make a commitment to determine the number of radios needed to support fire fighting responders, (b) provide the criteria to determine staging locations for radio(s), (c) explain why only one fire fighting response radio needs to survive a potential LOLA event at VEGP Units 3 and 4, (d) address how and where spare batteries or chargers are to be provided/stored, [and] (e) discuss how its communication enhancements are designed to deal with concurrent loss of offsite power at the site. In its response dated October 29, 2009, the applicant provided the criteria to determine the number and staged location of radios. The applicant stated one fire fighting response radio is sufficient to initiate communications between the onsite fire brigade commander and the responding fire fighters. The applicant indicated that chargers and spare batteries are stored at the security pavilion and also in the dress-out areas. Each of these areas is greater than 100 yards from the target areas. The hand-held communications equipment operates using batteries and the repeater has secondary power that comes from an

uninterruptible power supply (UPS). The applicant stated it would modify the submittal to add a commitment that the number and locations of radios would be included in LOLA procedures and guidance documents. The staff considers that this response meets the guidance in the February 25, 2005, letter, and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-21.**^[1]

Resolution of Standard Content Confirmatory Item 19.A-21

Confirmatory Item 19.A-21 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-21 is now closed.

In RAI 19-74 the staff asked the applicant to discuss plans on how communications will be restored following a LOLA event. In its response dated October 29, 2009, the applicant stated it would modify the submittal to stipulate that efforts to restore communications will be focused on the most rapid success path, the most effective communication pathway, and the ability to communicate with the broadest set of resources to ensure the most effective response. The staff found this response acceptable, and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-22.**

Resolution of Standard Content Confirmatory Item 19.A-22

Confirmatory Item 19.A-22 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-22 is now closed.

The staff evaluated the level and type of training of response personnel. In its submittal, the applicant addressed providing fire brigade personnel with training on accelerant-fed fires. The concern for accelerant-fed fires is related to the potential for them to greatly exceed what has been analyzed under 10 CFR Part 50.48 (which assumes fires will not affect multiple fire areas). The applicant's submittal stated that fire brigade personnel receive accelerant-fed fire training, site fire brigade personnel are trained in the application of firefighting foam, training is provided to the fire brigade on the coordinated fire response between onsite and offsite fire responders (including interface with operations) to help delineate roles and responsibilities during response, and site familiarization training with local offsite responders is offered on a recurring basis. Additionally, training of offsite responders is conducted to enhance the understanding of the coordinated response strategies for a LOLA event. Drills are conducted on large liquid fires (involving offsite fire responders, onsite fire brigade, and operations staff). In RAI 19-58, the staff requested that the applicant discuss the training of fire brigade personnel, including any tabletop exercises that will be conducted prior to the initial fuel load and periodically, as required. The applicant was also asked whether training on fighting Class B fires will be provided to brigade

members. In its response dated October 29, 2009, the applicant committed that the tabletop exercise will be conducted prior to the initial fuel load and periodically, as required. In addition, the applicant said it would modify the MSD to state that training on fighting a Class B fire will be provided to the fire brigade members. The staff considers that the guidance of the February 25, 2005, letter is met by this submittal and considers the RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-23**.

Resolution of Standard Content Confirmatory Item 19.A-23

Confirmatory Item 19.A-23 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-23 is now closed.

In RAI 19-21, the staff asked the applicant to provide the specifics by which it determined that the separation between critical equipment such as portable pump and radios and target areas was acceptable. In its response dated December 23, 2009, the applicant stated that equipment credited in multiple mitigative strategies will be located a minimum of 100 yards from target areas or spatially separated to meet the requirements of Phase 3 in NEI 06-12. The RAI also asked the applicant to state if it would measure distance from a target area to mitigating equipment by taking the distance from the exterior wall of the target area to the closest exterior wall of the structure surrounding the mitigating equipment. In its response to RAI 19-25, the applicant addressed the staff's concern in RAI 19-21 indicating it would measure the distance in this manner. The staff considers the responses to meet the criteria of NEI 06-12 and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-24**.

Resolution of Standard Content Confirmatory Item 19.A-24

Confirmatory Item 19.A-24 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-24 is now closed.

In RAI 19-25 the staff asked the applicant to address how the AP1000 design would simultaneously fight a fire while providing 500 gpm injection to the SFP. In its response dated December 23, 2009, the applicant clarified and stated it would modify the MSD to stipulate that the diesel-driven fire pump is designed to provide sufficient water to supply the largest sprinkler header in the auxiliary building, the annex building, or the radwaste building; plus 500 gpm to feed fire hoses; and an additional 500 gpm, which can provide makeup to the SFP. The staff considers this response meets the guidance of NEI 06-12 and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-25**.

Resolution of Standard Content Confirmatory Item 19.A-25

Confirmatory Item 19.A-25 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-25 is now closed.

Evaluation of Site-Specific Response to Standard Content

The Staff verified that the Turkey Point Units 6 and 7 MSD incorporates the information identified in the Standard Content Confirmatory Items 19.A-18 through 19.A-25 identified above. Accordingly, FPL has resolved the Vogtle RAIs identified above as standard content. Further, the Staff did not pose any RAIs to FPL regarding the standard content described above. Also, the following is additional information provided by the applicant that is not necessary for the staff to make its safety finding.

In its Mitigation Strategy Table (MST) Phase I Fire Fighting Response Strategy Item 1, the applicant provided two additional commitments that are not in the VEGP MST. These two commitments are:

1. Fire brigade equipment staging areas are specified in plant guidelines, and
2. Training is provided to the plant personnel on fire brigade equipment staging areas.

In its MST Phase I Fire Fighting Response Strategy Item 2, the applicant provided two additional commitments that are not in the VEGP MST. These two commitments are:

1. Safe locations given pre event notification are identified in plant procedures, and
2. Staging areas for fire brigade personnel are identified in plant guidelines.

In its MST Phase I Fire Fighting Response Strategy Item 6, the applicant provided an additional commitment that is not in the VEGP MST. This commitment states:

A list of assets available from mutual aid organizations are identified in plant guidelines.

In its MST Phase I Fire Fighting Response Strategy Item 10, the applicant provided an additional commitment that is not in the VEGP MST. This commitment states:

The locations of the chargers and spare batteries for radios will be spatially separate from the target areas by more than 100 yards.

In its MST Phase 1 Fire Fighting Response Strategy Item 12, the applicant provided the following site specific information regarding the alternate site assembly areas for personnel:

For Turkey Point Units 6 and 7, the primary assembly area for evacuated and responding plant personnel is the Security Training Complex/Daycare/Turkey Point School. An alternate assembly area for evacuated plant personnel is the Turkey Point Alternate Offsite Assembly Area. Because of their distance from the plant, these locations will not be directly impacted by the LOLA event.

In its MST Phase 1 Fire Fighting Response Strategy Item 14, the applicant states that the makeup water reservoir is the primary water supply source for the fire protection ring header, whereas VEGP identifies the cooling tower basin as the primary water supply source. Because Turkey Point Units 6 and 7's makeup water reservoir is only replacing VEGP's cooling tower basin and has a larger nominal volume, the staff finds this difference does not affect its standard content conclusions.

The following portion of this technical evaluation section is reproduced from Attachment A to Appendix 19.A of the VEGP SER:

Phase 2 - Summary of Technical Information for Spent Fuel Pool Cooling

The objective of the SFP cooling strategies proposed by the applicant is to assure cooling of the spent fuel in the SFP should the water level of the pool be lowered or the pool emptied due to a LOLA event. Consideration is given to diversity of equipment, as defined in NEI 06-12, between normal and alternate strategies. The SFP for the AP1000 is located in the "southern"² portion of the auxiliary building. None of the walls of the SFP are exposed to the exterior of the building. The top of active fuel in the SFP is approximately 7.75 feet above grade.

NEI 06-12 identifies various strategies applicants should implement to mitigate damage to fuel in the SFP caused by a beyond-design basis LOLA event. The applicant developed mitigative strategies based on NEI 06-12 guidance. The applicant stated that VEGP Units 3 and 4 have design enhancements, such as the integral spray nozzles in the SFP, to facilitate the implementation of these measures in a manner to reduce reliance on operator actions compared to operating facilities.

The first strategy specified in NEI 06-12 for Phase 2 is to provide a diverse internal SFP makeup source in addition to normal makeup sources to the pool. For the AP1000 design, normal makeup is provided by the demineralized water system (DWS). The DWS pumps water into the SFP through the spent fuel pool cooling system (SFS) normal return line. The applicant identified the alternative source as from the FPS through the "West" spray header in the SFP. The flow rate to the pool will be at least 500 gpm, with water drawn from the fire water storage tank(s) that have a total capacity of 815,000 gallons. The applicant identified the equipment and support systems for this pathway. The applicant states that these pathways are physically and electrically diverse (as defined in NEI 06-12) from the normal path for SFP makeup (i.e., share no piping or components). The alternate pathway does not require operators to use fire hoses to implement SFP refill.

² Terms dealing with the orientation of buildings or their contents may reference "north," "south," "east," or "west," referring to the relation of the structure, system, or component to the "north" orientation assumed in the AP1000 design documents.

The second strategy specified in NEI 06-12 for Phase 2 is a diverse means of providing at least 500 gpm makeup to the SFP using a power-independent pumping capability that is external to the structure housing the SFP. The applicant stated the AP1000 design provides the capability through a combination of two flow paths. The first path uses gravity flow from the passive containment cooling water storage tank (PCCWST) (located on the roof of the shield building) to supply the “east” spray header for the SFP. The second path uses a portable ac-independent pump that takes suction from the fire water yard main loop supply piping and then it pumps water to the SFP through a flanged connection exterior to the auxiliary building that leads to the SFP makeup line. The applicant’s submittal discusses the flow paths in detail, including that there are no power sources, piping, or equipment for these flow paths that are shared with the normal SFP makeup flow path. The applicant stated these flow paths meet the definition of “diverse” defined in NEI 06-12.

The third strategy specified in NEI 06-12 guidance is to establish a flexible means of providing at least 200 gpm spray to the SFP using a power-independent pumping capability. Operating plants typically address this requirement by manually routing fire hoses from the exterior of the building to the SFP elevation. The pumping source for operating plants is a diesel-powered pump connected to the fire water supply system yard ring header via hydrants. Concerns with this approach include area access, radiation exposure to plant operators, difficulties with carrying hoses up stairwells to the SFP floor elevation, and time constraints. The applicant stated the AP1000 design includes two permanently installed SFP spray headers, each capable of providing greater than 400 gpm spray flow to the SFP. This eliminates some of the concerns associated with operating reactor strategies. Additionally, the AP1000 external spray strategy uses three spray methods. The first spray method uses gravity to feed water to the east spray header from the PCCWST until the portable pump can be connected to the external flanged connection. The second spray method uses the diesel-driven fire pump to provide spray flow from the FPS through the west spray header. The third spray method uses the portable pump taking suction from a fire hydrant, using water from the fire water storage tanks. The portable pump sends water through the flanged connection that is connected to piping that penetrates the east portion of the auxiliary building at the ground level and delivers the water to the east spray header. The applicant’s submittal discusses the flow paths in detail. The applicant stated that the two spray headers provide redundancy and spatial separation to avoid damage to both during an event. Piping and valves for the SFP east spray header are located in separate rooms of the auxiliary building from the piping and valves for the SFP west spray header, thereby ensuring adequate spatial separation of the two spray systems. The rooms are separated by 24-inch thick concrete walls. No plant electrical equipment is needed to establish these flow paths through the SFP east or west spray headers. Consequently, the applicant stated that the three spray methods are diverse, as defined by the NEI 06-12 guidance.

The applicant stated the spray system consists of two spray headers, each with 16 fixed spray nozzles recessed into the east and west walls of the SFP. They are located at an approximate elevation of 134'-9" and are angled downward.

The fixed spray nozzles will be preferentially directed to areas of the pool where high decay heat fuel may be staged or stored to supply the necessary spray flux for cooling. An evaluation of the fuel assembly decay heat loads and corresponding spray flow requirements, compared with the calculated spray flux pattern will be performed by the applicant to confirm adequate spray coverage in the SFP. Plant procedures will apply the results of this evaluation to direct that fuel assemblies may only be staged or stored in locations that are provided adequate spray flux to remove their decay heat.

In addition to the three strategies described, the applicant stated that VEGP Units 3 and 4 have added SFP makeup strategies. Consistent with NEI 06-12, new plants typically have several additional potential water sources and flow paths to provide makeup water to the spent fuel pool beyond those discussed in Sections 6.1, 6.2.1, and 6.2.2 of the MSD. Specifically for the AP1000 design, the applicant identified the following water sources and flow paths that provide makeup water to the SFP:

- The chemical and volume control system (CVS) nominally provides 100 gpm of makeup to the SFP. This water is pumped using the CVS makeup pumps. Makeup from the CVS to the SFP is provided through a 3-inch CVS line that connects to a 10-inch SFS line.*
- The passive containment cooling system (PCS) recirculation pumps can take suction from the passive containment cooling ancillary water storage tank (PCCAWST) to provide makeup to the SFP through either the east spray header or the PCS makeup line. Either of these flow paths provides an estimated flow of 200 gpm.*
- A Class III hose station in the vicinity of the SFP is charged through the FPS, and can provide an estimated flow of 250 gpm through a 2-1/2 inch fire hose. The fire hose can be routed directly to the SFP.*
- The internal SFP makeup strategy can be modified to use the motor-driven fire pump in lieu of the diesel-driven fire pump. This flow path will take suction from either fire water storage tank to provide approximately 600 gpm to the west spray header.*
- The in-containment refueling water storage tank (IRWST) can provide water to the SFP using the SFS pumps. Permanent piping from the IRWST can be aligned to the SFS pump suction to provide approximately 1200 gpm through the SFP cooling return line.*
- The IRWST can also be aligned to the suction of the normal residual heat removal system (RNS) pumps to inject approximately 1500 gpm of makeup through the normal RNS return line to the SFP.*

The applicant states that the primary sources of water for the alternate makeup to the SFP are the PCCWST, PCCAWST, fire water storage tank, fire

water/clearwell storage tank, demineralized water storage tank, condensate storage tank, the boric acid storage tank, and the cooling tower basin.

The SFP leakage control strategies provided in NEI 06-12 are based on operational actions. The applicant stated the SFP for the AP1000 is designed to have thick, heavily reinforced concrete walls and floor. The AP1000 SFP is located above the two waste holdup tank rooms. Both of these rooms are designed to be water tight. Water tight doors are used for each waste holdup tank room so that if the pool were to drain from damage to its floor the drainage would be contained within one of the rooms. This would prevent the water level in the SFP from draining below the top of fuel in the SFP. Nonetheless, the applicant stated that appropriate SFP leakage control strategies and procedures are included in technical support center and emergency operations facility guidance for the responding group to consider during a LOLA event as possible control methods.^[1]

Staff Evaluation of Spent Fuel Pool Cooling

The staff evaluated the capabilities of the VEGP Units 3 and 4 design to provide alternate SFP makeup and to spray the SFP including evaluation of the flow rates and the ability of the applicant to implement the strategies in a timely manner. The staff evaluated the applicant's submittal on SFP cooling against the guidance of NEI 06-12 and DC/COL-ISG-016.

The applicant's response to RAI 19-81 addresses the staff's questions in RAIs 19-81, 19-82, 19-83, and 19-84. The staff asked the applicant in RAI 19-83 to address personnel actions to provide diverse makeup and spray to the SFP. In its response dated May 5, 2010, the applicant stated the response to RAI 19-81 provided this information. The applicant stated that the actions required to manipulate the valves needed to implement these strategies can be accomplished within two hours. The staff concurs with the applicant's referral to RAI 19-81, and considers that the guidance in NEI 06-12 is met by the response to RAI 19-81. The staff considers RAI 19-83 resolved.

The staff asked the applicant in RAI 19-84 to address the flow rates associated with the normal makeup flow path and each of the diverse flow paths. This information was provided by the applicant in response to RAI 19-81 in its May 5, 2010 letter and later clarified in its May 28, 2010 letter. The staff reviewed the flow rates and found they met the guidance in NEI 06-12. The staff considers RAI 19-84 resolved.

The first strategy reviewed by the staff was the alternate internal makeup capability to the SFP. In this strategy, as outlined in NEI 06-12, the alternate makeup pathway is to provide at least 500 gpm injection to the SFP using piping and equipment that are diverse from the normal pathway. In its May 29, 2009, submittal, the applicant described several pathways that can inject into the SFP from sources internal to the auxiliary building. In RAI 19-81 the staff asked the applicant to clarify the diverse pathways that were credited with providing injection or spray into the SFP, including a description of the valves, pumps,

significant electrical equipment (including instrumentation), hoses, and piping in the pathways. In its response dated May 5, 2010, the applicant provided a single alternate makeup path that provided at least 500 gpm flow to the SFP and was diverse as defined by NEI 06-12. The applicant also proposed to modify Sections 6.1 and 6.2 of the MSD to describe the pathways from the water sources to the final injection into the SFP. The description addressed valves, pumps, tanks, piping and other significant equipment, flow rates, power requirements, operator actions, and the degree of separation/diversity. These proposed revisions address the changes associated with RAIs 19-82, 19-83, and 19-84. Strategy tables were supplied that summarize the key aspects for the SFP Makeup-Internal Strategy (Table 6-1), SFP Makeup-External Strategy (Table 6-2), and SFP Spray-External Strategy (Table 6-3). A simplified diagram was also supplied to aid in understanding the injection and spray flow paths. The staff reviewed the applicant's RAI responses regarding the alternate internal makeup capability. The staff determined that these responses provided adequate identification of the flow path and meets the guidance of NEI 06-12. The staff considers RAI 19-81 resolved.

The staff reviewed the physical and electrical separation (as defined in NEI 06-12) of the pathways. In RAI 19-82 the staff asked the applicant to address whether or not the power supplies are diverse, as defined in NEI 06-12, for equipment that must function to inject or spray water into the SFP. In its response dated May 5, 2010, the applicant stated that as discussed in its response to RAI 19-94, in the same letter, the normal makeup to the SFP is provided by the Demineralized Water System. All valves in the alternate flow path are manually actuated, and the only significant electrical equipment required to establish the flow path is the use of one of the two Demineralized Transfer Pumps. The power source for the pumps is the normal plant power system. The response to RAI 19-81, in the same letter, provides a summary of the electrical equipment used to establish flow paths for the diverse internal and external SFP makeup strategies and spray strategy (i.e., Tables 6-1 through 6-3 in the MSD). These proposed changes to the MSD demonstrate that the electrical equipment needed is diverse and the pathways meet the definition of "diverse." The applicant's response meets the guidance in NEI 06-12 and the staff considers RAI 19-82 and RAI 19-94 resolved.

*Tracking proposed changes to the MSD in response to RAIs 19-81, 19-82, 19-83, and 19-84 is **Confirmatory Item 19.A-26**.*

Resolution of Standard Content Confirmatory Item 19.A-26

Confirmatory Item 19.A-26 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-26 is now closed.

The second strategy evaluated by the staff was the establishment of a flexible means of external SFP makeup of at least 500 gpm using a portable, power-independent pumping capability. The staff reviewed the pathways (one of

which used gravity injection from the PCCWST and the other which used the portable pump) to determine if they provided flow and found the flow adequate and the pathways physically and electrically diverse as defined by NEI 06-12. The flow paths should provide at least 500 gpm of makeup flow to the SFP as stated in NEI 06-12. Although the use of the PCCWST does not rely on use of a portable pumping capability, the capability is power-independent and spatially separated. Use of the PCCWST meets one of the Commission's objectives of reducing the reliance on operator actions. The staff considers that gravity injection from the PCCWST meets the intent of the NEI 06-12 guidance.

The third strategy evaluated by the staff was the establishment of a flexible means of SFP spray using a portable, power-independent pumping capability. The staff reviewed the flow paths to determine if they are physically and electrically diverse as defined in NEI 06-12. The two paths each should provide at least 400 gpm of spray flow to the SFP, due to VEGP 3 and 4's SFP loading pattern. In its response by letter to RAI 19-81 dated May 5, 2010, clarified by letter on May 28, 2010, and further clarified in RAI 19-69 by letter on August 13, 2010, the applicant provided a description of the flow paths credited for providing at least 400 gpm spray from each header to the SFP. The staff reviewed these pathways and found that they could provide at least 400 gpm spray flow from each header to the pool. The pathways use the portable pump or diesel-driven FPS pump to inject flow into either the "east" or "west" SFP spray headers. As a result of the loading pattern chosen by the applicant and the heavy reliance on the use of emergency spray cooling when the fuel is initially offloaded from the core both headers are needed to provide 800 gpm of flow to the SFP. The permanently discharged spent fuel assemblies will continue to cool following discharge. If it is desired to go to a single header for spray coverage or otherwise reduce spray capabilities, a confirmation of the stored fuel assembly decay heat loads and corresponding spray flow requirements is performed prior to moving fuel assemblies into SFP storage locations or reducing spray capabilities. The staff finds that the two spray headers are diverse as defined in NEI 06-12. The applicant stated at the onset of a LOLA event which results in the drain down of the SFP, the AP1000 design has the capability of providing passive spray/makeup to the pool initially through the "east" header from the PCCWST. In RAI 19-85, and further clarified in RAI 19-69, the staff asked the applicant to discuss its plans to demonstrate that the spray headers will deliver an effective spray to the SFP of at least 800 gpm or 400 gpm, whichever is appropriate depending on the SFP loading pattern at the time. In its response dated May 5, 2010, the applicant proposed to modify the MSD by adding a commitment that preoperational tests will be performed prior to initial fuel load to verify the required flow rates through each spray header and that adequate coverage of the pool is provided. The staff considers this acceptable and considers RAI 19-69, RAI 19-81, and RAI 19-85 resolved, pending the incorporation of these changes in a future revision of the MSD. This is
Confirmatory Item 19.A-27.

Resolution of Standard Content Confirmatory Item 19.A-27

Confirmatory Item 19.A-27 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-27 is now closed.

*Guidance in NEI 06-12 specifies that the implementing guidance for Phase 2 should include steps to assist plant staff in determining whether to use the external strategy in the makeup or spray modes. In RAI 19-92 the staff asked the applicant to address this. In its response dated May 5, 2010, the applicant stated that it would modify the submittal to add a commitment that such guidance will be included in makeup and spray strategies prior to initial fuel load. The staff agrees that the flexible means of providing SFP cooling credited by the applicant meets the criteria of NEI 06-12. The staff therefore considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-28**.*

Resolution of Standard Content Confirmatory Item 19.A-28

Confirmatory Item 19.A-28 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-28 is now closed.

Guidance in NEI 06-12 calls for fuel that has been unloaded from the reactor and has the greatest decay heat to be distributed throughout the SFP in a particular pattern to lessen the chance that fuel uncovering will lead to an exothermic reaction and a potential zirconium fire. The applicant's submittal of May 29, 2009, stated the VEGP Units 3 and 4 design did not need to constrain SFP loading patterns. This was because there is spray cooling available and the rooms under the SFP are designed to be water tight so that if the water in the pool were to drain out and fill these rooms, the water level in the pool would not drop below the top of fuel in the SFP. The staff found this approach unacceptable and in RAI 19-69 asked the applicant to consider dispersing the hot fuel as a defense-in-depth measure, because the damage assumed under 10 CFR 50.54(hh)(2) is non-mechanistic and can come from any number of beyond design basis security events. In Supplement 1 to RAI 19-69, the staff also asked the applicant to provide a detailed technical basis for the conclusion that the SFP will not drain down below half the height of the fuel assemblies based on a scenario that does not credit the function of the water tight doors, as well as to consider committing to implementing the defense-in-depth SFP loading strategy originally presented in RAI 19-69 if this conclusion cannot be supported. In Supplement 2 to RAI 19-69, the staff requested additional information regarding the diverse external strategy for maintaining SFP cooling capabilities, including SFP dispersal pattern(s) and SFP spray system design and operation. Also, the staff noted that the applicant's strategy may deviate from industry and regulatory guidance, and that the primary focus should be on compliance with the regulatory requirements to maintain and restore SFP cooling capabilities. In its response dated August 13, 2010, the applicant stated that during refueling outages, the complete core (157 fuel assemblies) may be staged in a uniform

pattern in Region 1 and Region 2 of the pool, in accordance with spray flux and criticality requirements. The applicant stated that since this configuration does not allow for air cooling to prevent a zirconium fire in a LOLA event with a complete loss of SFP inventory, the prevention of a zirconium fire will be accomplished by using the installed spray system on both sides of the pool. VEGP 3 and 4's loading pattern strategy requires a heavy reliance on the use of spray. A detailed description of the spray system to be utilized by the applicant due to the loading pattern chosen is already provided in this section of the SER, under the description of the third strategy evaluated by the staff for the establishment of a flexible means of SFP spray using a portable, power-independent pumping capability.

Although air cooling is neither credited nor necessary to meet the regulatory requirements of 10 CFR 50.54(hh)(2) for the AP1000 design, the capability to provide air cooling exists. The applicant stated that the capabilities to augment natural circulation air cooling of fuel assemblies in the pool in the unlikely event that the SFP inventory, makeup, and spray capabilities are lost include the availability of limited downcomer space resulting from open areas within and around the spent fuel racks, and passive ventilation of the bulk air space in the SFP area. The design features supporting passive ventilation would be enabled by opening the roll-up doors to the staging area and the personnel doors in the stairway leading to the SFP operating deck, thereby allowing outside air to flow into the SFP area. The hot air over the pool surface would then exit the building through engineered relief panels that are designed to open manually or automatically through the activation of fusible links.

*The staff finds that the strategy of providing sufficient spray to remove decay heat is an acceptable approach for minimizing the chance that fuel uncover will lead to an exothermic reaction and a potential zirconium fire. The staff considers this RAI resolved, pending the incorporation of these changes in a future revision of the MSD. This is **Confirmatory Item 19.A-29**.*

Resolution of Standard Content Confirmatory Item 19.A-29

Confirmatory Item 19.A-29 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-29 is now closed.

*Guidance in NEI 06-12 specifies that flexible hoses used to deliver flow to the SFP be secured in some manner. In RAI 19-86 the staff asked the applicant to address this issue. In its response dated May 5, 2010, the applicant proposed to revise Section 6.0 of the MSD to state that guidance documents will include instructions for securing flexible hoses. The staff considers the guidance in NEI 06-12 met and considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-30**.*

Resolution of Standard Content Confirmatory Item 19.A-30

Confirmatory Item 19.A-30 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-30 is now closed.

*Guidance in NEI 06-12 calls for an applicant to describe additional site-specific SFP makeup strategies using the strategies identified in Attachment A to the NEI letter from Marvin Fertel to Luis Reyes on Closure of Phase 2, January 24, 2006. In RAI 19-88 the staff asked the applicant to provide this list. In its response dated May 5, 2010, the applicant proposed to add a new section to the MSD (Section 6.2.3), which will list six additional strategies beyond those previously identified for the VEGP Units 3 and 4 design. This meets the guidance in NEI 06-12, and the staff considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-31**.*

Resolution of Standard Content Confirmatory Item 19.A-31

Confirmatory Item 19.A-31 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-31 is now closed.

*In RAI 19-71, the staff asked the applicant to provide a list of onsite resources that could be used by the emergency response officer (ERO) to reduce or stop leakage from a damaged SFP or other pool holding spent fuel and their general location. In its response, the applicant indicated that planning for VEGP Units 1 and 2 has already developed a list of materials that are available onsite to reduce or stop leakage from a damaged pool and that it would modify its submittal to include the list of onsite resources. These materials include sheets of plywood, steel plates, aluminum plates, Plexiglas, sand bags, and inflatable bladders. The staff finds this meets the guidance in NEI 06-12 and this RAI is considered resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-32**.*

Resolution of Standard Content Confirmatory Item 19.A-32

Confirmatory Item 19.A-32 was determined by staff not to be necessary. As a result, Confirmatory Item 19.A-32 is now closed and RAI 19-71 is resolved.

Phase 3 - Summary of Technical Information for Core Cooling Mitigation Should a LOLA Event Occur

One aspect of the requirements in 10 CFR 50.54(hh)(2) is the need for an applicant to provide strategies and procedures to help assure core cooling should a LOLA event occur. In order to develop guidance and strategies to maintain or restore core cooling, the applicant identified a list of key safety functions that are to be protected should a LOLA event occur. The list identified by the applicant is similar to the generic list provided in NEI 06-12. The methodology used by the

applicant to identify strategies to maintain or restore these key safety functions is similar to the method used by currently operating reactor utilities (i.e., NEI 05-07, Revision 1) to identify reactor core cooling mitigation strategies. The applicant identified each key safety function (including necessary support equipment such as power, cooling water, ventilation, etc.). After identifying the key safety functions, the applicant identified the normal, primary and alternative means of meeting the key safety functions. The applicant identified the minimal set of equipment for both the primary and alternate means.

Next, the applicant identified the physical locations of equipment in the systems and support systems needed to satisfy each key safety function. The applicant compared the physical locations of the primary and alternate means to the separation criteria in NEI 06-12. To meet the separation criteria, a strategy must meet the criteria depicted in Figure 4.2, "Separate Building Criteria," or Figure 4.3, "Nearby Building Criteria, External Threats" of NEI 06-12, or must meet the criteria in both Figure 4.4, "Same Face External Threats (all Elevations)" and Figure 4.5, "Internal Threat Separation Criteria," of NEI 06-12. Figures 4.2, 4.3, and 4.4 address damage from the exterior of the structures (e.g., a truck bomb or aircraft impact). Figure 4.5 addresses damage caused by fires and explosions that originate from within the confines of a structure. The applicant stated that the separation of the primary and alternate means meet the criteria of NEI 06-12.

The applicant identified the key safety functions for core cooling. For each key safety function, it identified the normal means of providing the key safety function, and the primary and alternate means to meet each key safety function if the normal means is not available. The key safety functions, normal means, primary means, and alternate means were identified as follows:

Key Safety Function - Reactor Coolant System (RCS) Makeup

The applicant identified RCS makeup as a key safety function. The applicant stated the normal means of providing RCS makeup for the AP1000 design is the CVS (e.g., if a cooldown of the RCS results in shrinkage in RCS volume). The applicant has identified the primary means of meeting RCS makeup if CVS is unavailable is core makeup tank (CMT) A. CMT B is the alternate means of providing RCS makeup. The CMTs are part of the passive core cooling system (PXS).

Key Safety Function – Safety Injection

The applicant identified safety injection as a key safety function. The applicant stated that a LOLA event inside containment is complex due to the open nature of the containment structure, the proximity of equipment needed to ensure safe shutdown, and the array of possibilities for LOLA events. In general for a pressurized-water reactor (PWR), safety injection is only needed if there is a loss of coolant accident or a steam line break. The applicant stated that the normal means of meeting the key safety function, safety injection, for the AP1000 design is through the PXS. If a LOLA event occurs in a location inside containment

where a LOCA would not occur, there is no need for safety injection. If a LOLA event were to occur in a location that could cause a LOCA and drain the IRWST, the containment would be flooded, and the AP1000 design should remain in a safe cooldown state. If a LOLA event were to occur near the IRWST or any of its injection piping such that it damaged that equipment, the containment would be flooded and the AP1000 should remain in a safe cooldown state. The applicant identified the following primary and alternate means. If a LOLA event initiates a LOCA without causing the IRWST to fail or the injection piping to rupture, the primary means of providing safety injection involves CMT A, Accumulator A, two "east" steam generator compartment 4th stage automatic depressurization system (ADS) valves, the IRWST, two "south" injection squib valves, two "south" recirculation squib valves, and associated piping. The alternate means uses CMT B, Accumulator B, and two "west" steam generator compartment 4th stage ADS valves, the IRWST, two "north" injection squib valves, two "north" recirculation squib valves, and associated piping. The equipment for the primary means is located in the "southern" half of containment and the equipment for the alternate means is located in the "northern" half of containment with the exception of the 4th stage ADS squib valves. The two 4th stage squib valves credited for the primary means are located in the "east" steam generator compartment, and the two 4th stage ADS valves for the alternate means are in the "west" steam generator compartment. They are separated by two 24-inch, steel-lined, concrete walls. The applicant stated the physical separation meets the criteria in NEI 06-12.

The applicant stated that the only equipment credited that requires power in the event of a LOCA are the squib valves, which receive power and control from the protection and safety monitoring system (PMS) divisions and the Diverse Actuation System (DAS). All other equipment is passive. Either the PMS or the DAS can arm and fire the squib valves. The applicant stated that PMS and DAS are spatially separated except in the area of the squib valves themselves. If the LOLA event were to occur in that area, safety injection would be initiated from the other safety injection means or through gravity drain through the break in the squib valve line. The applicant stated that outside containment the four safety-related division battery rooms are in the "northern" portion of the auxiliary building. Each divisional battery room is separated by a 24-inch thick concrete wall and is routed to its containment penetration through separate three-hour fire areas, each bordered by 24-inch thick concrete walls. The backup DAS panel is spatially separated from divisional battery rooms and the main control rooms by several reinforced concrete walls. The applicant states these two diverse methods to actuate safety injection and ADS satisfy the Chapter 4 guidance of NEI 06-12 for providing the key safety function, safety injection.

Key Safety Function – Decay Heat Removal

The applicant provided the following description of the normal, primary and alternative means for decay heat removal. The normal means of providing decay heat removal for the reactor core is through the main feedwater system. The primary means of providing decay heat removal is to use the startup feedwater system, which consists of two redundant trains, each capable of providing

adequate flow from the condensate storage tank to remove decay heat from the steam generators. If normal alternating current power (ac-power) and direct current power (dc-power) are lost, the operators can manually start the standby diesel generators (DGs) and provide power to the standby feedwater pumps and their support systems. The alternate means of providing decay heat removal is via natural circulation through the passive residual heat removal (PRHR) heat exchanger, located in the IRWST. The inlet valve from the RCS to the PRHR heat exchanger is normally open and the outlet valves in the line from the heat exchanger to the RCS are normally closed. To initiate decay heat removal through the PRHR heat exchanger, operators would open the valves (normally closed; air operated; open on loss of air pressure or electrical power, or a safety injection signal) located in the PRHR outlet. The applicant states these two methods for decay heat removal satisfy the guidance of Chapter 4 of NEI 06-12 for providing decay heat removal.

Staff Evaluation of Reactor Core Cooling Mitigation

The staff evaluated the applicant's submittal on core cooling against the guidance of NEI 06-12 and DC/COL-ISG-016. NEI 06-12 directs COL applicants to employ strategies and processes similar to those employed at currently operating reactors to address core cooling, SFP cooling, and fission product barrier integrity issues caused by LOLA events. The following areas were evaluated by the staff.

The staff evaluated the applicant's list of key safety functions. The staff reviewed Section 7.0, Phase 3 Mitigative Strategies, in the applicant's May 29, 2009, submittal. Based on the AP1000 design, the staff finds the listed key safety functions to be appropriate, and the staff has not identified any other safety functions that need to be addressed by the applicant to help maintain or restore core cooling. The staff evaluated the process used by the applicant to identify strategies and procedures to mitigate a LOLA event, and determined that the process used by the applicant followed the guidance of DC/COL-ISG-016.

Guidance in NEI 06-12 specifies that an applicant identify target areas (i.e., areas of the plant where core damage or fission product releases could be a direct result of a LOLA event). In RAI 19-10 the staff asked the applicant to identify all target areas and provide a site map with the areas identified. In its response dated October 29, 2009, the applicant identified the Auxiliary Building and Shield Building for VEGP Units 3 and 4 as target areas for those units. The staff finds the applicant followed the guidance in NEI 06-12, and considers this RAI resolved.

The staff reviewed the primary and alternate means of meeting the key safety functions (RCS makeup, safety injection, and core decay heat removal) identified in the applicant's May 29, 2009, submittal.

In RAI 19-40 the staff asked the applicant to more fully discuss the key safety function RCS makeup. The staff asked the applicant to use NEI 06-12 and (a) more clearly identify the primary and alternate means to meet the key safety

function including key support functions such as ac-power and dc-power, instrumentation and control, instrument air, and component cooling, (b) identify the success criteria used for determining the minimal set of equipment (e.g., from the VEGP Units 3 and 4 PRA) needed to maintain or restore the key safety function, and (c) discuss the separation of the primary and alternative means and their support functions, including which of the separation criteria in NEI 06-12 is met by the alternate means. When considering whether separation is adequate, the evaluation should consider a LOLA event that occurs either inside or outside the structure containing the primary means of meeting the key safety function. In its response dated November 13, 2009, the applicant stated the primary means was the CVS and the alternate means was the CMTs. The response discussed the support systems needed for the primary and alternate systems. The applicant stated the success criteria for RCS makeup are from Table 7.4-1, "Systems Required for Safe Shutdown," of the AP1000 DCD. The applicant stated that the primary and alternate means for providing RCS makeup meet the separation criteria in NEI 06-12. In RAI 19-99, which refers to RAI 19-40, the staff asked the applicant to more clearly address the degree of spatial separation, as defined by NEI 06-12, between the primary and alternate means of providing RCS makeup. In its response dated May 24, 2010, the applicant proposed to revise the wording in the MSD to clarify that the primary and alternate means of providing RCS makeup are CMT A and CMT B, respectively. The staff reviewed the applicant's description of the separation between the primary and alternate means, and agrees that it meets the guidance of NEI 06-12. The staff considers these RAIs resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-33**.

Resolution of Standard Content Confirmatory Item 19.A-33

Confirmatory Item 19.A-33 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-33 is now closed.

In RAI 19-41 the staff asked the applicant to more fully discuss the key safety function, safety injection. The staff asked the applicant to use NEI 06-12 and (a) more clearly identify the primary and alternate means to meet the key safety function including key support functions such as ac-power and dc-power, instrumentation and control, instrument air, and component cooling, (b) identify the success criteria used for determining the minimal set of equipment (e.g., from the VEGP Units 3 and 4 PRA) needed to maintain or restore the key safety function, and (c) discuss the separation of the primary and alternative means and their support functions, including which of the separation criteria in NEI 06-12 is met by the alternate means. When considering whether separation is adequate, the evaluation should consider a LOLA event that occurs either inside or outside the structure containing the primary means of meeting the key safety function. In its response dated November 13, 2009, the applicant stated that the primary means for providing safety injection is by injecting water from the CMTs, accumulators, and the IRWST into the reactor vessel using the PMS and Class 1E direct current batteries. These components are located inside

containment with exception of the PMS and the Class 1E batteries which are located in the non-radiological portion of the auxiliary building. Only fourth stage ADS squib valves require dc-power to actuate. The dc-power is normally supplied by the Class 1E safety-related batteries located in the auxiliary building. The applicant identified the alternate means to provide safety injection as the DAS, which can actuate a limited number of plant controls, including the fourth stage ADS squib valves. The success criteria for safety injection were derived from Table 7.4-1 of the AP1000 DCD. The applicant discussed the separation between the DAS and other systems and components needed for safety injection. The staff found this response unacceptable and asked for more information in RAI 19-100.

In RAI 19-100, which refers to RAI 19-41, the staff asked the applicant to (a) discuss in more detail and clarify the pathways and equipment credited for the primary and alternative means that provide the key safety function safety injection; (b) discuss the specifics of the spatial separation among the primary and alternative means and their support systems including ac-power; (c) state whether or not the AP1000 is designed so that dc-power to equipment needed to actuate the primary and alternative means of safety injection meets the separation criteria of NEI 06-12 including equipment either inside or outside of containment; (d) state whether or not the CMTs, accumulators, and their piping credited for the primary means are spatially separated from the equipment credited for the alternative means (e.g., CMTs, accumulators, and their piping); and (e) document this information. In its response dated May 24, 2010, the applicant provided details on pathways for safety injection and spatial separation of the pathways and proposed to revise Section 7.18 of the MSD. The applicant also stated that no LOLA event is possible that could simultaneously breach the containment shell and cause a non-isolatable LOCA. The staff reviewed the information provided by the applicant. The staff considers that the spatial separation of the pathways meets the guidance of NEI 06-12, and considers these RAIs resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-34**.

Resolution of Standard Content Confirmatory Item 19.A-34

Confirmatory Item 19.A-34 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-34 is now closed.

In RAI 19-42 the staff asked the applicant to more fully discuss the key safety function, decay heat removal. The staff asked the applicant to use NEI 06-12 and (a) more clearly identify the primary and alternate means to meet the key safety function including key support functions such as ac-power and dc-power, instrumentation and control, instrument air, and component cooling, (b) identify the success criteria used for determining the minimal set of equipment (e.g., from the VEGP Units 3 and 4 PRA) needed to maintain or restore the key safety function, and (c) discuss the separation of the primary and alternative means and their support functions, including which of the separation criteria in NEI 06-12 is

met by the alternate means. When considering whether separation is adequate, the evaluation should consider a LOLA event that occurs either inside or outside the structure containing the primary means of meeting the key safety function. In its response dated November 13, 2009, the applicant stated that the primary means of decay heat removal was from using one of the two redundant startup feedwater system trains using flow from the condensate storage tanks to deliver water to the steam generators. The startup feedwater pumps are located inside the turbine building. The applicant identified figures in the AP1000 DCD that detailed the flow paths. If offsite power is lost, the applicant stated the pumps can be loaded on the standby DGs. The applicant identified the alternate means as the PRHR heat exchanger located in the IRWST. This flow path needs no power to initiate decay heat removal. Assuming loss of ac-power and dc-power, the air-operated valves in the associated flow paths fail open and initiate natural recirculation. The success criteria were identified as coming from Table 7.4-1 of the AP1000 DCD. The applicant stated that the locations of the primary equipment are the turbine building and the auxiliary building, and the location of the alternate system is in the containment. The staff found this response acceptable, because the primary and alternate systems were clearly defined and their separation meets the guidance and criteria in NEI 06-12. The staff considers this RAI resolved.

In RAIs 19-67 and 19-102, the staff sought to have the applicant assure that certain ac-power and dc-power capabilities as well as capabilities for manual start of the standby DGs and certain equipment (e.g., the startup feedwater pumps) existed. The manual start capabilities are provided in the AP1000 design as a defense-in-depth measure similar to that required by Orders to operating reactors following the events of 9/11. In its response to RAI 19-67 dated November 13, 2009, the applicant stated that, based on the spatial separation guidance in NEI 06-12, adequate spatial separation is provided between sources of ac-power and dc-power such that no postulated LOLA event would disable the power for both the primary and alternate equipment credited to support key safety functions in Section 7 of the submittal. The applicant also stated there is adequate spatial separation between the standby DGs, the Class 1E batteries, and the dc-power supply for the secondary DAS panel. The applicant stated that, based on the guidance in NEI 06-12, there is adequate separation among the four divisions of safety-related dc batteries such that no single LOLA incident would disable all four safety-related trains of Class 1E batteries. In its response to RAI 19-102 dated May 24, 2010, the applicant stated the standby DGs included in the AP1000 design have an air start system. The applicant proposed to modify the submittal to state the following: (1) that the standby DGs can be manually started without dc-power being available; (2) the standby DGs can power the startup feedwater pumps and their support systems; (3) the startup feedwater pumps and their support systems can be manually started without dc-power; and (4) operator instructions will be developed for performing a manual start of the standby diesel generator for responding to a LOLA event at the site. The applicant later revised its response to RAI 19-102 based on publically noticed closed meetings with the staff. The applicant challenged the regulatory basis for requiring the DGs to have a manual start function and the staff determined that there was no regulatory basis for requiring the DGs to have

this function. In its revised response to RAI 19-102 dated October 8, 2010, the applicant stated that, because of the fundamental design differences and passive nature of the AP1000 as compared to the currently operating reactor fleet, the AP1000 does not rely upon the DGs for any safety functions. The applicant stated that the standard AP1000 design does not provide the capability to manually start or operate the diesel generators in the event of a loss of all ac and dc power. Instead, the AP1000 design provides independent means of providing decay heat removal which satisfies the separation criteria discussed in Section 4.2.3.4 of NEI 06-12. As stated in the response to RAI 19-67, adequate spatial separation is provided between the sources of ac-power and dc-power power such that no postulated event would disable the power for both the primary and alternate equipment credited to support the key safety functions, including decay heat removal. The applicant stated that for Phase 1 strategies, the NEI 06-12 guidance specifies that the applicant should implement NRC's February 25, 2005, guidance, "Developing Mitigating Strategies/Guidance for Nuclear Power Plants to Respond to Loss of Large Areas of the Plant in Accordance with B.5.b of the February 25, 2002, Order." However, the applicant noted that the ability to perform decay heat removal is a Phase 3 strategy and that guidance for addressing Phase 3 strategies is discussed in Section 4.2.3 of NEI 06-12. The applicant stated it would modify its submittal to stipulate that procedures will be developed to start the standby diesel generators upon a loss of normal ac-power, assuming plant dc-power is available to power the necessary diesel generator controls and auxiliaries. These procedures will be completed prior to initial fuel load. The staff considers that this design meets the guidance of NEI 06-12, and considers these RAIs resolved, pending the incorporation of this change in a future revision of the MSD. This is
Confirmatory Item 19.A-35.

Resolution of Standard Content Confirmatory Item 19.A-35

Confirmatory Item 19.A-35 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-35 is now closed.

In RAIs 19-66 and 19-68 the staff asked the applicant to address how the plant will be brought to a safe shutdown condition and how key safety functions will be met following a LOLA event inside or outside containment. The applicant was to address primary and alternative means, their support systems, minimal equipment, and the spatial separation between the means as defined in NEI 06-12. In its response dated November 13, 2009, the applicant addressed the primary and alternate pathways of providing core cooling and addressed other key safety functions defined for VEGP Units 3 and 4. It stated redundant equipment inside and outside containment is spatially separated. Equipment inside the containment is separated in reactor coolant loop compartments that are protected by modular walls that are greater than 18-inches thick. In addition, there are two vessel injections lines located 180 degrees apart at the reactor vessel. The applicant stated adequate spatial separation exists between the standby DGs, the Class 1E batteries, and the dc-power supply for the secondary

DAS panel such that power is expected to be available to achieve safe shutdown of the unit. The staff finds that the arrangement described by the applicant meets the separation criteria in NEI 06-12. The staff considers these RAIs resolved.

Summary of Technical Information for Fission Product Release Reduction

Although the AP1000 design is robust and includes many safety features, it is possible that a LOLA event could damage fuel in the SFP or the reactor core. The provisions of 10 CFR 50.54(hh)(2) require an applicant to develop and implement strategies and procedures for fission product release mitigation. The object is to have strategies and procedures that will limit fission product releases to the public should a LOLA event occur. The applicant identified a list of key safety functions that are to be protected should a LOLA event occur. The list identified by the applicant is similar to the generic list provided in NEI 06-12. The methodology used by the applicant is similar to the method used by currently operating reactor utilities (i.e., NEI 05-07, Revision 1) to identify fission product release mitigation strategies. After identifying the key safety functions and the normal, primary, and alternate means, the applicant identified the minimal set of equipment for both the primary and alternate means of satisfying each key safety function (including necessary support equipment such as power, cooling water, ventilation, etc.).

Next, the applicant identified the physical locations of equipment in the identified systems and support systems. The applicant compared the physical locations of the primary and alternate means to the separation criteria in NEI 06-12. The applicant stated that the separation of the primary and alternate means meet the criteria of NEI 06-12.

In its submittal, the applicant identified the following key safety functions for reducing fission product releases should a LOLA event occur:

Key Safety Function - Containment Cooling

The applicant identified containment cooling as a key safety function for fission product release mitigation. It identified that the PCS is involved in the normal, primary, and alternate means to provide containment cooling should a LOLA event occur. When providing containment cooling in its normal mode, the PCS delivers cooling water (stored in the PCCWST) to the exterior of the containment via gravity flow. This condenses steam in the containment to avoid exceeding containment design limits and to compensate for RCS boil off following an accident. The PCS provides the heat transfer mechanism to provide for condensation, while the PXS serves to return condensate to the IRWST or the containment sump. The applicant stated that if the PCCWST is unavailable, design bases code calculations indicate that air-only cooling is sufficient to initially maintain containment cooling. The applicant identified the following primary and alternate means. The primary means of providing containment cooling involves pumping water to the PCS bucket at the top of the containment through one of two pipes 180 degrees apart on the exterior of the shield building. The alternate means involves pumping water to the PCS bucket using the other

pipe on the shield building exterior. The following pumps are available to pump through the primary or alternate paths: the PCS makeup pumps, the motor-driven FPS pump, the diesel-driven FPS pump, or the portable pump via a connection to the PCS on the exterior of the auxiliary building. Sources of water include the fire water storage tanks (greater than 325,000 gallons each), the passive containment cooling ancillary water storage tank (780,000 gallons), and the cooling tower basin (greater than 5,000,000 gallons). The normal PCS gravity drain does not require ac-power or dc-power to activate the in-line valves, which fail open on loss of power. Neither the diesel-driven FPS pumps nor the portable pump require ac-power or dc-power to operate.

Key Safety Function - Containment Isolation

The applicant stated that if a LOLA event were to occur that caused a LOCA, it would be necessary to isolate containment prior to actuating PXS, if PXS is to be fully effective. In the AP1000 design, a high percentage of containment penetrations are normally closed, and the few that are normally open either fail closed or use dc-power valves for isolation. The one exception is a fluid line that penetrates containment, where both isolation valves require dc-power to close, and there is no check valve in the line to prevent reverse flow. As designed for the AP1000 plant, the applicant states the containment isolation valves and their power supplies in this line meet the spatial separation criteria defined in NEI 06-12.

The applicant stated that each containment penetration has a redundant means of containment isolation. Where the redundant means of isolation is also an electric-operated valve, the redundant valve is assigned to a different electrical and instrumentation and control (I&C) division. Additionally, outside of containment the four electrical and I&C divisions are maintained in separate fire areas divided by three hour fire barriers consisting of 24-inch thick concrete walls. The applicant indicated the two diverse methods of providing containment isolation satisfy the guidance in Chapter 4 of NEI 06-12, and no alternative means are required.

In addition, the applicant discussed the use of sprays (sprays inside buildings and using sprays such as portable pumps with hoses and monitor nozzles to spray the exterior of buildings) to reduce fission product releases.

Staff Evaluation of Fission Product Release Reduction

The staff evaluated the applicant's strategies and procedures for the key safety function fission product release reduction using the criteria in NEI 06-12, as modified by DC/COL-ISG-016.

The staff reviewed Section 7.0, Phase 3 Mitigative Strategies, in the applicant's May 29, 2009, submittal. Based on the AP1000 design, the staff finds the listed key safety functions to be appropriate, and the staff has not identified any other safety functions that need to be addressed by the applicant to help maintain the capability to reduce fission product releases.

In RAI 19-43 the staff asked the applicant to identify the primary and alternate means to meet the key safety function, containment cooling, including support functions. The staff asked that the applicant identify the source of the success criteria used, and asked for a discussion of the separation of the primary and alternate means using the separation criteria of NEI 06-12. In its response dated November 13, 2009, the applicant stated that the primary means of providing containment cooling is via gravity drain from the PCCWST to the outside surface of the containment. The source of the success criteria was identified as Table 7.4-1, "Systems Required for Safe Shutdown," of the AP1000 DCD. The response noted that the PCS makeup pumps can pump water to the distribution bucket of the PCCWST, which is hung from the shield building roof and suspended just above the containment dome for optimum water delivery. The applicant identified alternative paths of providing water to the distribution bucket as two lines routed on opposite sides of the shield building. The lines can be fed by either of the fire protection pumps (one ac-driven and the other diesel-driven) or the portable pump. The staff considers the design to meet the guidance of DC/COL-ISG-016 and NEI 06-12. The staff considers this RAI resolved.

*The staff reviewed the means of meeting the key safety function, containment isolation. In RAI 19-44, the staff asked the applicant to specifically identify the primary and alternate means of meeting the key safety function, identify from what source the applicant developed its success criteria, and discuss the spatial separation of equipment credited for the primary and alternative means of providing the key safety function, containment isolation. The staff reviewed the applicant's responses dated November 13, 2009, and February 5, 2010. The applicant identified the inboard and outboard containment isolation valves as the primary and alternate means, indicated that the success criteria were taken from Table 6.2.3-1, "Containment Mechanical Penetrations and Isolation Valves," of the AP1000 DCD, and discussed the physical separation of the inboard and outboard valves. The staff found these explanations acceptable, but in RAI 19-101 requested that the applicant reference where it is documented that the two I&C divisions controlling and powering the containment isolation valves are separated by at least two full height 24-inch thick concrete walls. In its response dated May 24, 2010, the applicant proposed to modify the submittal accordingly. The staff considers this RAI resolved, pending the incorporation of this change in a future revision of the MSD. This is **Confirmatory Item 19.A-36**.*

Resolution of Standard Content Confirmatory Item 19.A-36

Confirmatory Item 19.A-36 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-36 is now closed.

The guidance in NEI 06-12 specifies that an applicant discuss the evaluation of existing dose projection models for their adequacy in projecting doses for a LOLA event. The staff requested the applicant to address this in the staff's RAI 19-62. The staff's RAI sought to get the applicant to choose from among an array of

dose projection models one that would be appropriate for onsite responders following a LOLA event where there were fission product releases. In its response dated November 13, 2009, the applicant stated that due to the unbounded nature of a LOLA event, the severe accident dose rates in Chapter 49 of the AP1000 PRA were determined to be the most appropriate dose models for projecting doses to onsite event responders. The staff considers PRA dose projections acceptable for this purpose and considers this RAI resolved.

Staff Evaluation of Command and Control

While having equipment, guidance, and strategies for LOLA mitigation is important, loss of the control room and its personnel, or loss of command and control could negate the best of strategies, if such a loss is not factored into planning. Although the nuclear industry has well-developed command and control structures for design basis events, the extent and type of damage postulated for some beyond design basis security threats may create unique challenges. Normal command and control structures may be interrupted. The guidance in NEI 06-12 is designed to enhance command and control by pre-thinking strategies for dealing with command and control interruption. This includes guidelines for initial site operational response should a LOLA event occur. NEI 06-12 provides appropriate guidance on helping to assure command and control issues are capable of being performed following a LOLA event. Additional requirements are given by 10 CFR 50.54(hh)(1) and its attendant guidance, Regulatory Guide 1.214, "Response Strategies for Potential Aircraft Threats," July 2009, which describes approaches for conforming with the requirements that power reactor licensees develop, implement, and maintain procedures for responding to potential aircraft threats.

The applicant stated that command and control protocols will be in place that specify that the site maintains overall command authority for onsite fire fighting actions so that firefighting priorities, as defined by operations personnel (i.e., a licensed operator), are communicated to the offsite incident commander. This is an important consideration, because operations should make the decision whether the first priority of fire fighters is the recovery of key safety functions.

The applicant has committed to develop site assembly areas for recovery operations personnel, identify helicopter landing zones, and develop enhanced communications capabilities to focus fire/response teams on necessary plant operations. The applicant has committed to develop procedures to provide guidance to plant personnel on how to maintain core cooling in the wake of a LOLA event. This will include guidance for early responders (e.g., through Extensive Damage Mitigation Guidelines (EDMGs)) and high level guidance to the incident commander and ERO that will take over once additional operations support arrives on site or is mustered. In its response dated December 23, 2009, to RAIs 19-75 and 19-77, the applicant stated that it would modify the submittal to add a commitment that the EDMG will be written prior to initial fuel load to cover an event where the control room staff and resources are substantially affected. The command and control structure will be established using EDMG

*guidance and should state that the most senior operations person that survives the event becomes the onsite incident commander until relieved. As discussed in its response to RAI 19-76, dated October 29, 2009, the applicant committed that, prior to initial fuel load, the EDMGs will cover offsite notifications, emergency response organization callout, and damage assessment. The staff finds these responses follow the guidance of NEI 06-12 and considers these RAIs resolved, pending the incorporation of these changes in a future revision of the MSD. This is **Confirmatory Item 19.A-37**.*

Resolution of Standard Content Confirmatory Item 19.A-37

Confirmatory Item 19.A-37 is an applicant commitment to revise its MSD under Part 9 to its COL application to incorporate the described changes. The staff verified that the MSD under Part 9 of the VEGP COL application was appropriately revised. As a result, Confirmatory Item 19.A-37 is now closed.

Guidance in NEI 06-12 discusses dispersal of plant personnel to help assure that command and control capabilities will survive a LOLA event, if the plant is warned prior to the event. In the submittal and in response to various RAIs, the applicant stated that procedures will identify staging areas for operations and support personnel that maximize survivability from a LOLA event, if there is prior warning. The procedures provide guidance and direction for relocation of personnel based on various threats. Guidance documents will exist to obtain corporate resources, and helicopter landing zones are designated in procedures. The applicant stated that radios needed to support operational recovery teams are provided in appropriate locations and are separate from fire fighting radios. SAMG-like guidance is available to operators and the ERO to implement the mitigative strategies. Thus, the staff finds this acceptable because it meets the guidance in NEI 06-12.

The Staff verified that the Turkey Point Units 6 and 7 MSD incorporates the information identified in the Standard Content Confirmatory Items 19.A-26 through 19.A-37 identified above. Accordingly, FPL has resolved the Vogtle RAIs identified above as standard content. Further, the Staff did not pose any RAIs to FPL regarding the standard content described above.

Conclusion

Based on the staff's review of the information provided by the applicant under 10 CFR 52.80(d), as described above, the staff concludes that the applicant has adequately followed the guidance of DC/COL-ISG-016; NEI 06-12; and the February 25, 2005, guidance letter. Accordingly, the staff finds that the applicant provided sufficient information at the COL application stage, including commitments made in the Turkey Point Units 6 and 7 COL application, to meet the requirements of 10 CFR 52.80(d) and to provide reasonable assurance that the requirements in 10 CFR 50.54(hh)(2) will be met prior to the initial fuel load of Turkey Point Units 6 and 7, respectively.

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Turkey Point
Units 6 and 7

Table 19-A-1. VEGP RAIs Responses that are Endorsed by Turkey Point Units 6 and 7

VEGP RAI	VEGP Response Date	Endorsement Date
19-11	10/29/2009	11/15/2010
19-13	10/29/2009	11/15/2010
19-14	10/29/2009	11/15/2010
19-15	12/23/2009	11/15/2010
19-16	02/05/2010	11/15/2010
19-17	12/23/2009	11/15/2010
19-18	11/13/2009	11/15/2010
19-20	10/29/2009	11/15/2010
19-21	12/23/2009	11/15/2010
19-22	10/29/2009	11/15/2010
19-23	11/13/2009	11/15/2010
19-24	10/29/2009	11/15/2010
19-25	12/23/2009	11/15/2010
19-26	12/23/2009	11/15/2010
19-27	11/13/2009	11/15/2010
19-28	12/23/2009	11/15/2010
19-29	10/29/2009	11/15/2010
19-30	10/29/2009	11/15/2010
19-31	11/13/2009	11/15/2010
19-32	11/13/2009	11/15/2010
19-33	12/23/2009	11/15/2010
19-34	11/13/2009	11/15/2010
19-35	11/13/2009	11/15/2010
19-37	10/29/2009	11/15/2010
19-38	12/23/2009	11/15/2010
19-39	12/23/2009	11/15/2010
19-40	11/13/2009	11/15/2010
19-41	11/13/2009	11/15/2010
19-42	11/13/2009	11/15/2010
19-43	11/13/2009	11/15/2010
19-44	02/05/2010	11/15/2010
19-62	11-13-2009	11/15/2010
19-65	02/05/2010	11/15/2010
19-66	11/13/2009	11/15/2010
19-67	11/13/2009	11/15/2010
19-68	11/13/2009	11/15/2010
19-69	02/05/2010	04/20/2011
19-72	02/05/2010	11/15/2010
19-74	10/29/2009	11/15/2010
19-75	12/23/2009	11/15/2010
19-76	10/29/2009	11/15/2010
19-77	12/23/2009	11/15/2010
19-78	10/29/2009	11/15/2010

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OFFICIAL USE ONLY - SECURITY-RELATED INFORMATIONTurkey Point
Units 6 and 7**Table 19-A-1. VEGP RAIs Responses that are Endorsed by Turkey Point Units 6 and 7**

VEGP RAI	VEGP Response Date	Endorsement Date
19-79	12/23/2009	11/15/2010
19-81	05/28/2010	11/15/2010
19-82	05/05/2010	11/15/2010
19-83	05/05/2010	11/15/2010
19-84	05/05/2010	11/15/2010
19-85	08/13/2010	11/15/2010
19-86	05/05/2010	11/15/2010
19-87	05/05/2010	11/15/2010
19-88	05/05/2010	11/15/2010
19-90	05/05/2010	11/15/2010
19-91	05/28/2010	11/15/2010
19-92	05/05/2010	11/15/2010
19-93	05/28/2010	11/15/2010
19-94	05/05/2010	11/15/2010
19-95	05/24/2010	11/15/2010
19-96	05/24/2010	11/15/2010
19-98	05/24/2010	11/15/2010
19-99	05/24/2010	11/15/2010
19-100	06/04/2010	11/15/2010
19-101	05/24/2010	11/15/2010
19-102	05/24/2010	04/20/2011
19-103	05/24/2010	11/15/2010
Erratum 1	05/24/2010	11/15/2010
Erratum 2	05/24/2010	11/15/2010
Erratum 3	05/24/2010	11/15/2010
Erratum 4	05/24/2010	11/15/2010

20.0 REQUIREMENTS RESULTING FROM FUKUSHIMA NEAR-TERM TASK FORCE RECOMMENDATIONS

This chapter addresses the Fukushima Near-Term Task Force (NTTF) recommendations that are applicable to the Turkey Point Units 6 and 7 Combined License (COL) application, submitted by the applicant, Florida Power and Light (FPL). The applicable recommendations address four topics: reevaluations of the seismic and flood hazard (related to Recommendation 2.1), mitigation strategies for beyond-design-basis external events (related to Recommendation 4.2), spent fuel pool (SFP) instrumentation (related to Recommendation 7.1), and emergency preparedness staffing and communications (related to Recommendation 9.3).

Background

In response to the events at Fukushima resulting from the March 11, 2011, Great Tohoku earthquake and tsunami in Japan, the U.S. Nuclear Regulatory Commission (NRC) established the NTTF to conduct a systematic and methodical review of NRC processes and regulations to determine whether the agency should make additional improvements to its regulatory system and to make recommendations to the Commission for policy direction. In July 2011, the NTTF issued a 90-day report, SECY-11-0093, "Near Term Report and Recommendations for Agency Actions Following the Events in Japan," identifying 12 recommendations. On September 9, 2011, in SECY-11-0124, "Recommended Actions to Be Taken Without Delay From NTTF Report," the staff provided to the Commission for its consideration NTTF recommendations that can and, in the staff's judgment, should be initiated, in part or in whole, without delay. In SECY-11-0124 the staff identified and concluded that the following subset of actions had the greatest potential for safety improvement in the near-term:

1. Recommendation 2.1: Seismic and Flood Hazard Reevaluations
2. Recommendation 2.3: Seismic and Flood Walkdowns
3. Recommendation 4.1: Station Blackout Regulatory Actions
4. Recommendation 4.2: Equipment covered under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.54(hh)(2)
5. Recommendation 5.1: Reliable Hardened Vents for Mark I Containments
6. Recommendation 8: Strengthening and Integration of Emergency Operating Procedures, Severe Accidents Management Guidelines, and Extensive Damage Mitigation Guidelines
7. Recommendation 9.3: Emergency Preparedness Regulatory Actions (staffing and communications).

On October 3, 2011, in SECY-11-0137, "Prioritization of Recommended Actions to Be Taken in Response to Fukushima Lessons Learned," the staff identified two actions in addition to the actions discussed in SECY-11-0124 that had the greatest potential for safety improvement in the near-term. The additional actions are:

1. Inclusion of Mark II containments in the staff's recommendation for reliable hardened vents associated with NTTF Recommendation 5.1
2. The implementation of SFP instrumentation proposed in Recommendation 7.1

The staff also prioritized the NTTF recommendations into Tier 1, Tier 2, and Tier 3, where the recommendations in Tier 1 represent those that the staff determined should be started without unnecessary delay, while recommendations in Tier 2 are those that could not be initiated in the near term, and recommendations in Tier 3 require further study to support regulatory action.

On February 17, 2012, in SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," the staff provided the Commission with proposed orders and requests for information to be issued to all power reactor licensees and holders of construction permits.

On March 9, 2012, the Commission approved issuance of the proposed orders with some modifications in the staff requirements memorandum (SRM) to SECY-12-0025. On March 12, 2012, the NRC issued two orders, namely EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" and EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" to the appropriate licensees and permit holders (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A735 and ML12054A679, respectively). The recipients of the Orders included the Southern Nuclear Operating Company, which was then the only holder of a COL issued under 10 CFR Part 52 (for the Vogtle Electric Generating Plant Units 3 and 4). The Commission determined that the requirements of EA-12-049 were necessary to provide adequate protection to the public health and safety, while those of EA-12-051 were imposed to provide enhanced protection under an administrative exemption to the Backfit Rule in 10 CFR 50.109, "Backfitting" and the issue finality requirements in 10 CFR 52.63, "Finality of standard design certifications" and 10 CFR Part 52, Appendix D, Paragraph VIII, "Design Certification Rule for the AP1000 Design."

In a letter dated March 12, 2012 (ADAMS Accession No. ML12053A340), the staff also issued requests for information pursuant to 10 CFR 50.54(f) regarding Recommendations 2.1, 2.3 and 9.3, as described in SECY-12-0025, to the appropriate licensees and permit holders.

The following Tier 1 recommendations from SECY-11-0137, as modified in SECY-12-0025, were considered in determining those that are applicable to a COL review:

1. Recommendation 2.1: Seismic and Flood Hazard Reevaluations
2. Recommendation 2.3: Seismic and Flood Walkdowns
3. Recommendation 4.1: Station Blackout Regulatory Actions
4. Recommendation 4.2: Equipment covered under 10 CFR 50.54(hh)(2)
5. Recommendation 5.1: Reliable Hardened Vents for Mark I and Mark II Containments
6. Recommendation 7.1: Spent Fuel Pool Instrumentation
7. Recommendation 8: Strengthening and Integration of Emergency Operating Procedures, Severe Accidents Management Guidelines, and Extensive Damage Mitigation Guidelines

8. Recommendation 9.3: Emergency Preparedness Regulatory Actions (staffing and communications)

The staff determined that the following three recommendations were applicable and should be addressed by the Turkey Point Units 6 and 7 COL applicant:

1. Recommendation 4.2: Equipment covered under 10 CFR 50.54(hh)(2) - Order licensees to provide reasonable protection for equipment currently provided pursuant to 10 CFR 50.54(hh)(2) from the effects of design-basis external events and to add equipment as needed to address multiunit events while other requirements are being revised and implemented.
2. Recommendation 7.1: Spent fuel pool instrumentation - Order licensees to provide reliable spent fuel pool level instrumentation.
3. Recommendation 9.3: Emergency preparedness regulatory actions (staffing and communications) - Order licensees to do the following until rulemaking is complete:
 - Determine and implement the required staff to fill all necessary positions for response to a multi-unit event.
 - Provide a means to power communications equipment needed to communicate onsite (e.g., radios for response teams and between facilities) and offsite (e.g., cellular telephones and satellite telephones) during a prolonged station blackout.

The staff determined that the remaining Tier 1 recommendations did not need to be further considered in the Turkey Point Units 6 and 7 COL review, as follows:

The applicant evaluated the seismic and flood hazards using the current guidance and methodologies. For the seismic hazard, consistent with guidance in Regulatory Guide 1.208, "A Performance-Based Approach to Define the Site- Specific Earthquake Ground Motion," the Turkey Point Units 6 and 7 COL application considered the latest information in the evaluation of seismic hazard, and this included consideration of the NUREG-2115, "Central and Eastern United States Seismic Source Characterization for Nuclear Facilities," (CEUS-SSC) model as described in FSER Chapter 2, Section 2.5.2. Further, FSER Section 3.7 documents the staff's evaluation of the seismic analyses of NI structures and adjacent seismic Category II structures based on the Turkey Point Units 6 and 7 seismic hazard. For the flooding hazard, which the staff evaluated in FSER Chapter 2, Sections 2.4.5 and 2.4.6, the applicant used Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants," as supplemented by best current practices. Accordingly, the applicant has provided assurance that natural flooding phenomena that could potentially affect the site have been appropriately identified and characterized. Thus, the staff determined that the applicant has already addressed the seismic and flood hazard reevaluation portion of Recommendation 2.1. Therefore, no additional information is needed to address Recommendation 2.1 for the Turkey Point Units 6 and 7 COL application.

Additionally, the staff determined that Recommendation 2.3 was not applicable to the Turkey Point Units 6 and 7 COL because the plant is not yet constructed, and Recommendation 5.1 was not applicable because it applies to boiling water reactor plant designs with Mark I and

Mark II Containments. Recommendations 4.1 and 8 did not need to be further considered because SECY-11-0137 and its associated SRM direct that regulatory action associated with them be initiated through rulemaking.

In SECY-12-0025, the staff stated that it would request all COL applicants to provide the information required by the orders and requests for information through the review process. Accordingly, for the Turkey Point Units 6 and 7 COL application, the staff issued request for additional information (RAI) 6434 (ADAMS Accession No. ML12122A973) dated May 1, 2012. The May 1, 2012, RAI letter related to Implementation of Fukushima Near-Term Task Force Recommendations pertaining to seismic hazard reevaluation, mitigation strategies for beyond-design-basis external events, spent fuel pool instrumentation, and emergency preparedness staffing and communications based on Recommendations 2.1, 4.2, 7.1, and 9.3, as modified by SRM-SECY-12-0025. The following sections of this chapter present the staff's safety evaluation related to these areas.

20.1 Mitigation Strategies for Beyond-Design-Basis External Events (Based on Recommendation 4.2)

20.1.1 Introduction

On March 12, 2012, the staff issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," (ADAMS Accession No. ML12054A735), which directed then-current licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and SFP cooling capabilities for a beyond-design-basis external event. Order EA-12-049 specified a three-phase approach for mitigation of beyond-design-basis external events, as follows: The initial phase involves the use of installed equipment and resources to maintain or restore core cooling, containment, and SFP cooling without alternating current (ac) power. The transition phase involves providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase involves obtaining sufficient offsite resources to sustain those functions indefinitely.

In SECY-12-0025, the staff indicated that it would ensure that any additional actions necessary to increase the capability of currently licensed plants to mitigate beyond-design-basis external events would be addressed for design certification and COL applications submitted under 10 CFR Part 52 that were then under active staff review prior to certification or licensing. The staff also indicated that it would request all COL applicants to provide the information required of a licensee by any such order. SECY-12-0025 notes that the AP1000 standard design (which is referenced for Turkey Point Units 6 and 7) includes passive design features that provide core cooling, containment, and SFP cooling capabilities for 72 hours, without reliance on ac power. The AP1000 design also includes equipment to maintain required safety functions in the long term (beyond 72 hours to 7 days). As such, a COL applicant referencing the AP1000 standard design needs to include in its application provisions to address the final phase defined in Order EA-049.

NRC Interim Staff Guidance (ISG) JLD-ISG-2012-01, Revision 0, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," endorses with clarifications, the methodologies described in the industry guidance document, Nuclear Energy Institute (NEI) 12-06, "Diverse

and Flexible Coping Strategies (FLEX) Implementation Guide,” Revision 0. JLD-ISG-2012-01 describes an acceptable approach for developing mitigation strategies for beyond-design-basis external events at nuclear power plants based on the guidance in NEI 12-06. The following documents the staff’s evaluation of the applicant’s proposal for mitigation strategies for a beyond-design-basis external event at proposed Turkey Point Units 6 and 7 in response to the above matters consistent with Order EA 12-049.

20.1.2 Summary of Application

The Turkey Point Units 6 and 7 Final Safety Analysis Report (FSAR), Revision 8, provides information on systems used to establish and sustain core cooling, containment, and SFP cooling capabilities for the proposed Turkey Point Units 6 and 7. For example, Section 6.3, “Passive Core Cooling System,” of the FSAR discusses the passive core cooling system (PXS), which provides emergency core cooling following postulated design-basis events, and incorporates by reference Section 6.3 of the AP1000 design control document (DCD) Tier 2 with identified departures and supplements. The PXS is a seismic category 1, safety-related system that can establish and maintain safe shutdown conditions for 72 hours after an event without operator action and without the use of ac power and is described in AP1000 DCD Tier 2, Section 6.3. FSAR Section 6.2, “Containment Systems,” addresses containment systems and incorporates by reference Section 6.2.2, “Passive Containment Cooling System,” of the AP1000 DCD Tier 2. The passive containment cooling system (PCS) is also a safety-related system and is located within the shield building structure, which is designed to withstand the effects of natural phenomena. The PCS maintains the containment temperature and pressure within its design limits by providing passive cooling of the containment vessel. The system has sufficient capacity to provide for 72-hour cooling without the need for ac power or operator action and is described in AP1000 DCD Tier 2, Section 6.2. FSAR Section 9.1.3, “Spent Fuel Pool Cooling System,” addresses spent fuel pool cooling and describes how passive cooling of the spent fuel is achieved using the water inventory of the SFP and makeup from the cask washdown pit. The cooling of the spent fuel uses only safety-related makeup, and does not rely on active components or ac power.

As discussed above, in SECY-12-0025, the NRC staff indicated that it would review information provided by COL applicants to describe their mitigation strategies for beyond-design-basis external events. In light of SECY 12-0025, the staff issued RAI 6434, Question 01.05-2, to request information regarding the Turkey Point Units 6 and 7 mitigation strategies to sustain core cooling, containment, and SFP cooling capabilities functions indefinitely.

The applicant provided an initial response to the RAI in a letter dated June 29, 2012 (ADAMS Accession No. ML121850685). In its initial response, the Turkey Point Units 6 and 7 COL applicant proposed a license condition related to mitigation strategies for beyond-design-basis conditions resulting from an extended loss of ac power and loss of access to the normal heat sink (referred to below as an ELAP event). Subsequent to that response, the applicant provided the NRC staff with the general mitigation strategy that will be used by Turkey Point Units 6 and 7, including the strategies for initial (0 to 72 hours) mitigation, in a letter dated October 29, 2015 (ADAMS Accession No. ML15306A159). The letter, which was a supplemental response to RAI 6434, provided the staff with a Westinghouse report (designated as APP-GW-GLR-171, “AP1000 Flex Integrated Plan,” for the publicly available version) that included a description of the mitigating strategies for beyond-design-basis external events that will be applied at Turkey Point Units 6 and 7.

In Item 12, “Fukushima Response Actions,” of Part 10, “Proposed License Conditions (including inspection, test, analysis, and acceptance criteria (ITAAC)),” of the Turkey Point Units 6 and 7 COL application, the applicant proposed a license condition related to this subject.

20.1.3 Regulatory Basis

The regulatory basis for the staff review of mitigation strategies for beyond-design-basis external events is as follows:

- The Atomic Energy Act of 1954, as amended, Section 161, “General Provisions,” which authorizes the Commission to regulate the possession and use of special nuclear materials as necessary or desirable to protect public health and to promote the common defense and security.
- 10 CFR 52.97(a)(1), which authorizes the Commission to issue a COL if it finds, among other things, that issuance of the license will not be inimical to the health and safety of the public. This regulation applies here because the Commission found in Order EA-12-049 that it is necessary for power reactor licensees to develop, implement and maintain guidance and strategies to restore or maintain core cooling, containment, and SFP cooling capabilities in the event of a beyond-design-basis external event in order to ensure adequate protection of the public health and safety.

The staff’s guidance for beyond-design-basis external event mitigation strategies is as follows:

- SRM-SECY-12-0025, “Staff Requirements – SECY-12-0025 – Proposed Orders and Requests for Information in Response to Lessons Learned from Japan’s March 11, 2011, Great Tohoku Earthquake and Tsunami,” dated March 9, 2012, approves issuance of orders for beyond-design-basis external events, as necessary for ensuring continued adequate protection under the 10 CFR 50.109(a)(4)(ii) exception to the Backfit Rule.
- JLD-ISG-2012-01, Revision 0, “Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” issued August 29, 2012, endorses NEI 12-06, Revision 0, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide” (issued August 21, 2012), with exceptions/clarifications.
- Order EA-12-049, “Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” dated March 12, 2012. Although Order EA-12-049 does not apply to Turkey Point Units 6 and 7, the staff followed the current NRC and industry guidance for establishing mitigation strategies for beyond-design-basis external events at AP1000 reactors in evaluating the equipment used as part of the mitigation strategy for Turkey Point Units 6 and 7.

20.1.4 Technical Evaluation

The NRC staff reviewed the information submitted by Florida Power and Light (FPL) regarding its proposed mitigation strategies for beyond-design-basis conditions resulting from an ELAP

event. To assess whether the proposed mitigation strategies provided an acceptable approach, the staff applied JLD-ISG-2012-01, Revision 0, which endorses, with clarifications, the methodologies described in industry guidance document NEI 12-06, Revision 0. Appendix F, "Guidance for AP1000 Design." NEI 12-06 outlines the process to be used by AP1000 COL licensees and applicants to define and implement the mitigation strategies for beyond-design-basis conditions resulting from an ELAP event.

Section 7.0, "Guidance for AP1000 Design," of JLD-ISG-2012-01 states that the guidance in Appendix F of NEI 12-06 provides an acceptable means to meet the requirements of Order EA-12-049 or license conditions imposing similar requirements for the AP1000 reactor design. Appendix F to NEI 12-06 specifies that the underlying strategies for coping with ELAP events for AP1000 plants involve a three-phase approach as follows:

1. Initial coping through installed plant equipment without ac power or makeup to the ultimate heat sink. From 0 to 72 hours, the certified AP1000 design includes passive systems that provide core cooling, containment, and SFP cooling.
2. Following the 72-hour passive system coping time, support is necessary to continue passive system cooling. From 3 to 7 days, this support can be provided by installed plant ancillary equipment or by offsite equipment installed to connections provided in the AP1000 design.
3. To extend the passive system cooling time beyond 7 days to an indefinite time, offsite assistance is necessary, such as the delivery of diesel fuel oil. Appendix F includes provisions related to the qualification and use of equipment intended to mitigate an ELAP event.

As mentioned in Appendix F to NEI 12-06, APP-GW-GLR-171, referenced above, indicates that core cooling, containment, and SFP cooling is provided for the initial time period of 0 to 72 hours through installed, safety-related plant equipment that is part of the certified design. These systems do not rely on ac power or on access to any external water sources, because the containment vessel and the passive containment cooling system serve as the safety-related ultimate heat sink. The NRC staff reviewed and found acceptable the site-specific functional design, qualification, and inservice testing program descriptions for this safety-related equipment for Turkey Point Units 6 and 7 as discussed in the applicable sections of this report.

Following the initial 72-hour coping period, APP-GW-GLR-171 indicates that support is necessary to continue passive system cooling, and this support can be provided by installed ancillary equipment or by offsite equipment interfacing with installed plant connections. For example, additional inventory for the passive containment cooling system (PCS) and SFP can be supplied from the onsite passive containment cooling ancillary water storage tank (PCCAWST) using the onsite PCS recirculation pumps, powered using the onsite ancillary diesel generators or offsite replacement generators. The installed ancillary equipment and stored cooling water are capable of supporting passive system cooling from 3 days after the event to 7 days after the event. Beyond this time period, the report indicates that offsite assistance and resources are needed. For indefinite coping after 7 days, an offsite pump (PCCAWST makeup pump) and appropriate connection materials to refill the PCCAWST from the closest water source will be provided. In the event that the PCS recirculation pumps are

unavailable, a second self-powered, offsite pump (PCS/SFP makeup pump) and appropriate connection materials will be available.

APP-GW-GLR-171 also includes several additional provisions related to the qualification and use of commercially procured equipment that will be used 72 hours after an ELAP event:

- Programmatic controls for this equipment include quality attributes, equipment design, equipment storage, procedure guidance, maintenance, testing, training, staffing, and configuration control.
- The quality assurance (QA) provisions in AP1000 DCD Tier 2, Table 17-1, "Quality Assurance Program Requirements for Systems, Structures, and Components Important to Investment Protection," will be applied to this AP1000 FLEX equipment.
- The graded approach to availability and testing as shown in AP1000 DCD Tier 2, Section 16.3, "Investment Protection," will be applied to the FLEX equipment.
- The design and maintenance of the FLEX equipment will be in accordance with Section 11.2, "Equipment Design," and Section 11.5, "Maintenance and Testing," respectively, of NEI 12-06.
- AP1000 DCD Tier 2, Section 1.9.5.4, "Additional Licensing Issue – Post-72 Hour Support Actions," describes procedures that address actions that would be necessary 72 hours subsequent to an ELAP event to maintain core, containment, and SFP cooling for an indefinite period of time.

The NRC staff reviewed the applicable sections of the Turkey Point Units 6 and 7 FSAR, along with their respective AP1000 DCD sections, the final safety evaluation report (FSER) for the AP1000 design certification, and other sections of this report to verify the above information. For example, Table 8.1-201, "Site-Specific Guidelines for Electric Power Systems," in the Turkey Point Units 6 and 7 FSAR indicates that station blackout is addressed as a design issue in the AP1000 DCD. The staff reviewed station blackout as part of its review of Chapter 8 of the AP1000 DCD Tier 2. Section 8.5.2.1, "Station Blackout," of the AP1000 FSER states that the AP1000 safety-related passive systems automatically establish and maintain safe-shutdown conditions for the plant following design-basis events, including the loss of ac power sources, and the passive systems can maintain these safe-shutdown conditions after design-basis events for 72 hours, without operator action, following a loss of both onsite and offsite ac power sources. The staff reviewed the applicability of this FSER conclusion to Turkey Point Units 6 and 7.

Section 8.3.2, "Direct Current Power and Uninterruptible Power Systems," of the AP1000 FSER, Supplement 2, states that Class 1E batteries will be sized adequately to perform their safety functions as designed and that ITAAC verifying that the batteries are adequately designed are identified in AP1000 DCD Tier 1, Table 2.6.3-3. APP-GW-GLR-171 discusses the connections for the onsite ancillary diesel generators and the offsite portable generators. Electrical isolation between safety related power systems and power sources utilized in Phase 3 is addressed in APP-GW-GLR-171, which states that voltage regulating transformers are the connection point for the offsite portable generators. Section 8.3.2, "Direct Current Systems," of this document

discusses how the voltage regulating transformer in combination with fuses and/or breakers will interrupt the input or output (ac) current under faulted conditions to achieve electrical isolation. As part of the license condition, part (c), as set forth in Section 20.1.5 of this Safety Evaluation Report (SER), the capacity of the offsite portable generators will be assessed by FPL to ensure they are capable of providing power to the necessary loads described in AP1000 DCD Tier 2 Table 8.3.1-4, "Post-72 hours nominal load requirements." Section 9.5.3 of this document addresses plant lighting systems, specifically emergency lighting which provides illumination in areas where emergency operations are performed.

Emergency core cooling for the Turkey Point Units 6 and 7 is accomplished using the AP1000 PXS, which is described in Section 6.3 of the AP1000 DCD Tier 2. The Turkey Point Units 6 and 7 FSAR specifies that Section 6.3 of the AP1000 DCD Tier 2 was incorporated by reference with identified departures. The staff reviewed Turkey Point Units 6 and 7 FSAR Section 6.3, and finds that the departures have no impact on the capability of the PXS to establish and maintain safe-shutdown conditions for 72 hours following a loss of both onsite and offsite ac power sources, as explained in Section 6.3 of this FSER. Therefore, the staff finds that core cooling for the initial phase (0-72 hours) of mitigation for Turkey Point Units 6 and 7 will be accomplished by its safety-related PXS, per the Turkey Point Units 6 and 7 licensing basis.

The mitigation of a station blackout, as required by 10 CFR 50.63, addresses the capability of a nuclear power plant to provide adequate core cooling during a loss of ac power. In addition to core cooling, the recommendations for mitigation strategies for beyond-design-basis external events also address containment function and SFP cooling.

The control of containment pressure and temperature for Turkey Point Units 6 and 7 is accomplished using the AP1000 PCS, which is described in Section 6.2.2, "Passive Containment Cooling System," of the AP1000 DCD Tier 2. The staff observes that, with the exception of a departure related to the containment leak rate test program, Section 6.2.2 of the AP1000 DCD Tier 2 was incorporated by reference into the Turkey Point Units 6 and 7 FSAR. In Section 6.2.2 of the AP1000 FSER, the staff stated the principal design basis for the PCS is to maintain the containment internal pressure below the design value for 3 days following a design-basis accident. The staff review, as documented in Section 6.2.1.1, "Containment Pressure and Temperature Response to High-Energy Line Breaks," of the AP1000 FSER, found that the PCS met its design objectives. Therefore, the containment function for the initial phase of (0-72 hours) mitigation for Turkey Point Units 6 and 7 will be accomplished by its safety-related PCS per the Turkey Point Units 6 and 7 licensing basis.

The SFP cooling function for the Turkey Point Units 6 and 7 is accomplished by maintaining sufficient water inventory in the SFP to keep the fuel covered and, therefore, provide the necessary cooling in the event of an extended loss of SFP cooling due to the loss of ac power. In Section 9.1.3.2.3, "Increase in Number of Spent Fuel Storage Locations," in Supplement 2 of the AP1000 FSER, the staff concluded that the SFP will maintain water coverage above the spent fuel assemblies for at least 72 hours following a loss of nonsafety-related SFP cooling, using only safety-related makeup water. Therefore, initial phase mitigation is accomplished through passive means. However, as indicated in Note 9 in the DCD Tier 2 Table 9.1-4, "Station Blackout/Seismic Event Times," for the most limiting scenario (full core offload) the need for operator action 18 hours into the event is specified. In Attachment 1, "Sequence of Events Timeline," to the AP1000 FLEX integrated plan, this action has been identified and the appropriate procedure cited to assure the task is performed. Hence, SFP cooling for the initial

phase (0-72 hours) of mitigation for Turkey Point Units 6 and 7 will be accomplished by passive cooling of the SFP in accordance with the Turkey Point Units 6 and 7 licensing basis.

As described above, the NRC staff has reviewed the mitigation strategies for beyond-design-basis external events for Turkey Point Units 6 and 7 based on the information provided by the applicant, including referenced mitigation guidance for beyond-design-basis external events applicable to AP1000 reactors. Based on the foregoing, the staff finds that the Turkey Point Units 6 and 7 COL applicant has provided or referenced information to describe its mitigation strategies for beyond-design-basis external events in an acceptable manner. The staff recognizes that full implementation of the mitigation strategies for beyond-design-basis external events at AP1000 reactors cannot be established until after licensing (e.g., during procedure development). The staff prepared a license condition for implementation of the mitigation strategies for beyond-design-basis external events at Turkey Point Units 6 and 7, based on the applicant's proposed license condition with specific enhancements to provide consistency with the current NRC staff approach to mitigation strategies. Completion of the activities associated with the license condition, including lessons learned from initial AP1000 implementation, can be verified through NRC inspection activities.

20.1.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff proposes to include the following license condition related to the mitigation strategies program:

- License Condition (20-1) – Mitigation Strategies for Beyond-Design-Basis External Events:
 - a. The Licensee shall complete development of an overall integrated plan of strategies to mitigate a beyond-design-basis external event at least 1 year before the completion of the last ITAAC on the schedule required by 10 CFR 52.99(a).
 - b. The overall integrated plan required by this condition must include guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities. The overall integrated plan must include provisions to address all accident mitigation procedures and guidelines (including the guidance and strategies required by this section, emergency operating procedures, abnormal operating procedures, and extensive damage management guidelines).
 - c. The guidance and strategies required by this condition must be capable of (i) mitigating a simultaneous loss of all alternating current (ac) power and loss of normal access to the normal heat sink and (ii) providing for adequate capacity to perform the functions upon which the guidance and strategies rely for all units on the Turkey Point Units 6 and 7 site and in all modes at each unit on the site.
 - d. Before initial fuel load, the Licensee shall fully implement the guidance and strategies required by this condition, including:

1. Procedures;
 2. Training;
 3. Acquisition, staging, or installation of equipment and consumables relied upon in the strategies; and
 4. Configuration controls and provisions for maintenance and testing (including testing procedures and frequencies for preventative maintenance) of the equipment upon which the strategies and guidance required by this condition rely.
- e. The training required by condition d.2 must use a Systematic Approach to Training (SAT) to evaluate training for station personnel, and must be based upon plant equipment and procedures upon which the guidance and strategies required by this Condition rely.
- f. The Licensee shall maintain the guidance and strategies described in the application upon issuance of the license, and the integrated plan of strategies upon its completion as required by condition a. The Licensee may change the strategies and guidelines required by this Condition provided that the Licensee evaluates each such change to ensure that the provisions of conditions b and c continue to be satisfied and the Licensee documents the evaluation in an auditable form.

20.1.6 Conclusion

The NRC staff reviewed the mitigating strategies for Turkey Point Units 6 and 7 to provide assurance of core cooling, containment, and SFP cooling capabilities in the event of a beyond-design-basis external event resulting in an ELAP event. For the reasons set forth above, the staff finds that the approach for mitigating beyond-design-basis external events to be used at Turkey Point Units 6 and 7 is consistent with NRC Order EA-12-049 and both general and AP1000-specific NRC guidance (including NEI 12-06, Appendix F, as endorsed by the NRC staff). Therefore, the staff concludes that the mitigating strategies for beyond-design-basis external events described for Turkey Point Units 6 and 7 are acceptable. The NRC will impose a license condition as discussed in this SER section to verify the implementation of the mitigation strategies for beyond-design-basis external events at Turkey Point Units 6 and 7 as described in the specified documentation.

20.2 Reliable Spent Fuel Pool Instrumentation (Based on Recommendation 7.1)

20.2.1 Introduction

During the events in Fukushima, responders were without reliable instrumentation to determine the water level in the spent fuel pool (SFP). This caused concerns that the pool may have boiled dry, resulting in fuel damage, and highlighted the need for reliable SFP instrumentation. The SFP level instrumentation at United States (U.S.) nuclear power plants is typically narrow range and, therefore, only capable of monitoring normal and slightly off-normal conditions. Although the likelihood of a catastrophic event affecting nuclear power plants and the associated SFPs in the U.S. remains very low, beyond-design-basis external events could challenge the ability of existing spent fuel pool level instrumentation in providing emergency responders with reliable information on the condition of SFPs. Reliable and available level indication is essential to ensure plant personnel can effectively prioritize emergency actions.

SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami" states that the staff will request all COL applicants to provide the information required by the orders and request for information letters described in SECY-12-0025, as applicable, through the review process. With regard to Recommendation 7.1 for reliable spent fuel pool instrumentation, SECY-12-0025 notes that the AP1000 standard design includes two permanently fixed safety related level instruments with the capability for a third instrument connection.

JLD-ISG-2012-03, Revision 0, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," endorses with exceptions and clarifications the methodologies described in the industry guidance document, NEI 12-02, Revision 1, "Industry Guidance for Compliance with Nuclear Regulatory Commission (NRC) Order EA-12-051, To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," and provides an acceptable approach for satisfying the applicable requirements.

20.2.2 Summary of Application

The NRC issued RAI 6434, concerning spent fuel pool instrumentation. The applicant responded to the staff's RAI in letters dated June 29, 2012 (ADAMS Accession No. ML121850685) and October 28, 2013 (ADAMS Accession No. ML13302C082). As part of the RAI response, the applicant submitted a Westinghouse report, APP-SFS-M3R-004, "Response to NRC Orders EA-12-051 and EA-12-063 and Background Information for Future Licensees on AP1000 Spent Fuel Instrumentation." The RAI responses also proposed adding supplemental information to the FSAR and proposed a license condition. The applicant updated FSAR Section 9.1.3.7 to describe its proposed spent fuel pool level instrumentation.

Supplemental Information

- PTN Supplement (SUP) 9.1-1

The applicant provided supplemental information PTN SUP 9.1-1 addressing spent fuel pool instrumentation in FSAR Section 9.1.3.7.

License Condition

- Part 10, License Condition 12.B

The applicant proposed a license condition related to personnel training for reliable spent fuel pool level instrumentation to Part 10 of the COL application.

20.2.3 Regulatory Basis and Guidance

The regulatory basis for the staff review of mitigation strategies for beyond-design-basis external events is as follows:

- The Atomic Energy Act of 1954, as amended, Section 161, “General Provisions,” which authorizes the Commission to regulate the possession and use of special nuclear materials as necessary or desirable to protect public health and to promote the common defense and security.
- SRM-SECY-12-0025, which approves the issuance of orders for reliable SFP instrumentation under an administrative exemption to the Backfit Rule, 10 CFR 50.109, and the issue finality requirements in 10 CFR 52.63 and 10 CFR Part 52, Appendix D, Paragraph VIII.

The staff’s guidance for beyond-design-basis external event mitigation strategies is as follows:

- JLD-ISG-2012-03, Revision 0, “Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation,” issued August 29, 2012, endorses NEI 12-02, Revision 1, “Industry Guidance for Compliance with NRC Order EA-12-051, To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” with exceptions and clarifications.

20.2.4 Technical Evaluation

In light of the SECY-12-0025, the staff issued RAI 6434 requesting additional information in relation to the lessons learned from the Great Tohoku Earthquake and Tsunami. In RAI 6434, Question 01.05-3, the staff requested the applicant to:

- Provide sufficient reliable instrumentation, able to withstand design-basis natural phenomena, to monitor spent fuel pool water level, as described in Attachment 3 to Order EA-12-051.

In Commission Order EA-12-051, the Commission describes the key parameters used to determine that a level instrument is to be considered reliable. NEI 12-02, Appendix A4,

“AP1000 Spent Fuel Pool Instrumentation Guidance,” provides an AP1000-specific acceptable approach for satisfying the applicable requirements. In order to address the staff’s RAI, the applicant’s response references Westinghouse report APP-SFS-M3R-003, “Response to NRC Orders EA-12-051 and EA-12-063, and Background Information for Future Licensees on AP1000 Spent Fuel Pool Instrumentation,” Revision A, which discussed how the AP1000 SFP level instrument is designed to be reliable, following the guidance provided in NEI 12-02, Appendix A4. The applicant added supplemental information to Section 9.1.3.7 of the FSAR and created a new Part 10, License Condition 12.B.

Arrangement:

Commission Order EA-12-051, Attachment 2, Section 1.1 states that the spent fuel pool level instrument channels shall be arranged in a manner that provides reasonable protection of the level indication function against missiles that may result from damage to the structure over the spent fuel pool. This protection may be provided by locating the safety-related instruments to maintain instrument channel separation within the spent fuel pool area, and to utilize inherent shielding from missiles provided by existing recesses and corners in the spent fuel pool structure.

The applicant’s response states as follows: The AP1000 design has three safety-related SFP level instrument channels (AP1000 DCD Revision 19, Table 7.5-1 (Sheet 7 of 12)). All three channels and associated instrument tubing lines are located below the fuel handling area operating deck and the cask washdown pit as stated in the supplemental information added to Turkey Point Units 6 and 7 FSAR Section 9.1.3.7. This location provides level indication function protection from missiles that may result from damage to the structure over the spent fuel pool. In addition, the SFP level instruments associated with protection and safety monitoring system (PMS) Divisions A and C are physically separated from the SFP instrument associated with PMS Division B as stated in the supplemental information added to Turkey Point Units 6 and 7 FSAR Section 9.1.3.7.

The staff evaluated the instrument description provided in the DCD and the proposed supplemental information added to Turkey Point Units 6 and 7 FSAR Section 9.1.3.7.D and determined that the SFP level instrument will be arranged as described above (below the operating deck and cask washdown pit) in a manner that provides reasonable protection against missiles, and therefore, the staff concludes that these features are in conformance with Commission Order EA-12-051, and the guidance provided by JLD-ISG-2012-03.

The textual supplemental information found in FSAR Section 9.1.3.7 is complete, but is missing the left margin annotation (LMA) PTN SUP 9.1-1. The applicant has informed the staff that it will add the LMA notation in a future revision of the FSAR. This confirmatory item is identified as **Confirmatory Item 20.2-1**.

Resolution of Turkey Point Confirmatory Item 20.2-1

Confirmatory Item 20.2-1 is an applicant commitment to add a LMA notation in its FSAR Section 9.1.3.7. The staff verified that the Turkey Point Units 6 and 7 COL FSAR, Revision 8 was appropriately revised. As a result, Confirmatory Item 20.2-1 is now closed.

Qualification:

Commission Order EA-12-051, Attachment 2, Section 1.2 states that the level instrument channels shall be reliable at temperature, humidity, and radiation levels consistent with the spent fuel pool water at saturation conditions for an extended period.

The applicant's response states as follows: The three safety-related SFP level instruments are seismically qualified and are located below the fuel handling area operating deck (AP1000 DCD Revision 19, Section 9.1.3.4.3.4 and Table 7.5-1 (Sheet 7 of 12)).¹ The environment in these areas is mild with respect to safety-related equipment qualification and affords access for post-accident actions. Even though they are not directly exposed to SFP boiling, the instruments are qualified to function at the conditions (temperature, humidity, and radiation) that could be seen where these instruments are located, including those caused by SFP boiling. This provides assurance that the SFP level transmitters exposed to these environmental conditions will remain available and functional for an extended period.

The staff reviewed the applicant's response and concludes that since the SFP level transmitters are not located on the pool area, they are not required to be designed to handle the pool area conditions. However, they must be designed to remain operational under the worst expected conditions for the area in which they are located. The AP1000 DCD does state that the instruments are designed to remain functional at the expected local conditions; therefore, the staff concludes that these features are in conformance with Commission Order EA-12-051, and the guidance provided by JLD-ISG-2012-03.

Power Sources:

Commission Order EA-12-051, Attachment 2, Section 1.3 states that the instrumentation channels shall provide for power connections from sources independent of the plant alternating current (ac) and direct current (dc) power distribution systems, such as portable generators or replaceable batteries. Power supply designs should provide for quick and accessible connection of sources independent of the plant ac and dc power distribution systems. Onsite generators used as an alternate power source and replaceable batteries used for instrument channel power shall have sufficient capacity to maintain the level indication function until offsite resource availability is reasonably assured.

The applicant's response states as follows: The AP1000 SFP level instruments are provided with Class 1E DC power supply for at least 72 hours of post-accident monitoring. One of these safety-related instruments is powered through PMS Division A which contains a 24-hour battery supply. The safety-related SFP level instrument PMS divisions are described in the supplemental information (PTN SUP 9.1-1) added to Turkey Point Units 6 and 7 FSAR Section 9.1.3.7. A description of the AP1000 Class 1E DC and UPS system is contained in AP1000 DCD Revision 19, Section 8.3.2.1.1. Beyond the initial 72 hours, instrument power can be supplied by the use of onsite permanently installed ancillary diesel generators or offsite portable generators with quick and accessible connection points. Permanently installed onsite ancillary diesel generators are capable of providing power for Class 1E post-accident monitoring

¹ The RAI responses for this topic discuss a departure from the AP1000 DCD related to environmental zones for the level instruments. The departure is evaluated in FSER Section 3.11.4.

including SFP level instrumentation. This capability is described in Westinghouse AP1000 DCD Revision 19, Section 8.3.1.1.1. As described in Westinghouse AP1000 DCD Revision 19, Section 1.9.5.4, offsite portable generators are capable of being connected to distribution panels or to a safety-related connection.

As discussed in the applicant's response and as described in the AP1000 DCD, the safety related power distribution system has the capability of connecting to portable generators to power safety related distribution panels, which power the level instruments. These panels are Seismic Category I and designed to remain operational following a safe shutdown earthquake. Accordingly, the staff concludes that these design features are in conformance with Commission Order EA-12-051, and the guidance provided by JLD-ISG-2012-03.

Accuracy:

Commission Order EA-12-051, Attachment 2, Section 1.4 states that the instrument shall maintain its designed accuracy following a power interruption or change in power source without recalibration.

The applicant's response states as follows: The measured range of the SFP level by the safety-related instruments is from the top of the SFP to the top of the fuel racks, the level instruments are calibrated at a reference temperature suitable for normal SFP operation and will read conservatively at elevated temperatures, including during boiling conditions. These instruments are calibrated on a regular basis and their accuracy is not affected by power interruptions. All these design features are described in the supplemental information (PTN SUP 9.1-1) added to Turkey Point Units 6 and 7 FSAR Section 9.1.3.7.

Because the instruments are designed to remain within calibration upon a loss of power, the staff concludes that these design features are in conformance with Commission Order EA-12-051, and the guidance provided by JLD-ISG-2012-03.

Display:

Commission Order EA-12-051, Attachment 2, Section 1.5 states that the display shall provide on-demand or continuous indication of spent fuel pool water level.

The applicant's response states as follows: The safety-related SFP level sensors provide continuous indication of the SFP level to the main control room as well as the Remote Shutdown Workstation and are included in the Qualified Data Processing System PMS display as indicated in Westinghouse AP1000 DCD Revision 19, Table 7.5-1 (Sheet 7 of 12). Safety-related instrumentation gives an alarm in the main control room when the water level in the SFP reaches the low-low-level setpoint as stated in AP1000 DCD Revision 19, Section 9.1.3.7.D.

Based on the system description provided above, the staff concludes that these design features are in conformance with Commission Order EA-12-051, and the guidance provided by JLD-ISG-2012-03.

License Condition

Commission Order EA-12-051, Attachment 2, Section 2 states that the spent fuel pool instrumentation shall be maintained available and reliable through appropriate development and implementation of a training program. Personnel shall be trained in the use and the provision of alternate power to the safety-related level instrument channels.

The applicant's COLA Part 10 includes License Condition 12.B, which requires the development and implementation of a training program in accordance with the guidance contained in JLD-ISG-2012-03.

The applicant's proposed license condition states:

B. RELIABLE SPENT FUEL POOL LEVEL INSTRUMENTATION

Prior to initial fuel load, the licensee shall fully implement the following requirements for spent fuel pool level indication using the guidance contained in JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, Revision 0.

- The spent fuel pool instrumentation shall be maintained available and reliable through the development and implementation of a training program. The training program shall include provisions to ensure trained personnel can route the temporary power lines from the alternate power source to the appropriate connection points and connect the alternate power source to the safety-related level instrument channels.

The proposed license condition is consistent with the guidance provided in JLD-ISG-2012-03, and will ensure that the operators will be properly trained in the adequate equipment maintenance procedures and the proper operational procedures in order to establish the necessary alternate power connections. Accordingly, the staff concludes that the proposed license condition is acceptable because the development and implementation of a training program is consistent with Commission Order EA-12-051 and the guidance provided by JLD-ISG-2012-03.

20.2.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff proposes to include the following license condition related to development and implementation of a training program:

- License Condition (20-2) – Reliable Spent Fuel Pool Level Instrumentation

Prior to initial fuel load, the Licensee shall address the following requirements using the guidance contained in JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, Revision 0:

The spent fuel pool instrumentation shall be maintained available and reliable through the development and implementation of a training program. The training program shall include provisions to ensure trained personnel can route the temporary power lines from

the alternate power source to the appropriate connection points, and connect the alternate power source to the safety-related level instrument channels.

20.2.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff finds that the application includes all the information relevant to SFP instrument reliability. No outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR.

The staff evaluated the applicant's and the AP1000 design description of the SFP water level instrument and determined that the instruments are in accordance with the guidance provided in JLD-ISG-2012-03. Therefore, the staff concludes that the applicant's SFP level instruments are reliable, and able to withstand design-basis natural phenomena and monitor key SFP level parameters as described in Commission Order EA-12-051. In addition, the staff concludes that the information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it conforms to the guidance provided in JLD-ISG-2012-03. The staff based its conclusions on the following:

- PTN SUP 9.1-1 is acceptable because, when combined with the information in Table 7.5-1 and Sections 8.3.1.1.1 and 9.1.3.7.D of the AP1000 DCD, it includes provisions for SFP instrumentation arrangement, qualification, power sources, accuracy and display that are consistent with the requirements described in SECY-12-0025 and Commission Order EA-12-051.
- The proposed license condition is acceptable because it provides that, prior to fuel load, the licensee will have in place procedures for the proper maintenance of the level instruments and for the connection and use of an alternate power source in order to power the level instruments.

20.3 Emergency Preparedness (Based on Recommendation 9.3)

20.3.1 Introduction

The accident at Fukushima reinforced the need for effective emergency preparedness, the objective of which is to ensure the capability exists for a licensee to implement measures that mitigate the consequences of a radiological emergency and provide for protective actions of the public. The accident at Fukushima highlighted the need to determine and implement the required staff to fill all necessary positions of the emergency organization responding to a multi-unit event with impeded access to the site. Additionally, there is a need to ensure that the communication equipment relied on has adequate power to coordinate the response to an event during an extended loss of ac power. An application for a COL must describe these matters.

20.3.2 Summary of Application

In Revision 8 of the Turkey Point Units 6 and 7 COL application, Part 10, the applicant proposed License Condition 12.C, related to emergency preparedness communications and staffing, to address Fukushima NTTF Recommendation 9.3.

20.3.3 Regulatory Basis

The requirements for EP for beyond-design-basis external events are established or described in the following:

- 10 CFR 50.47(b)(1) states, in part, that each principal response organization has staff to respond and to augment its initial response on a continuous basis.
- 10 CFR 50.47(b)(2) states, in part, that adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, and timely augmentation of response capabilities is available.
- 10 CFR 50.47(b)(6) states that provisions exist for prompt communications among principal response organizations to emergency personnel and to the public.
- 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," Section IV. E. 9, states, in part, that adequate provisions shall be made and described for emergency facilities and equipment, including at least one onsite and one offsite communications system, and that each system shall have a backup power source.

The guidance for EP for beyond-design-basis external events are established or described in the following:

- SECY-12-0025 states, in part, that the staff will also request all COL applicants to provide the information required by the orders and request for information letters described in this paper, as applicable, through the review process.
- NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," Revision 0, May 4, 2012 (ADAMS Accession No. ML12125A412).
- NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Section B, "Onsite Emergency Organization," states, in part, the following:
 5. Each licensee shall specify the positions or title and major tasks to be performed by the persons to be assigned to the functional areas of emergency activity. These assignments shall cover the emergency functions in Table B-1 entitled, "Minimum Staffing Requirements for Nuclear Power Plant Emergencies." The minimum on-shift staffing levels shall be as indicated in Table B-1. The licensee must be able to augment on-shift capabilities within a short period after declaration of an emergency. This capability shall be as indicated in Table B-1.

- NUREG-0696, "Functional Criteria for Emergency Response Facilities," offers guidance on how to meet the requirements of 10 CFR Part 50, Appendix E, and describes the onsite and offsite communications requirements for the licensee's emergency response facilities.

20.3.4 Technical Evaluation

The NRC issued RAI 6434, dated May 1, 2012 to the applicant, concerning implementation of the Fukushima NTTF Recommendation 9.3 in the combined license application for Turkey Point Units 6 and 7. In response, the applicant proposed a license condition in the Turkey Point Units 6 and 7 COL application, to address the 10 CFR 50.54(f) request for information letters sent to existing licensees regarding communications and staffing for NTTF Recommendation 9.3. This license condition was subsequently revised in the license application. As part of its proposed license condition, the applicant committed to perform assessments for NTTF Recommendation 9.3 using NEI 12-01, Revision 0. By letter from the NRC to NEI dated May 15, 2012, the NRC stated that the guidance in NEI 12-01, Revision 0, provides an acceptable method for licensees to employ when responding to the 10 CFR 50.54(f) letters regarding NTTF Recommendation 9.3. The applicant proposed the license condition on communications and staffing in License Condition 12.C in Part 10 of the Turkey Point Units 6 and 7 COL application. The staff reviewed the applicant's submitted information and documented its evaluation and conclusions involving the staffing levels and communications in Sections 13.3.4.2 and 13.3.4.6, respectively, of this SER.

20.3.5 Post Combined License Activities

Post-combined license activities consist of two staff-proposed license conditions to address NTTF Recommendation 9.3, which are provided in Section 13.3.4.2 of this SER.

20.3.6 Conclusion

The staff's conclusions regarding how the applicant addressed NTTF Recommendation 9.3 is provided in Section 13.3.4.2 of this SER.

21.0 DESIGN CHANGES PROPOSED IN ACCORDANCE WITH ISG-11

This safety evaluation report (SER) chapter contains the staff's evaluations of five requests from the Turkey Point Units 6 and 7 combined license (COL) applicant to depart from the AP1000 certified design referenced in the COL application. The applicant made the requests subsequent to determining that the departures in its COL application involved changes to the application that did not meet the criteria for post-COL deferral identified in Interim Staff Guidance DC/COL-ISG-011, "Finalizing Licensing-Basis Information." The five requests include six departures from the AP1000 certified design. Because each of the requests contains changes to the AP1000 Tier 1 information or technical specifications (TS), exemptions are required, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, Appendix D, Section VIII, in order for the staff to find the departures acceptable. The applicant included exemption requests in its application, and the staff review of each request also appears in this chapter as part of each technical evaluation. The requests address the following five aspects of the AP1000 certified design:

- Passive core cooling system containment condensate return
- Main control room (MCR) dose
- MCR Heatup
- Hydrogen Vent Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)
- Neutron Flux Logic Operating Bypass

The staff evaluated each of the departures for impact on the Turkey Point Units 6 and 7 plant-specific probabilistic risk assessment (PRA). None of them have any impact on the quantification of core damage frequency or large release frequency. Only one (the departure relating to the passive core cooling system containment condensate return) resulted in a revision to any PRA-based insight. As discussed in Section 21.1.4 of this SER, this clarification did not alter any staff finding related to AP1000 design certification. The staff finds that the cumulative risk impact of these design changes and departures is acceptable.

For the staff's evaluations of the applicant's five exemption requests to depart from the AP1000 certified design, the staff applied the design centered review approach discussed in Section 1.2.3 of this SER. Under this approach, the staff performed a single review where multiple COL applicants submitted identical information. In this case, the reference COL is the Levy Nuclear Plant (LNP) Units 1 and 2, and the Turkey Point Units 6 and 7 COL is a subsequent COL.

21.1 Passive Core Cooling System Containment Condensate Return

21.1.1 Introduction

General Design Criteria (GDC) 34 of Appendix A to 10 CFR Part 50, requires that nuclear power plant designs have a system capable of removing residual heat, such that the decay heat does not exceed design limits for the fuel and pressure boundary. Inherent in this requirement is the need to bring the plant to a safe, stable condition following an anticipated transient. The AP1000 design accomplishes this function via the passive core cooling system (PXS). The PXS is designed to perform the following safety-related functions:

- emergency core decay heat removal
- reactor coolant system (RCS) emergency makeup and boration
- safety injection

- containment sump pH control

In order to support long term decay heat removal in a closed loop configuration, the AP1000 passive core cooling system must achieve a sufficient condensate return rate such that inventory in the in-containment refueling water storage tank (IRWST) is maintained in order to retain the heat transfer capability of the passive residual heat removal (PRHR) heat exchanger (HX). Water is steamed from the IRWST during transients that require the PRHR HX to remove decay heat from the RCS. The steam that reaches the containment shell condenses and returns to the IRWST through a gutter system. PTN DEP 3.2-1, a departure from the AP1000 design control document (DCD) requested by the applicant and reviewed below, proposes design changes to increase the fraction of condensate return to the IRWST and quantifies the condensate losses associated with the pressurization of the containment atmosphere, condensation on heat sinks within the containment, and from dripping or splashing from structures and components attached to the containment shell. PTN DEP 6.3-1, another departure reviewed below, makes further changes to the final safety analysis report (FSAR) supporting the design change proposed in PTN DEP 3.2-1.

21.1.2 Summary of Application

Florida Power and Light (FPL) incorporated in Turkey Point Units 6 and 7 COL application, Revision 8, dated August 26, 2016 (Agencywide Documents and Access Management System (ADAMS) Accession No. ML16251A127), the same information that Duke Energy Florida (DEF) incorporated into the LNP COL application related to the voluntary submittal of an exemption request and design change description for departure from the AP1000 DCD to address containment condensate cooling design. The information was originally submitted in endorsement and exemption request letter dated May 9, 2016 (ADAMS Accession No. ML16132A293).

Tier 1 and Tier 2 Departures

The applicant proposed the following Tier 1 and Tier 2 departures from the AP1000 DCD:

- PTN DEP 3.2-1 and PTN DEP 6.3-1

In PTN DEP 3.2-1, the applicant included a departure from Tier 1 and Tier 2 DCD information related to design changes of the containment condensate return system used to direct water that has condensed on the containment shell to the IRWST during accident scenarios. The proposed Tier 2 departure includes changes to FSAR Chapters 3, 5, 6, 7, 14, 15, and 19 as well as the TS and corresponding bases appearing in Part 4 of the COL application. In addition, the applicant requested an exemption from the incorporation by reference of AP1000 DCD Tier 1 information, specifically Tier 1 Subsection 2.2.3, Tables 2.2.3-1 and 2.2.3-2. The exemption request proposes to revise the list of components in these tables to include additional components of the containment condensate return cooling system of the PXS.

In PTN DEP 6.3-1, the applicant proposed changes to FSAR Chapters 5, 6, 7, 9, 15, and 19 to address a departure related to quantifying the duration that the PRHR HX can maintain safe shutdown conditions, changing the description of the duration from indefinite to at least 14 days.

This exemption request involves a departure from Tier 1 Section 2.2.3, Tables 2.2.3-1 and 2.2.3-2, with Tier 2 involved departures. Therefore, these departures require NRC approval and are evaluated below.

21.1.3 Regulatory Basis

The changes proposed in PTN DEP 3.2-1 and PTN DEP 6.3.1 are required to meet the following GDC, which applies to the AP1000 DCD:

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, GDC 34, "Residual heat removal," as it applies to the capability of the PRHR HX to perform safety related safe shutdown cooling of the RCS. Additionally, PTN DEP 3.2-1 and PTN DEP 6.3.1 are required to meet GDC 44, "Cooling water," as it applies to the ability of the containment systems to transfer heat from the PRHR HX to the ultimate heat sink via the passive containment cooling system.

21.1.4 Technical Evaluation

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the design certification (DC) and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (LNP Units 1 and 2) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the LNP COL FSAR, Revision 9 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

Tier 1 and Tier 2 Departures

- PTN DEP 3.2-1 and PTN DEP 6.3-1

The following portion of this technical evaluation section is reproduced from Section 21.1.4 of the LNP COL application FSR.

- *LNP DEP 3.2-1 and LNP DEP 6.3-1*

LNP DEP 3.2-1 proposes to change the PXS to increase the fraction of condensate returning to the IRWST when there is steam in the containment building. This change creates intermediate gutters at the top and bottom of the polar crane girder and at the containment shell intermediate ring stiffener. It blocks drain holes that were in these structures and adds dams where needed to collect condensate. It adds downspouts from these gutters to the IRWST. It also modifies the gutter drip lip so that condensate is not lost between the containment wall and the gutter. Condensate that is “lost” does not return to the IRWST, and instead drips off of the shell into various containment holdup volumes, such as the loop compartments or reactor vessel cavity.

LNP DEP 6.3-1 proposes additional changes to the FSAR in conjunction with the design changes described in LNP DEP 3.2-1 to clarify the duration of operation of the PRHR HX and separate the description of the safety functions from the non-safety design function of the PXS.

The staff reviewed a request for an exemption submitted by the applicant. The request proposed changes to Tier 1 Tables 2.2.3-1 and 2.2.3-2 and generic TS Surveillance Requirement (SR) 3.5.4.7 in the AP1000 DCD. Additionally, the staff reviewed the Tier 2 changes for potential effects on safety functions of the PXS and the associated Chapter 15 safety analyses, the safe-shutdown temperature evaluation in Chapter 19E, the seismic classification in Chapter 3, and the TS and Bases in Chapter 16. The regulatory evaluation of the exemption request appears in Subsection A, below, and the technical evaluation of the exemption request and departure appears in Subsection B, below.

A. Regulatory Evaluation of Exemption Request

A.1 Summary of Exemption

The applicant requested an exemption from the provisions of 10 CFR Part 52, Appendix D, Section III.B, “Design Certification Rule for the AP1000 Design, Scope and Contents,” that require the applicant referencing a certified design to incorporate by reference Tier 1 information. Specifically, the applicant proposed to revise Tier 1 Tables 2.2.3-1 and 2.2.3-2 by adding components to the condensate return design to enable the PXS to more effectively perform its design functions and revised TS SR 3.5.4.7 to address downspout screens.¹

A.2 Regulations

- 10 CFR Part 52, Appendix D, Section VIII.A.4 states that exemptions from Tier 1 information are governed by the requirements of 10 CFR 52.63(b) and 10 CFR 52.98(f). It also states that the Commission may deny such a request if the design change causes a significant reduction in plant safety otherwise provided by the design. This subsection of Appendix D also provides that a*

¹ While the applicant describes the requested exemption as being from Section III.B of 10 CFR Part 52, Appendix D, the entirety of the exemption pertains to proposed departures from Tier 1 information and generic TS in the generic DCD. In the remainder of this evaluation, the NRC will refer to the exemption as an exemption from Tier 1 information and generic TS to match the language of Sections VIII.A.4 and VIII.C.4 of 10 CFR Part 52, Appendix D, which specifically govern the granting of exemptions from Tier 1 information and generic TS.

design change requiring a Tier 1 change shall not result in a significant decrease in the level of safety otherwise provided by the design.

- *10 CFR Part 52, Appendix D, Section VIII.C.4 states that an applicant may request an exemption from the generic TS or other operational requirements. The Commission may grant such a request only if it determines that the exemption will comply with the requirements of 10 CFR 52.7.*
- *10 CFR 52.63(b)(1) allows an applicant or licensee to request NRC approval for an exemption from one or more elements of the certification information. The Commission may only grant such a request if it complies with the requirements of 10 CFR 52.7 which in turn points to the requirements listed in 10 CFR 50.12 for specific exemptions, and if the special circumstances present outweigh the potential decrease in safety due to reduced standardization. Therefore, any exemption from the Tier 1 information certified by Appendix D to 10 CFR Part 52 must meet the requirements of 10 CFR 50.12, 52.7, and 52.63(b)(1).*

A.3 Evaluation of Exemption

As stated in Section VIII.A.4 of Appendix D to 10 CFR Part 52, an exemption from Tier 1 information is governed by the requirements of 10 CFR 52.63(b)(1) and 52.98(f). Additionally, the Commission will deny an exemption request if it finds that the requested change to Tier 1 information will result in a significant decrease in safety. Pursuant to 10 CFR 52.63(b)(1), the Commission may, upon application by an applicant or licensee referencing a certified design, grant exemptions from one or more elements of the certification information, so long as the criteria given in 10 CFR 50.12 are met and the special circumstances as defined by 10 CFR 50.12 outweigh any potential decrease in safety due to reduced standardization.

As stated in Section VIII.C.4 of Appendix D to 10 CFR Part 52, the Commission may grant an exemption from generic TS of the DCD only if it determines that the exemption will comply with the requirements of 10 CFR 52.7. As stated above, Section 52.7 points to 10 CFR 50.12 for specific exemptions.

Applicable criteria for when the Commission may grant the requested specific exemption are provided in 10 CFR 50.12(a)(1) and (a)(2). Section 50.12(a)(1) provides that the requested exemption must be authorized by law, not present an undue risk to the public health and safety, and be consistent with the common defense and security. The provisions of 10 CFR 50.12(a)(2) list six special circumstances for which an exemption may be granted. It is necessary for one of these special circumstances to be present in order for NRC to consider granting an exemption request. The applicant stated that the requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subsection defines special circumstances as when "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule." The staff's analysis of each of these findings is presented below.

A.3.1 Authorized by Law

This exemption would allow the applicant to implement approved changes to Tier 1 Tables 2.2.3-1 and 2.2.3-2 and generic TS SR 3.5.4.7. This is a permanent exemption limited in scope to particular Tier 1 information and generic TS, and subsequent changes to this information or any other Tier 1 information or generic TS would be subject to full compliance with the change processes specified in Sections VIII.A.4 and VIII.C.4 of Appendix D to 10 CFR Part 52. As stated above, 10 CFR 52.63(b)(1) allows the NRC to grant exemptions from one or more elements of the certification information, namely, as discussed in this exemption evaluation, the requirements of Tier 1. Moreover, Section VIII.C.4 allows the NRC to grant exemptions from generic TS if the exemption meets the requirements of 10 CFR 52.7 and 50.12. The NRC staff has determined that granting of the applicant's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, as required by 10 CFR 50.12(a)(1), the exemption is authorized by law.

A.3.2 No Undue Risk to Public Health and Safety

The underlying purpose of AP1000 Tier 1 Tables 2.2.3-1 and 2.2.3-2 and generic TS SR 3.5.4.7 is to ensure that the plant will be constructed and operated with a safe and reliable condensate return system in the event of an accident.

Additions to the condensate return portion of the passive core cooling system improve the reliability and effectiveness of the condensate return system; these additions to the system, therefore, support the system's intended design functions. The plant-specific Tier 1 DCD and TS will continue to reflect the approved licensing basis for the applicant and will maintain a level of detail consistent with that which is provided elsewhere in Tier 1 of the plant-specific DCD. The affected design description in the plant-specific Tier 1 DCD provides the detail to support the performance of the associated ITAAC. The proposed changes to Tier 1 information and generic TS are evaluated and found to be acceptable in Section 6.3 of this safety evaluation. Therefore, the staff finds the exemption presents no undue risk to public health and safety as required by 10 CFR 50.12(a)(1).

A.3.3 Consistent with Common Defense and Security

The proposed exemption would allow the applicant to implement modifications to the Tier 1 information and generic TS requested in the applicant's submittal. This is a permanent exemption limited in scope to particular Tier 1 information and a specific TS. Subsequent changes to this information or any other Tier 1 information or generic TS would be subject to full compliance with the change processes specified in Sections VIII.A.4 and VIII.C.4 of Appendix D to 10 CFR Part 52. This change is not related to security issues. Therefore, as required by 10 CFR 50.12(a)(1), the staff finds that the exemption is consistent with the common defense and security.

A.3.4 Special Circumstances

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever application of the regulation in the particular circumstances would not serve the underlying purposes of the rule or is not necessary to achieve the underlying purpose of the rule. The underlying purpose of the specific Tier 1 Tables 2.2.3-1 and 2.2.3-2 and TS SR 3.5.4.7 being modified in the exemption request is to identify and conduct surveillances of the components that will be added to the design of the condensate return portion of the passive core cooling system. The additional components and new surveillance requirements for those components are needed so that the passive core cooling system can perform its intended function, that is, to bring the reactor coolant system to safe shutdown conditions during certain non-loss-of-coolant-accident events.

Application of the requirements in Tier 1 Tables 2.2.3-1 and 2.2.3-2 and generic TS SR 3.5.4.7 is not necessary to achieve the underlying purpose of those portions of the rule. The proposed additions to the condensate return portion of the passive core cooling system support the system's intended design functions, as does the addition of a generic TS to conduct surveillances of those additional components. The system and tables listing its components and surveillances, as modified in the requested exemption, will continue to perform their intended functions and will, therefore, meet the underlying purposes of the rule. Accordingly, because application of the requirements in Tier 1 Tables 2.2.3-1 and 2.2.3-2 and the generic TS SR 3.5.4.7 is not necessary to achieve the underlying purpose of the rule, special circumstances are present. Therefore, the staff finds that special circumstances exist as required by 10 CFR 50.12(a)(2)(ii) for the granting of an exemption from the Tier 1 information and generic TS described above.

A.3.5 Special Circumstances Outweigh Reduced Standardization

This exemption, if granted, would allow the applicant to change certain Tier 1 information incorporated by reference from the AP1000 DCD into the LNP COL application. An exemption from Tier 1 information may only be granted if the special circumstances of the exemption request, required to be present under 10 CFR 52.7 and 10 CFR 50.12, outweigh any reduction in standardization. The proposed exemption would modify the condensate return portion of the passive core cooling system to improve the reliability and effectiveness of the condensate return system. The proposed additions to the system support the system's intended design functions and the key design functions of the passive core cooling system will be maintained.²

As described below in the technical evaluation, the changes to the condensate return system (1) ensure the capability of the PRHR HX to maintain the RCS in a safe, stable condition, as described in DCD Chapter 19E, "Shutdown Temperature Evaluation," and (2) demonstrate the existing non-loss-of-coolant accident (LOCA)

² Based on the nature of the proposed changes to the generic Tier 1 information in Tables 2.2.3-1 and 2.2.3-2 and TS SR 3.5.4.7, both of which maintain and support the design functions of the passive core cooling system, other AP1000 licensees and applicants may request the same exemption, preserving the intended level of standardization.

analyses in Chapter 15 that credit the PRHR HX remain valid. Consequently, while there is a small possibility that standardization may be slightly reduced by the granting the exemption from the specified Tier 1 requirements, the proposed exemption modifying the condensate return portion of the passive core cooling system will improve the reliability and effectiveness of the condensate return system, to better allow the system to perform its intended function. For this reason, the staff determined that even if other AP1000 licensees and applicants do not request similar departures, the special circumstances supporting this exemption outweigh the potential decrease in safety due to reduced standardization of the AP1000 design, as required by 10 CFR 52.63(b)(1).

A.3.6 No Significant Reduction in Safety

The proposed exemption would modify the passive core cooling system from the design presented in the original application. As described below in the technical evaluation, the changes to the condensate return system (1) ensure the capability of the PRHR HX to maintain the RCS in a safe, stable condition, as described in DCD Chapter 19E, "Shutdown Temperature Evaluation," and (2) demonstrate the existing non-LOCA analyses in Chapter 15 that credit the PRHR HX remain valid. The proposed changes to the PXS design will increase the reliability of the system, maintain its key design functions, and will not adversely affect its function. Therefore, the staff finds that granting the exemption would not result in a significant decrease in the level of safety otherwise provided by the design, as required by 10 CFR Part 52, Appendix D, Section VIII.A.4.

A.4 Conclusion

The staff has determined that pursuant to Section VIII.A.4 of Appendix D to 10 CFR Part 52, the exemption: (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, (4) has special circumstances that outweigh the potential decrease in safety due to reduced standardization, and (5) does not significantly reduce the level of safety at the licensee's facility. The staff has also determined, pursuant to Section VIII.C.4 of Appendix D to 10 CFR Part 52, that the generic TS portion of the exemption request: (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, (4) demonstrates the existence of special circumstances. Therefore, the staff grants the applicant an exemption from the requirements of Tier 1 Tables 2.2.3-1 and 2.2.3-2 and generic TS SR 3.5.4.7 of the generic DCD associated with the LNP Units 1 and 2.

B. Technical Evaluation of Exemption Request and Departure

B.1 Passive Core Cooling System, Accident Analysis, and Shutdown Temperature Evaluation

Letter NPD-NRC-2014-005, submitted by the applicant and dated February 7, 2014, requested the previously described departures from 10 CFR Part 52, Appendix D, Section III.B. A revised submittal, letter NPD-NRC-2015-015, dated May 5, 2015, included two supporting reports as Enclosures 2 and 3: APP-GW-GLR-161, Revision 2 (proprietary) and APP-GW-GLR-607, Revision 2

(non-proprietary), respectively, both titled “Changes to Passive Core Cooling System Condensate Return.” These reports describe the change and the basis for the change. In addition, APP-GW-GLR-161 and APP-GW-GLR-607 references three calculations and a test report further described below. Enclosure 6 provides the applicant’s request for exemption related to this topic. Enclosures 7 and 8 present, respectively, changes to AP1000 DCD Revision 19 and the LNP COLA information that will be included in a future revision to the COLA. Letter NPD-NRC-2014-005 and its enclosures are the subject of the following review by the staff.

The applicant indicated that the changes described in LNP DEP 3.2-1 are necessary to (1) ensure the capability of the PRHR HX to maintain the RCS in a safe, stable condition, as described in DCD Chapter 19E, “Shutdown Temperature Evaluation,” and (2) to demonstrate the existing non-LOCA analyses in Chapter 15 that credit the PRHR HX remain valid. The safe shutdown temperature evaluation, presented in DCD Chapter 19E Revision 19, assumes a constant condensate return fraction (the fraction of the water boiled off from the IRWST that will condense on the containment shell and return to the IRWST). Water that does not return to the IRWST can be referred to as condensate losses. The NRC staff understands that the applicant’s analyses showed there are a number of mechanisms for condensate losses that vary with time including: steam to pressurize the containment atmosphere, condensation on passive heat sinks within the containment, and condensate splashing from the containment vessel and its attachments that does not reach to the PXS gutter system. The NRC staff’s review of this departure request indicates some of these losses, such as the steam to pressurize the atmosphere, initially account for the majority of the condensation losses but decrease as the transient progresses, while other losses, such as the splashing from the attachments to the shell, are relatively time-independent and only a function of the amount of condensation on the shell. Condensate return is one of the primary factors influencing the performance of the PRHR HX.

Section 5.0, “Design Changes,” of APP-GW-GLR-607 and APP-GW-GLR-161 detail the changes proposed by the applicant for increasing the condensate return rate. Subsection 1 describes the PXS downspout piping network added at the polar crane girder and stiffener, the routing for which is shown in the revised Figure 6.3-1 of the FSAR. Four collection points are located on both the upper portion and the lower flange of the polar crane girder and the stiffener ring that are routed to common lines that empty into two collection points already existing on either side of the IRWST. These downspouts, collection points and connecting piping serve to capture condensate that previously would have been lost, and are sized such that any one line can accommodate the full flow anticipated during a transient to prevent a single failure from impacting the return flow to the IRWST. Subsection 2 describes the screens added to the downspouts and new guttering that is similar to screens existing on the IRWST gutter. These screens are designed to keep larger debris from blocking piping while still allowing condensate flow. The seismic qualifications of the downspouts and screens are further discussed later in this section. Subsection 3 explains how fabrication holes are blocked in the polar crane girder and the stiffener. Subsection 4 details the dam added to the polar crane girder to alleviate flow interactions between the containment shell and polar crane girder that contributed to losses. Furthermore,

changes to the gutter drip lip and gutter routing were made to reduce losses from the gutter-wall interaction as much as possible. The effect of these changes on the transient analysis is described in detail below.

The design changes, which are intended to reduce the condensate losses, prompted review of the analyses associated with transients that rely on condensate return. The effectiveness of the condensate return to the IRWST is captured in a series of proprietary calculations supporting the submittal, which were audited by the staff (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML14219A200 and ML15187A248) and are described in Section A.2 of APP-GW-GL-161 and APP-GW-GLR-607. The containment response is analyzed in calculation APP-PXS-M3C-071, "Containment Response Analysis for the Long Term PRHR Operation," via modifying the NRC-approved AP1000 WGOTHIC model used for containment peak pressure calculation that is part of the licensing basis, and provides transient containment pressure, temperature, and condensate holdup volumes input to the other calculations. Condensate losses implemented in WGOTHIC are obtained from a second calculation, APP-PXS-M3C-072, "Condensate Return to IRWST for Long Term PRHR Operation," which uses the parameters from WGOTHIC in concert with test results to provide a bounding condensate loss fraction from the containment shell. The test data used to calculate the losses are summarized in Section 4 of APP-GW-GL-161 and APP-GW-GLR-607 and described in detail in report TR-SEE-III-12-01, "AP1000 Condensate Return Test Report." A further calculation, APP-SSAR-GSC-536, "AP1000 Safe Shutdown Temperature Evaluation," incorporated the containment parameters and condensate behavior from the WGOTHIC analysis into LOFTRAN to calculate the behavior of the RCS and PRHR heat exchanger. This calculation was performed both for a 72-hour design basis case to verify that the assertions in Chapter 6 of the FSAR remain valid for all FSAR Chapter 15 events reliant on the PRHR, and for the 36-hour cooldown case depicted in Chapter 19 of the FSAR. A further calculation, APP-SSAR-GSC-009, "AP1000 Plant Safe Shutdown Duration Evaluation," justifies the duration of extended operation to 14 days using a LOFTRAN analysis. Further discussion of the analyses is located below in the "Evaluation of Containment Response," "Safety Design Bases," and "Non-Safety Design Bases" subsections of this SER section.

B.1.1 Evaluation of Containment Response

Although the staff audited the calculations referenced in the February 7, 2014 submittal by the applicant (ADAMS Accession Nos. ML14219A200 and ML15187A248), the submittal did not contain sufficient information for the staff to make a safety finding based on the docketed information, and thus the staff issued RAI 7439 in a letter dated March 6, 2014, asking the applicant to summarize the containment response calculation and its relationship with the other calculations. In its response dated May 5, 2014, the applicant provided a summary to address the impact of the cited calculation on the changes in LNP DEP 3.2-1. The staff requested in RAI 7439, Question 6.03-1, that the applicant provide additional detail on the results described in "Containment Response Analysis for the Long Term PRHR Operation" (ADAMS Accession Nos. ML14077A609 and ML14126A702), which describes the WGOTHIC model used to calculate the containment pressure and temperature as well as the steaming

rate from the IRWST to the containment atmosphere, heat sinks and the containment shell, to address the technical merits of the changes in LNP DEP 3.2-1. The staff reviewed this response and finds it acceptable, as it provides an accurate summary of the analysis explaining how the containment response calculation relates to other calculations, inputs, and key results with sufficient information for the staff to make its finding.

Operation of the PRHR HX is affected by the amount of condensate returned to the IRWST. Therefore, in order to bound all events that credit the PRHR HX, the staff considered events requiring operation of the PRHR HX. The applicant identified the loss of normal feedwater coincident with a loss of alternating current (ac) power to the plant auxiliaries as the most limiting transient. The discussion below analyzes this scenario, and the justification for the loss of ac power as the most limiting transient is provided below in the "Safety Design Basis" subsection of this SER.

Using WGOTHIC, the applicant modeled the containment behavior during a transient involving the actuation of the PRHR by modifying the containment model used for the peak pressure calculation such that it conservatively captured the phenomena that would challenge the performance of the PRHR HX. This was accomplished by modifying the existing peak pressure calculation model in the following ways: increasing the area of the passive heat sinks as modeled by applying a multiplying factor, creating a volume to capture the condensate losses on the shell, adding a flow path to account for containment leakage, changing the IRWST (including a structure simulating PRHR heat exchanger using boundary conditions from LOFTRAN) to better represent the conditions during a non-LOCA transient, and adding a heat structure in the cavity to represent the vessel, among other minor changes. The net effect of these changes is to minimize the condensation rate on the containment inner shell, maximize the amount of steam and condensate that does not return to the IRWST—such as on passive heat sinks in containment and in the containment atmosphere—and maximize the amount of heat input to the IRWST, all of which are conservatisms for the non-LOCA transients that challenge the PRHR HX.

The addition of the heat structure to represent the reactor vessel in the reactor cavity, although used appropriately to capture a physical phenomenon present in the problem, is not the most conservative modeling choice with respect to the calculation of condensate return. Most condensate that is lost from the containment shell eventually reaches the reactor cavity. This water fills the cavity to the point that it reaches the vessel and begins steaming. The vessel is surrounded by metallic insulation material designed to admit water through gaps and release the resultant steam through larger gaps between the insulation and the vessel. Although steaming from the reactor vessel cavity has competing effects on the system performance, as it both cools the reactor vessel and results in additional mixing below the operating deck, it does result in a larger net condensate return fraction to the IRWST. The applicant explored mechanisms that stimulate mixing within containment, but the precise extent of the mixing beneath the operating deck is not fully defined. The applicant states that additional mixing below the operating deck results in more condensate holdup on passive heat sinks, but also that in the long term steaming from the reactor vessel results in additional inventory return to the IRWST.

The analysis in WGOTHIC accounts for the heat removal from the reactor vessel by subtracting it from heat that would be removed by the PRHR HX so that the energy balance is maintained. Temperature data from LOFTRAN is extracted and input into one boundary of the WGOTHIC vessel, while the other boundary exposed to the control volume uses a boiling correlation. The amount of heat removed by the boiling from the vessel is stored and subtracted from the PRHR HX heat input. Due to the nature of the modeling of the heat structure in the cavity in WGOTHIC, the entirety of the structure participates in heat transfer to the fluid in the reactor cavity. To mitigate against the effects of this, the applicant subtracted the volume in the cavity underneath the vessel and added it to the reactor coolant drain tank room so as to increase the holdup volume that must fill prior to condensate reaching the reactor vessel. This still results in additional boiling from the condensate that reaches the reactor vessel, as a larger area available (at least until the water would have reached the top of the bottom head) results in higher heat transfer. Conversely, in the very long term, the WGOTHIC model does not consider additional area that would participate as the water in the cavity rises above the lower head of the reactor vessel. In "Containment Response Analysis for the Long Term PRHR Operation," the applicant documents a sensitivity study that explores the effect on IRWST level of no condensate return resulting from reactor vessel steaming. The analysis shows that IRWST level is reduced by as much as 7 inches in the 72-hour period following the transient as a result of not accounting for reactor vessel steaming. This reduction in IRWST inventory does not appreciably impact system performance during the first 72 hours and would not challenge the operability of the system until much later in the transient. The staff performed a confirmatory analysis on the effect of the lower condensate return rate using LOFTRAN, which showed the lack of steaming from the reactor vessel would have less impact than was calculated by the applicant in their sensitivity study. In addition, the staff confirmatory calculation in MELCOR documented below tracks level along the reactor vessel heat structure and uses a conservatively high holdup volume such that steaming from the cavity is not established until almost one day into the transient. The applicant's design basis calculation bounds the confirmatory analysis performed by the staff. As a result, the staff finds the treatment of steaming from the vessel bottom head acceptable for this analysis.

The applicant made additional changes as compared to the approved WGOTHIC model used for peak pressure analyses in the most recent revisions of the calculations referenced in the May 5, 2015, submittal. The elevation of a modeled volume was changed, (resulting in changes to flow paths not representative of pipes but rather a function of the modeling divisions) in the analysis to prevent condensate build up in the control volume from inhibiting air flow between the control volumes to prevent non-physical behavior and better represent real conditions. The condensate return fraction was further modified to be a flat value representative of the loss rate determined by testing at the highest flow rate (discussed further below) plus a margin of 0.7 percent. In addition, the heat structures representing the PRHR HX and reactor vessel receive temperature conditions from iterative runs of the LOFTRAN model discussed later in the "Safety Design Basis" section of this report, rather than bounding values.

In the applicant's supporting analysis, condensation on most of the heat sinks is directly analyzed in WGOTHIC, while condensation holdup on surfaces such as the operating deck floor and other equipment was incorporated into a horizontal film holdup volume assumed proportional to the cross sectional area of containment multiplied by a factor with no provided justification. Therefore, in RAI 7439, Question 6.03-3, the staff requested that the applicant justify the multiplication factor used and the treatment of the horizontal film in the WGOTHIC model. In a response dated June 12, 2014, the applicant determined that the earlier treatment of film may not have been conservative. Thus, the applicant performed a sensitivity study to determine the effect of a different approach. The approach detailed in the response changed the representative area to a value incorporating the total surface area of the heat sinks modeled within containment in WGOTHIC, which are a conservative representation of the total passive heat sink area inside containment, incorporating the fixed components. For direct condensation in WGOTHIC, the applicant further increased this value to bound the total passive heat sink area within containment. Though this value does not directly represent the film holdup area as some heat sinks like the core makeup tanks (CMTs), polar crane girder and stiffener are excluded, the use of total surface area rather than horizontal surface area incorporates margin such that this treatment is conservative.

In addition, the applicant used a different approach to determine film thickness for condensation on surfaces utilizing a maximum contact angle for wetting in the design basis analyses and a more realistic contact angle for the "conservative, non-bounding" analyses to determine the thickness of the film. Although these changes increase the film holdup by a factor of more than three, there is a negligible effect on the performance of the PRHR HX during the first 72 hours. Initially following a non-LOCA transient, the significantly lower condensate return rates for the first few hours and lack of steaming from the reactor vessel cause the impact of additional holdup resulting from the more conservative film holdup calculation to be lessened and the level in the IRWST to be relatively unchanged. As condensate return increases to its long term value, and steaming from the reactor vessel begins to have a measurable impact on the transient, the submittal shows a minor reduction in the time before the RCS begins to reheat, well after the safety-related 72-hour period. The PRHR is required to remove decay heat following a design basis event for a minimum of 72 hours, in accordance with the revised FSAR Section 6.3.1.1.1, "Emergency Core Decay Heat Removal" in LNP DEP 6.3-1. The staff verified that this calculation was incorporated into "Containment Response Analysis for the Long Term PRHR Operation" calculation in a subsequent audit (ADAMS Accession No. ML15187A248).

The amount of condensation held up on surfaces within containment is also an important parameter during containment floodup following a LOCA or automatic depressurization system (ADS) actuation. Because the AP1000 relies on gravity for the driving force for recirculation in the long-term following an accident, the height of water in containment must be sufficient to force flow through the direct vessel injection lines for an opening in the RCS above the floodup level. The NRC staff's confirmatory analysis applying the revised film holdup to the floodup calculation shows a negligible impact on the containment water level following a LOCA or ADS actuation. Thus, the staff finds the treatment of film holdup on surfaces within containment acceptable because it conservatively accounts for

condensation on surfaces using conditions for maximum condensate losses, and does not adversely affect current bounding analyses for other transients.

Containment response heavily depends on the initial conditions assumed for the transient of interest. Containment pressure and temperature, IRWST temperature, and the ambient outside temperature (equal to passive containment cooling system (PCS) water temperature) all have an impact. Pressure response can be divided into two phases for this transient, an initial spike up in pressure as the IRWST boils off, followed by a slow levelling off to a peak and decay as passive cooling occurs. Confirmatory analysis performed by the staff using MELCOR for design basis conditions follows a similar trend as the analysis performed by the applicant documented in "Containment Response Analysis for the Long Term PRHR Operation" (ADAMS Accession No. ML14219A200), although the pressure calculated by the applicant bounds the pressure in MELCOR at all points within an hour after steaming begins for the design basis. For best estimate conditions, the staff's confirmatory analysis shows a peak pressure of approximately 2 pounds per square inch greater than the applicant's WGOTHIC analysis, while design basis conditions result in confirmatory analysis yielding a pressure approximately 5 pounds per square inch less than the conservative value calculated by the applicant in WGOTHIC; these events, like all events involving PRHR actuation, do not challenge the design pressure. More importantly for this transient, the applicant's pressure used for the design basis analysis results in a higher saturation pressure for water in containment, which results in additional holdup in the containment atmosphere and higher IRWST temperatures and, therefore, reduced heat transfer through the PRHR. As such, the applicant's modeled pressure response in containment is conservative because it uses bounding inputs into an approved methodology and yields a more conservative value than staff models of the same conditions.

In each analysis performed by the applicant, calculations were performed for design basis conditions for Chapter 15 and "non-bounding, conservative" conditions for Chapter 19. Design basis conditions should represent the conservatively bounding set of values for any given transient, and the design basis values for the maximum temperature inside containment is 120 degrees Fahrenheit (°F) (48.9 degrees Celsius (°C)) and outside containment is 115 °F (46.1 °C). The analysis submitted used an in-containment initial temperature of 85 °F (29 °C) (capturing all the heat sinks as well as the IRWST) and an environment temperature of 115 °F (46.1 °C). In RAI 7439, Question 6.03-4, the staff requested the applicant justify the assumption of 85 °F (29 °C) for the initial temperature of containment for the design-basis accident (DBA) analysis. In the response dated July 1, 2014, the applicant explained that the effect of the temperature of the heat sinks outweighed the effect of the IRWST temperature. That is, a lower heat sink temperature results in more condensation on heat sinks and, therefore, more losses when compared with the effect of a change in the initial enthalpy in the IRWST, which affects the time to begin boiling. The NRC staff reviewed analysis supporting this assertion (ADAMS Accession No. ML14219A200), and although the effect is slight, lower heat sink temperatures result in a lower IRWST level as the transient progresses.

The choice of 85 °F (29 °C) for in-containment initial temperature was based on the use of an exterior temperature of 115 °F (46.1 °C), the TS maximum for

ambient air temperatures for the environment outside containment. The applicant performed a study for a plant located at a site where meteorological data indicates ambient temperatures could reach 115 °F (46.1 °C) and calculated in-containment temperatures for an operating facility with containment coolers running to show that containment temperatures (and therefore the temperatures of the heat sinks and the IRWST) would not reach below 88 °F (31 °C) for an ambient temperature of 115 °F (46.1 °C). The influence of exterior temperatures is more dramatic on PRHR HX performance: while lower temperatures inside containment would result in additional condensation on heat sinks, higher ambient temperatures result in higher initial PCS water temperatures, which result in less heat removal from containment during a transient and thus higher containment pressures and temperatures. The staff agrees that 85 °F (29 °C) for the in containment temperature presents an acceptably conservative value for a transient given a bounding environmental temperature of 115 °F (46.1 °C), due to the large thermal inertia of the heat sinks within containment and the sizable heat load for the operating plant under the steady state conditions leading up to the transient, in addition to the applicant's justification based on ambient temperatures.

Section 6.3.2.1.1 of the revised FSAR, "Emergency Core Decay Heat Removal at High Pressure and Temperature Conditions," in LNP DEP 6.3-1, addresses the impact of the revised analysis due to the design changes. The revised FSAR discusses the integrated system, including emphasis on the condensate return features, and explicitly describes the mechanics of in-containment condensation as the heat transfer mechanism. In addition, the FSAR now highlights that "[c]ondensation that is not returned to the in-containment refueling water storage tank drains to the containment sump." This is in accordance with the staff's understanding of the system as discussed in this subsection, and is acceptable because most water that does not return to the IRWST fills holdup volumes, which must fill to a certain level before overflowing and eventually reaching the lowest point in containment and filling the reactor coolant drain tank room and reactor cavity.

Section 6.3.2.1.1 also explains the impact of the condensate return rate on the duration of operation of the PRHR HX, and explains that if ac power is not recovered, the PRHR HX can continue to perform for a period of time beyond 72 hours. The plant also retains the ability to transition to open loop cooling via the automatic depressurization system if inventory in the IRWST is insufficient. This agrees with the staff analysis of the performance of the system and is an acceptable change to the FSAR, discussed further in the following section, "Safety Design Basis."

The changes made to Figures 6.3-1 and 6.3-2 in the FSAR appropriately capture the design changes as modeled in the analyses described in the submittal and are acceptable. The components in these figures added to Tier 1 are discussed in the "Classification of Structures, Components, and Systems" subsection below.

The applicant stated that the modifications referenced above to the WGOTHIC model, such as those incorporating condensate return to the IRWST, have no effect on the peak containment pressure calculation. Peak containment pressure is reached well before condensate return has a measurable impact on the transient, and any benefits from condensate return at later times are not credited.

The addition of downspouts at the polar crane and stiffener have no impact on the current peak pressure analysis because the model already assumes that condensate reaching the polar crane and stiffener makes its way to the reactor coolant drain tank room, which overflows to the reactor cavity region. The assumptions used in these analyses for initial conditions for temperature, humidity, and heat sink area limiting the amount of condensate return are less bounding for the case of peak containment pressure and, therefore, would not be applicable to the peak pressure calculation. The staff finds the peak pressure analysis in the licensing basis is unaffected by the changes implemented in the current analyses.

For the analyses supporting LNP DEP 3.2-1, the treatment of the PCS water coverage of the outside of the containment shell is consistent with that used in the peak pressure calculation model previously approved by the staff. That is, an assumed film coverage below the weir of 90 percent (for design basis conditions) at nominal flow rates, decreasing as the level in the PCS water storage tank drops during the 72-hour period (discussed in Section 6.2.1 of NUREG-1273 and Table 6.2.2-1 of the AP1000 DCD). Thus, that treatment is conservative for this analysis, as minimizing shell coverage maximizes the energy within containment, which maximizes the containment pressure and saturation temperature.

The calculation, "Containment Response Analysis for the Long Term PRHR Operation," receives inputs from the "Condensate Return to IRWST for Long Term PRHR Operation" calculation (ADAMS Accession No. ML14219A200), which calculates the effective condensate losses on the inside surface of the containment shell. The NRC staff requested in RAI 7439, Question 6.03-2 that the applicant submit additional detail on the results described in "Condensate Return to IRWST for Long Term PRHR Operation," which describes the methodology used to calculate losses over the containment shell, including the tests used to determine losses over attachments to the shell. This request was to address deficiencies in the submittal related to insufficient justification of the applicability of the development of the condensate loss model. The applicant summarized the calculation in a response dated June 12, 2014. The NRC staff reviewed the response and found it acceptable because it provides a summary with sufficient information on the calculation for the staff to make its finding.

Tests for losses over attachments to the shell were performed at lower temperatures than the prototypic conditions on the containment shell during a non-LOCA transient, which could peak in excess of 220 °F (104 °C). Therefore, in RAI 7439, Question 6.03-5, the staff requested the applicant justify the extrapolation from the losses for tested values of condensate losses over attachments to the wall to the values used in the analysis at containment pressure and temperature. In its response to the RAI dated June 27, 2014, the applicant explained that although the losses over wall attachments are extrapolated, the extrapolation is overly conservative and prior research indicates that film thickness should decrease at the same Reynolds number at higher temperatures and thus decrease the condensate losses. In addition, the applicant performed sensitivity studies on the effect of increasing the losses on the performance of the PRHR HX. Those sensitivities indicate that even for a case when losses over attachments are increased by a factor of 1.4 to 1.75, there is a negligible effect on the performance of the system in the first 72 hours and only a minor

(approximately 5 percent) reduction in the long term capability of the system. The NRC staff remains unconvinced as to the validity of the applicant's temperature scaling argument, especially given the relative variance in the test results. However, on the basis of the large degree of conservatism inherent in the extrapolation and the fact that a further 40 percent increase in losses over wall attachments results in an insignificant impact to the system performance, the staff finds the treatment of film losses over attachments to the containment shell acceptable.

The analysis described above using WGOTHIC passes a set of inputs to analyses in LOFTRAN (discussed below). The applicant extracts a table including time, condensate return flow, condensate temperature, IRWST steaming rate, containment pressure, and CMT compartment temperature. The data for condensate return flow and condensate temperature are combined to create a recirculation ratio (the fraction of boil off from the IRWST returning as condensate). The recirculation ratio and containment pressure are then used in the LOFTRAN analysis; in the case of the LOFTRAN run using design basis conditions, the recirculation ratio is further reduced and the pressure is increased from the values calculated in WGOTHIC for additional conservatism.

On the bases that the modifications to the gutter system are appropriately incorporated into the analyses for events that actuate the PRHR, that the data from tests used to determine the losses on the containment shell conservatively bound realistic losses, and that condensate loss mechanisms have been quantified and captured in the analysis, the staff finds the treatment of containment conditions in calculations supporting LNP DEP 3.2-1 and LNP DEP 6.3-1 acceptable. Therefore, the staff finds the proposed LNP DEP 3.2-1 FSAR revisions related to containment response noted above to be acceptable pending the staff's confirmation that the proposed FSAR revisions are incorporated in the LNP Units 1 and 2 COL application. The staff is tracking these revisions as **LNP Confirmatory Item 21.1-1**.

Resolution of LNP Confirmatory Item 21.1-1

LNP Confirmatory Item 21.1-1 is a commitment by the applicant to revise the LNP COL FSAR to provide additional information related to containment response as indicated in the letter dated January 14, 2016. The staff confirmed that the LNP COL FSAR has been appropriately revised. As a result, LNP Confirmatory Item 21.1-1 is now closed.

B.1.2 Safety Design Bases

The PXS performs the following safety-related functions:

1. Emergency decay heat removal
2. Emergency reactor makeup/boration
3. Safety injection
4. Containment pH control

The following subsections evaluate the impact of LNP DEP 3.2-1 and LNP DEP 6.3-1 on each safety function of the PXS.

B.1.2.1 Emergency Decay Heat Removal

LNP DEP 3.2-1 impacts the condensate return rate to the IRWST and thus impacts the emergency decay heat removal function of the PRHR HX. Under LNP DEP 3.2-1 and LNP DEP 6.3-1, the revised FSAR Section 6.3 states that for non-LOCA events in which a loss of core decay heat removal capability via the steam generators (SGs) occurs, the PRHR HX is designed to perform the following functions:

1. Remove core decay heat following a design basis event.
2. Maintain acceptable reactor coolant system conditions for a minimum of 72 hours following a non-LOCA event. Applicable post-accident evaluation criteria are specified in Chapter 15.
3. Sufficiently reduce RCS temperature and pressure during an SG tube rupture (SGTR) event to terminate breakflow, without overfilling the SG.

Emergency decay heat removal functions 1 and 3 are design criteria that have been evaluated in DCD Chapter 15, Revision 19 for the events identified in Table 21.1-1 and reviewed in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design." Previous staff review of DCD Chapter 15 events did not consider the possibility of PRHR HX tube uncover. Therefore, calculations could be terminated once the acceptance criteria for the design basis events were initially met. LNP DEP 3.2-1 revealed that the PRHR HX can provide cooling for a finite period of time before performance degrades and transition to open-loop cooling, via ADS actuation, is required to maintain the reactor in a safe, stable shutdown condition. LNP DEP 3.2-1 states that the water level in the IRWST remains above the uppermost points of the PRHR HX for the duration of all DCD Chapter 15 analyses and, therefore, there is no impact to the calculated heat transfer through the heat exchanger. This caused the staff to question the mission time for the PRHR HX and the termination criteria for DCD Chapter 15 analyses for events that credit the PRHR HX (Table 21.1-1).

Table 21.1-1. Chapter 15 Events that Credit the PRHR HX for Decay Heat Removal

DCD Section	Scenario	Calculation Duration
15.2.6	Loss of AC Power to Plant Auxiliaries	6.2 hrs
15.2.7	Loss of Normal Feedwater Flow	5.4 hrs
15.2.8	Feedwater System Pipe Break	3.1 hrs
15.5.1	Inadvertent Operation of CMTs During Power Operation	8.6 hrs
15.5.2	CVCS Malfunction that Increases RCS Inventory	5.6 hrs
15.6.3	Steam Generator Tube Rupture	6.7 hrs

Section 4.3.3.5 of the Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document (URD) and Section 2.3.2 of the staff's corresponding safety evaluation (NUREG-1242, "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document, Evolutionary Plant Designs," Volume 3) both state that a design expectation for the passive decay heat removal system is to have sufficient water

capacity in the passive decay heat water pools to permit 72 hours of operation after SCRAM without the need for refill. The 72-hour capacity of the passive residual heat removal system was approved by the Commission in their responses to SECY-94-084, "Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs," and SECY-95-132, "Policy and Technical Issues Associated with Regulatory Treatment of Non-Safety Systems in Passive Plant Designs (SECY-94-084)." Based upon the Commission position expressed in SECY-94-084 and SECY-95-132, the licensing guidance in the URD, NUREG-1242, "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document, Evolutionary Plant Designs," and the Regulatory Treatment of Non-Safety Systems as discussed in Section 19.3 of the Standard Review Plan, in order for the PRHR HX to meet the requirements of GDC 34 and GDC 44, the IRWST should have sufficient capacity to permit a minimum of 72 hours of operation after SCRAM following an accident without the need for refill. In RAI-7475, Question 6.03-10, the staff requested clarification of the mission time for the PRHR HX. In a response dated June 27, 2014 (ADAMS Accession No. ML14182A106), the applicant stated that the PRHR HX operates to bring the RCS to an acceptable, stable condition and maintain this condition for at least 72 hours after a non-LOCA event to allow ample time for decision-making and initiation of recovery actions. During this 72-hour time period, applicable Chapter 15 design basis safety evaluation criteria are met. The 72-hour operational requirement for the PRHR HX following a non-LOCA event is consistent with the Commission position for compliance with GDC 34 and GDC 44.

DCD Chapter 15 analyses that credit the PRHR HX, shown in Table 21.1-1, terminate before the 72-hour operational requirement of the PRHR HX. This caused the staff to question the possibility of PRHR HX tube uncover during the 72-hour time period, and the resulting impact to Chapter 15 analyses. In RAI 7440, Question 15.02.06-2, the staff requested the applicant to (1) identify the bounding Chapter 15 event in terms of PRHR HX performance, and (2) extend the calculation for the bounding event out to 72 hours in order to demonstrate the 72-hour operational requirement of the PRHR HX.

In their response dated June 27, 2014 (ADAMS Accession No. ML14182A106), to the first part of RAI 7440, Question 15.02.06-2, the applicant identified the Loss of AC Power to Plant Auxiliaries (LOAC) as the limiting event in terms of PRHR HX performance. The applicant explained that the LOAC event combines a relatively late reactor trip with a significant loss of secondary side inventory in both steam generators, and a loss of forced reactor coolant flow. It therefore, represents the largest mismatch between primary side energy and secondary side/PRHR HX heat removal capability. The applicant's response to RAI 7440, Question 15.02.06-2 included a sensitivity study, performed with the MAAP4.0.7 code, to evaluate the impact of different events on PRHR HX performance. The results demonstrated that the plant response to different events begins to converge after approximately 8 hours into the event with the LOAC event producing slightly bounding heat loads on the PRHR HX over the 72-hour calculation time. The NRC staff performed confirmatory calculations as part of the review, which include a sensitivity study to investigate the impact of the initiating event. The result of the staff's sensitivity study is consistent with the applicant's response to RAI 7440, Question 15.02.06-2. Based upon

considerations discussed in this paragraph, the staff finds the selection of LOAC as the limiting event in terms of PRHR HX performance to be acceptable.

In their response to the second part of RAI 7440, Question 15.02.06-2, the applicant performed a 72-hour calculation of the LOAC event. The analysis utilized the LOFTRAN code to model the response of the reactor coolant system. In evaluating the applicant's response, the staff evaluated the analytical procedure (i.e., use of LOFTRAN) and the results of the calculation. In the NRC staff's safety evaluation for the AP1000 DCD, NUREG-1793, the staff concluded that the applicant's use of LOFTRAN as described in WCAP-15644 (ADAMS Accession No. ML040890663) is acceptable for licensing calculations of the AP1000 subject to the following limitation:

- LOFTRAN is approved to analyze the transients listed in Table 21-2 of NUREG-1793. Use of the code for other analytical purposes will require additional justification.*

Previous licensing calculations that utilized LOFTRAN extended less than 10 hours and did not experience uncover of the PRHR HX tubes. Thus, the staff investigated the applicability of the code to the analyses referenced in the departure. Modeling of tube uncover in LOFTRAN uses a collapsed liquid level within the IRWST, where surface area of the PRHR HX above the collapsed liquid level is not credited for heat removal. The surface area below the liquid level is calculated as described in WCAP-14235 (ADAMS Accession No. 9709290174) and approved in the staff's safety evaluation of the AP1000 DCD in NUREG-1793. During pool boiling, the secondary side heat transfer is modeled using a modified Rosenhow correlation. This modified Rosenhow correlation was developed from experimental data obtained from the AP600 PRHR HX test program described in WCAP-13573 (ADAMS Accession No. 9705280203). The AP600 PRHR HX test program included a series of tests where PRHR HX tubes were uncovered to different levels (75 percent, 50 percent, and 25 percent) which demonstrated insignificant heat transfer for the uncovered tubes and heat transfer consistent with nucleate boiling for the covered tubes. Details of the staff review of the PRHR HX test program are available in Section 21.5.3 of NUREG-1512, "Final Safety Evaluation Report Related to Certification of the AP600 Standard Design." Of specific concern were the flow distribution and behavior in the tubes and two-phase flow behavior in the IRWST, especially within the tube bundle. High heat transfer rates could cause violent boiling on the outer surface of the tube, resulting in vapor blanketing of some portion of the heat exchanger surface and drastic reduction in heat transfer. Westinghouse analyzed the PRHR HX performance and concluded that it is unlikely that vapor blanketing could occur, and that if it did occur, such behavior would be limited to a very short length near the inlet of the tube bundle, leaving sufficient heat transfer area to meet its design performance requirements. Based upon the Westinghouse analysis and that vapor blanketing was not observed at any of the integral test facilities (OSU/APEX, SPES-2, or ROSA/LSTF), the staff concluded in NUREG-1512 that Westinghouse resolved the concern of vapor blanketing. The potential for the vapor generated by the lower tubes to impede the heat transfer of the upper (covered) tubes is reduced as the PRHR HX begins to uncover. Based upon considerations discussed in this paragraph, the staff finds the previous

resolution of the vapor blanketing issue to remain valid for the case of tube uncover and the heat transfer modeling of the PRHR HX to be acceptable.

In order to understand the limits of the analysis, the staff explored additional input considerations. In RAI 7475, Question 6.03-10, the staff requested the tube plugging assumption used for DBA analyses. In the response, dated June 27, 2014, the applicant stated that a design change was implemented to reduce the allowable number of plugged tubes for the PRHR-HX from the number of tubes making up 8 percent of the heat transfer area to the number of tubes making up 5 percent of the heat transfer area. However, the original 8 percent assumption is utilized for the DBA analysis presented in the response to RAI 7440, Question 15.02.06-2. Existing Chapter 15 analyses assume 8 percent tube plugging in the PRHR-HX (in terms of heat transfer area) for scenarios where minimizing heat removal is bounding and 0 percent tube plugging in the PRHR-HX where maximizing heat removal is bounding (e.g., steam line break). Boundary conditions for the containment response (i.e., containment pressure and condensate return ratio) were input as functions of time and have been evaluated above in subsection "Evaluation of Containment Response" of this SER. During an audit, the NRC staff identified that the initial power utilized in the 72 hour analysis accounted for a 1 percent uncertainty. Section 15.0.3.2 of the AP1000 DCD, Revision 19, states that a 1 percent uncertainty is supported by the main feedwater flow measurement instrumentation, but that a bounding value of 2 percent is used in the analysis. The Levy COL FSAR contains COL Information Item STD COL 15.0-1, which identifies the plant operating instrumentation which when properly calibrated will support 1 percent uncertainty in the core power based on flow measurement uncertainty. Additionally, the NRC staff performed a sensitivity study investigating the impact of the reduced core power uncertainty on the 72-hour LOAC event. The results of this study demonstrated that the reduction in core power uncertainty has an insignificant impact on the RCS response and Chapter 15 acceptance criteria.

The analysis of the LOAC event submitted by the applicant demonstrates that during the 72-hour period the top horizontal portion of the PRHR HX becomes uncovered. However, the PRHR HX capacity remains sufficient to prevent RCS heatup for a time period greater than 72 hours. The submitted analysis demonstrates that once the Chapter 15 acceptance criteria are satisfied, at approximately 6.2 hours, they remain satisfied for a time period exceeding 72 hours. The NRC staff performed confirmatory calculations as part of the review, which include a 72-hour analysis of the LOAC event. The staff's confirmatory calculation for the LOAC event is consistent with the applicant's submitted analysis. Based upon the identification of the LOAC event being the bounding event in terms of PRHR HX operation, the acceptable modeling of the LOAC event, and the result demonstrating the 72-hour operational requirement for the PRHR HX, the staff finds the submitted analysis of the 72-hour LOAC event acceptable.

In a letter dated January 14, 2016 (ADAMS Accession No. ML16020A250), the applicant updated their submittal, which included the consideration of ambient heat losses from the RCS during Chapter 15 non-LOCA events. Previous analyses had assumed the RCS to be adiabatic, which would result in the highest required heat removal from the PRHR HX; due to ambient heat losses

from the RCS, from the pressurizer in particular, and in the absence of positive pressure control associated with pressurizer heaters, the applicant was concerned that pressure in the RCS could be reduced to the point that subcooled margin is lost. A loss of subcooling was thought to have the potential to inhibit the performance of the PRHR HX. Additional analyses were conducted by the applicant to investigate the impact of ambient heat loss from the RCS. A description of these analyses is provided in APP-GW-GLR-607, Revision 4 "Changes to Passive Core Cooling System Condensate Return," which is included as an enclosure to the letter of January 14, 2016. The NRC staff audited the supporting calculations (documented in the audit report, ADAMS Accession No. ML16034A034). The audit resulted in a supplemental RAI response, provided in letter dated January 14, 2016 (ADAMS Accession No. ML16020A105), to establish the basis for the ambient heat losses associated with the pressurizer. The RAI response included (1) a description of the ambient heat loss flow paths from the pressurizer and their treatment in transient analyses, and (2) a FSAR update to Section 5.4.5.2.1 to include the average maximum heat transfer rate specification for the metallic reflective insulation installed on the external surfaces of the RCS. The NRC staff found the RAI response identified the applicable heat loss mechanisms from the pressurizer during a DBA. NRC reviewed the details of the heat loss calculation during their audit of the supporting calculations and observed that additional conservatism was included in pressurizer heat loss calculations. Additionally, the NRC staff performed confirmatory calculations for the heat losses from the pressurizer which resulted in values that were consistent with the applicant's analyses. The conservative modeling of the heat losses from the pressurizer is further supported by data from applicable literature identified in the NRC staff's audit report. Based upon the information discussed above, the NRC staff finds the treatment of ambient heat losses in the analysis of DBAs to be suitably conservative. The applicant performed a DBA analysis that considers ambient heat losses, performed with LOFTRAN, showing that the RCS remains subcooled for a time period exceeding 72 hours. Therefore, the only impact on the DBA analysis was a lower temperature in the RCS due to the increased heat removal. The NRC staff performed confirmatory calculations as part of this review and obtained results that were consistent with the applicant's analysis. Based on the information in this paragraph, the NRC staff finds that ambient heat losses do not adversely impact DBA analyses for the AP1000.

The staff performed confirmatory calculations, which included the Chapter 15 LOAC event, to assist in evaluating the impacts of LNP DEP 3.2-1 to Chapter 15. The calculations caused the staff to question whether containment backpressure effects on PRHR HX performance were accounted for in Chapter 15. During the staff audit of the applicant's documents related to LNP DEP 3.2-1 and LNP DEP 6.3-1 (ADAMS Accession No. ML14219A200), the staff verified that in Revision 19 of the DCD, Chapter 15 analyses that credit the PRHR HX for decay heat removal do not account for containment backpressure effects on the PRHR HX. Not accounting for containment backpressure on PRHR HX performance introduces a slightly non-conservative boundary condition that affects PRHR HX performance late in the transient. However, the staff verified that this effect does not alter the conclusions of Chapter 15 analyses and thus produces no consequential impact.

*The change from indefinite operation of the PRHR HX to the 72-hour operational requirement, and subsequent analysis demonstrating the 72-hour operational requirement, are reflected in the applicant's proposed changes under FSAR Sections 5.4, 6.3, 7.4, and Table 19.59-18 in letter dated June 27, 2014. In the proposed FSAR changes noted above, indefinite operation is changed to extended operation at several locations. For consistency among the proposed changes, the staff is interpreting extended operation to be at least 72 hours. Based upon the considerations discussed within this subsection, the staff finds the proposed FSAR revisions noted above to be acceptable pending the staff's confirmation that the proposed revisions are incorporated in the LNP Units 1 and 2 COL application. The staff is tracking these revisions as **LNP Confirmatory Item 21.1-1**.*

Resolution of LNP Confirmatory Item 21.1-1

LNP Confirmatory Item 21.1-1 is a commitment by the applicant to revise the LNP COL FSAR to provide additional information related to ambient heat losses as indicated in the letter dated January 14, 2016. The staff confirmed that the LNP COL FSAR has been appropriately revised. As a result, LNP Confirmatory Item 21.1-1 is now closed.

Indefinite is still used in the revised FSAR (in Sections 6.3.1.1.4, 6.3.3.3.3, 6.3.3.4.3, and 7.4) when considering the entirety of the passive core cooling system; that is, when ADS is actuated and the system transitions to open-loop cooling with gravity driven injection. At that point, the system is nominally limited by normal containment leakage. This treatment remains unchanged from the system as reviewed by the staff in Revision 19 of the DCD.

B.1.2.2 Emergency Makeup and Boration

Emergency makeup and boration for non-LOCA events are functions performed by the CMTs and are not impacted by LNP DEP 3.2-1.

B.1.2.3 Safety Injection

LNP DEP 3.2-1 is evaluated to ensure ADS actuation and transition to open loop cooling is retained as a defense-in-depth means of providing emergency core cooling during non-LOCA events. The evaluation includes investigating the impact of IRWST level on the performance of the ADS spargers, the impact of LNP DEP 3.2-1 on the containment floodup level, and the availability of the ADS, IRWST injection, and containment recirculation valves during an extended station blackout.

In the event that operator action is taken to prolong closed loop mode of PXS operation for an extended period of time, the level in the IRWST can drop below the ADS spargers, causing the staff to question whether ADS actuation can be inhibited by a low IRWST level. In RAI 7440, Question 15.02.06-1, the staff requested information regarding the minimum IRWST level required for ADS actuation. In a letter dated June 19, 2014, the applicant stated that no minimum IRWST level is required for ADS actuation because:

1. ADS spargers do not limit the containment pressure increase for the bounding mass and energy release. The associated mass and energy release attributed to ADS actuation is bounded by the large break LOCA accident or a large main steam line break inside containment.
2. IRWST vents are more than sufficient to vent the amount of steam released if ADS Stages 1-3 are actuated after the spargers are uncovered. The IRWST vents are sized to vent steam relief from ADS stages 1-3 at high system pressures following several hours of PRHR HX operation during which the IRWST has reached saturation pressure.
3. During a long-term non-LOCA event, during which the IRWST level has fallen below the elevation of the ADS spargers, RCS pressure at the time of ADS actuation will be relatively low.
4. Steam relief from uncovered ADS spargers actually improves ADS Stages 1-3 performance due to the lower backpressure provided by the IRWST water. Limitations are imposed on the maximum sparger submergence depth to limit sparger discharge backpressure.
5. No damage is done to spargers, IRWST, or surrounding structures.

The NRC staff identifies the reasons as valid, but requested further justification for the argument that no damage is done to the ADS spargers, IRWST, or surrounding structures. In a supplemental letter dated July 24, 2014, the applicant stated that the ADS spargers are designed to withstand spurious actuation of ADS Stages 1-3 at normal operating conditions. Spurious actuation of ADS Stages 1-3 is bounding in terms of stress on the spargers because it results in bounding mass flows and temperatures experienced by the spargers. Additionally, with the IRWST water level below the spargers, the hydrodynamic loads associated with the initial discharge of air (trapped in the ADS valve discharge lines) or of the subsequent discharge of steam into the water are eliminated. Forces encountered by the IRWST and surrounding structures due to ADS actuation would not be large because the spargers contain a large number of small jets that would interact and dissipate over a relatively short distance. Based upon the considerations mentioned above and the equipment classification of the associated structures and components, the staff finds that ADS actuation is not inhibited by low IRWST level.

The NRC staff reviewed the potential changes to containment holdup during floodup following a LOCA or ADS actuation as a result of the changes in LNP DEP 3.2-1. The NRC staff audited the "Containment Floodup Level" calculation (ADAMS Accession No. ML14219A200), and found that steam in the containment atmosphere and film on surfaces was accounted for. Applying the calculation for film condensing on surfaces used in RAI 7439, Question 6.03-3, results in a higher holdup than calculated in the supporting analysis in the form of film, which would reduce the containment level following depressurization of the RCS by less than 2 inches. Given the conservatism inherent in the film holdup analysis in RAI 7439, Question 6.03-3, the staff finds no significant impact to containment floodup level as a result of LNP DEP 3.2-1.

An additional consideration is the availability of the ADS, IRWST injection, and containment recirculation valves during an extended station blackout event. The operator action to establish open loop cooling, if required, may occur at a time that exceeds the operating times for the ADS, IRWST injection, and containment

recirculation valves specified in Table 3.11-1 of the FSAR. As part of the staff review of submittals from Southern Nuclear Operating Company (SNC) in response to "Order to Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, Order EA-12-049," issued on March 12, 2012, for Vogtle Electric Generating Plant Units 3 and 4, which is licensed based on the same AP1000 certified design as the LNP Units 1 and 2 applicant, the NRC staff issued RAI 7741 and RAI 7756 to SNC seeking further justification that the AP1000 can transition to open loop cooling during an extended station blackout. SNC's response in letters dated December 4, 2014 (ADAMS Accession No. ML14338A658), and February 26, 2015 (ADAMS Accession No. ML15057A590), provided justification regarding (1) equipment qualification of the ADS, IRWST injection, and containment recirculation valves, and (2) diverse actuation capability for the squib valves.

SNC demonstrated the equipment qualification envelope for the ADS, IRWST injection, and containment recirculation valves is bounding for an event that utilized the PRHR HX long term. This was done by performing a best estimate calculation for the containment response to an event that utilized the PRHR HX over a 30-day duration. The pressure profile for the qualification envelope was shown to bound the results of the containment response calculation. The temperature profile from the containment response calculation was converted into an equivalent time at 150 °F (65.6 °C) using the Arrhenius method. This equivalent time is bounded by the qualification time specified for the ADS, IRWST injection, and containment recirculation valves. The Arrhenius methodology has been previously reviewed and approved by the NRC staff for modeling the temperature effects in a post-LOCA environment (ADAMS Accession No. ML003701987). Based on the discussion in this paragraph, the NRC staff finds the equipment qualification envelope for the ADS, IRWST injection, and containment recirculation valves bounds the expected containment environment during an extended station blackout for at least 30 days.

Additionally, SNC discussed the diverse capability for establishing open loop cooling. The primary means of establishing open loop cooling utilizes the Class 1E dc and uninterruptible power supply system (IDS). SNC's response included an analysis of the capacity of the IDS batteries. This analysis considered temperature de-rating of the batteries and self-discharge over a month and showed that sufficient margin is available for the batteries to perform their intended function during an extended station blackout. Should the battery supplies become completely exhausted, the ADS Stage 4, IRWST injection, and containment recirculation valves can be actuated via a diverse actuation system power independent device located at the secondary diverse actuation system station. Based upon the considerations in this paragraph, the NRC staff finds reasonable assurance that open loop cooling can be actuated during an extended station blackout event.

In a letter dated July 16, 2015 (ADAMS Accession No. ML15201A129), the applicant endorsed the RAI responses of SNC discussed above. Based upon the considerations of the environmental qualification of the ADS, IRWST injection, and containment recirculation valves, the containment floodup level, and the diverse actuation for establishing open loop cooling, the NRC staff finds that the safety injection function of the PXS is not impacted by LNP DEP 3.2-1.

B.1.2.4 Containment pH Control

Control of the pH in the containment sump post-accident is achieved through the use of pH adjustment baskets containing granulated trisodium phosphate (TSP) and is not impacted by LNP DEP 3.2-1.

B.1.2.5 Safe Shutdown

Short term safe shutdown conditions, defined in Section 7.4 of the DCD, include:

- Maintaining the reactor in a subcritical condition*
- Maintaining RCS average temperature less than or equal to no load temperature*
- Retaining adequate coolant inventory*
- Providing adequate core cooling*

Establishing short term safe shutdown conditions after an event has been demonstrated through DCD Chapter 15 analyses and reviewed by the staff in NUREG-1793. Through the evaluation of the PXS safety functions, the staff finds that short term safe shutdown is not impacted by LNP DEP 3.2-1.

Long term safe shutdown conditions, defined in Section 7.4 of the DCD, are the same as the short term conditions except that the RCS average temperature shall be less than 420 °F. The design requirement of entering a long term safe shutdown condition within 36 hours (i.e., reaching an average RCS temperature less than 420 °F in 36 hours) following an event is established in the URD and SECY-94-084. In Section 6.3 of the DCD, Revision 19, cooling the RCS to 420 °F in 36 hours is identified as part of the design basis for the PRHR HX. The ability of the PRHR HX to satisfy this design requirement is demonstrated in the shutdown temperature evaluation provided in DCD Section 19E.4.10.2.

The shutdown temperature evaluation utilizes the same model and evaluates the same event as discussed in subsection “Emergency Decay Heat Removal” of this SER. The analysis in Section 19E.4.10.2 differs in that several model inputs (e.g., containment response pressure, condensate return rate, initial power, and core decay heat) utilize more realistic values. Sections 6.3.3 and 7.4.1.1 of the revised FSAR refer to this analysis as “non-bounding, conservative.” In order to better understand the sources of conservatism in the calculation, the NRC staff issued RAI 7475, Question 6.03-11. The response, provided in letter from the applicant dated June 27, 2014, identified conservatism inherent in the condensate return rate and several modeling choices that were taken to increase the heat load on the PRHR HX and limit the heat removal capability of the PRHR HX. The use of nominal and best-estimate values for reactor power and decay heat remains consistent with the shutdown temperature evaluation supporting the design certification as verified by the staff during an audit of the original calculation (ADAMS Accession No. ML14219A200). The results of the updated analysis demonstrate the RCS average temperature decreases below 420 °F within 36 hours. The staff performed confirmatory calculations as part of the review, which include a shutdown temperature evaluation. The result of the

staff's confirmatory calculation for the shutdown temperature evaluation is consistent with the applicant's submittal. Based upon the considerations within this subsection, and the results of the bounding calculation discussed in subsection "Emergency Decay Heat Removal" of this SER, the staff finds the plant is consistent with SECY-94-084. The updated analysis is reflected in the applicant's proposed changes to FSAR Section 19E described in a letter from the applicant dated May 5, 2015.

In Revision 19 of the AP1000 DCD, the cooldown requirement of reaching an RCS temperature of 420 °F in 36 hours is the only performance criteria listed in Section 6.3.1.1.1 that is not demonstrated by a Chapter 15 analysis. In reading the original DCD, it would be possible to incorrectly conclude that this performance requirement was demonstrated by a Chapter 15 analysis. The applicant's proposed changes under FSAR Sections 6.3.1.1 in letters dated June 27, 2014, and July 24, 2014, clarify how this design requirement is demonstrated. Based upon considerations within this subsection, the staff finds the proposed FSAR revisions in Sections 6.3.1.1 and 19E, noted above, to be acceptable.

B.1.3 Non-Safety Design Basis

In the proposed FSAR revision under Section 6.3.1.2 the applicant states that the PRHR HX, in conjunction with the IRWST and the condensate return features of the PXS, has the capability to maintain the reactor coolant system in the specified, long-term shutdown condition for 14 days in a closed loop mode of operation. The 14-day operation is also reflected in the applicant's proposed changes under FSAR Section 19E. The basis for this duration is provided by extending the duration of the non-bounding conservative LOFTRAN calculation that was discussed in subsection "Safe Shutdown" of this SER. The staff verified the results of the analysis in an audit (see ADAMS Accession No. ML15187A248). In an update to the departure provided in a letter dated January 14, 2016 (ADAMS Accession No. ML16020A250), the applicant identified calculations incorporating ambient heat losses performed using RELAP 5, a transient analysis code, as LOFTRAN was not suited for demonstrating two-phase flow through the RCS. The RELAP calculations showed a loss of subcooling in the RCS occurring after 72 hours, but prior to 14 days. The calculations showed that the PRHR HX was capable of performing its function out to 14 days even with the loss of subcooling. The applicant provided test results from the APEX facility to demonstrate the ability of the PRHR HX to perform its function with a saturated RCS. The staff verified the results of the calculation and test results in an audit (ADAMS Accession No. ML16034A034). Operation of the PXS for 14 days in closed loop mode is not required to satisfy Commission regulations. The operational requirements of the PRHR HX have been evaluated in subsection "Safety Design Basis" of this SER. The staff finds the changes made to the operational duration and safety classification of the PRHR HX in LNP DEP 6.3-1 acceptable.

B.1.4 Post-72-Hour Actions

In DCD Section 6.3.4, it is stated that the only post-72-hour action required is a potential need for containment inventory makeup. This caused the staff to

question the post-72-hour actions in the event that closed loop mode of PXS operation is extended following a non-LOCA event. In RAI-7440, Question 15.02.06-3, the staff requested clarification on post-72-hour actions following non-LOCA events. In a response dated June 19, 2014 (ADAMS Accession No. ML14171A453), the applicant stated that containment makeup would be necessary if containment leakage reduces the containment flood-up level, but there is no requirement to provide makeup to the IRWST to maintain PRHR HX operability. The primary post-72-hour actions are to provide water makeup to continue passive containment cooling and spent fuel cooling and, in the event that operators extend the closed loop mode of PXS operation, to provide power to the post-accident monitoring cabinets when transition to open loop cooling is required. In RAI 7440, Question 15.06.01, the NRC staff sought clarification on the criteria for operators to actuate ADS and transition to open loop cooling. The applicant's response provided in letter dated January 15, 2016 (ADAMS Accession No. ML16021A188), stated four criteria associated with reliable indication of core cooling which included (1) power availability to IDS divisions B and C, (2) hot leg and CMT level, (3) core exit thermocouple temperature, and (4) RCS pressure. The NRC staff finds this answer acceptable because it requires operators to check for diverse and reliable indication of adequate core cooling. The impact of post-72-hour actions has been reviewed by the staff in subsection "Safety Design Bases" of this SER.

B.2 Classification of Structures, Components, and Systems

Section 6.0, "Impacts to the Licensing Basis," of APP-GW-GLR-607 and APP-GW-GLR-161, Revision 2 describes the changes impacted to the COL application and provides the additional piping and components to the PXS. Subsection "Tier 1," states that "The added components of the PXS are integral to providing safety-related core decay heat removal during non-LOCA events. Therefore, it is appropriate to apply inspections, test, analyses and acceptance criteria to the added PXS components to provide reasonable assurance that the facility has been constructed and will be operated in conformity with the applicable design criteria, codes and standards." It further states that "As required by general design criterion 2 of Appendix A to 10 CFR Part 50, the PXS is designed to withstand the effects of natural phenomena and normal and accident conditions without loss of capability to perform its safety functions." The PXS containment recirculation downspout screens are identified as follows:

PXS-MY-Y81	PXS-MY-Y85
PXS-MY-Y82	PXS-MY-Y86
PXS-MY-Y83	PXS-MY-Y87
PXS-MY-Y84	PXS-MY-Y88

These component numbers will be added to the LNP Units 1 and 2 FSAR to supplement Table 2.2.3-1 of the AP1000 DCD, Revision 19, Tier 1. Mark-ups to Table 2.2.3-1 of the AP1000 DCD, Revision 19, Tier 1 and Table 3.2-3 of the AP1000 DCD, Revision 19, Tier 2, provided in Appendix B of APP-GW-GLR-607 and APP-GW-GLR-161, state that these eight additional downspout screens are not American Society of Mechanical Engineers (ASME) Code Section III components and the principal construction code is manufacturer standard.

In Section 6.0 of APP-GW-GLR-607 and APP-GW-GLR-161, under the subheadings “Tier 2,” “Chapter 3: Impacted,” the applicant states that, “The new PXS downspout screens are AP1000 Safety Class C and seismic Category I components. These components meet the quality assurance requirements of 10 CFR 50, Appendix B. Additionally, the screens must be demonstrated to have no functional damage following a seismic ground motion exceeding the one-third of the safe shutdown earthquake ground motion before resuming operations in accordance with 10 CFR Part 50, Appendix S.” Under the subheading “Tier 1,” the applicant further states that ITAAC design requirements will be met for these eight added downspout screens.

On the basis of the safety and seismic classifications of these eight added downspout screens, their quality assurance requirements, and the fact that SRP 3.2.1, “System Quality Group Classification,” and Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” do not provide specific guidance for the code of construction for non-ASME, non-pressure retaining components that belong to Quality Group C, the staff agrees that the use of manufacturer standards for the design of these downspout screens and the classification of AP1000 Safety Class C and seismic Category I is acceptable. Therefore, the staff finds the proposed FSAR revisions concerning these eight added downspout screens to be acceptable.

Section 6.0 of APP-GW-GLR-607 and APP-GW-GLR-161, Subsection “Tier 1,” states that “As required by general design criterion 4 of Appendix A to 10 CFR Part 50, the PXS containment downspout piping would be safety-related and required to withstand normal and seismic design basis loads without losing functional capability.” The following PXS containment downspout piping are the proposed piping to be added to the LNP Units 1 and 2 FSAR to supplement Table 2.2.3-2 of AP1000 DCD, Revision 19, Tier 1:

<i>PXS-L301A</i>	<i>PXS-L306A</i>	<i>PXS-L301B</i>	<i>PXS-L306B</i>
<i>PXS-L302A</i>	<i>PXS-L307A</i>	<i>PXS-L302B</i>	<i>PXS-L307B</i>
<i>PXS-L303A</i>	<i>PXS-L308A</i>	<i>PXS-L303B</i>	<i>PXS-L308B</i>
<i>PXS-L304A</i>	<i>PXS-L309A</i>	<i>PXS-L304B</i>	<i>PXS-L309B</i>
<i>PXS-L305A</i>	<i>PXS-L310A</i>	<i>PXS-L305B</i>	<i>PXS-L310B</i>

Section 5.0, “Design Changes,” Subsection “Polar Crane Girder and Internal Stiffener Modifications,” Sub-subsection “1) PXS Downspout Piping,” of APP-GW-GLR-607 and APP-GW-GLR-161 states that these added downspout piping are classified as AP1000 Safety Class C, seismic Category I. Mark-up of Table 2.2.3-2 to AP1000 DCD, Revision 19, Tier 1, provided in Appendix B of APP-GW-GLR-607 and APP-GW-GLR-161, further states that these added downspout piping are ASME Code Section III piping. According to the AP1000 DCD, Revision 19, Tier 2, Section 3.2.2, “AP1000 Classification System,” Subsection 3.2.2.5, “Equipment Class C,” Class C structures, systems and components are designed to codes and standards consistent with the guidelines for NRC Quality Group C. In addition, 10 CFR 50, Appendix B and ASME Code, Section III, Class 3 apply to pressure retaining components.

Section 6.0 of APP-GW-GLR-607 and APP-GW-GLR-161, Subsection “Tier 1,” states that ITAAC design commitments will be met for these added downspout piping. In addition, Table 2.2.3-4 of the AP1000 DCD, Revision 19, Tier 1, provides ITAAC that 1) ensure the piping identified in Table 2.2.3-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements; 2) pressure boundary welds in piping identified in Table 2.2.3-2 as ASME Code Section III meet ASME Code Section III requirements; and 3) piping identified in Table 2.2.3-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.

On the bases that these downspout piping are designed to ASME Code Section III, Class 3 and the quality assurance requirements of 10 CFR 50, Appendix B, and that the ITAAC related to piping listed in Table 2.2.3-4 of the AP1000 DCD, Revision 19, Tier 1 apply, the staff finds the classification of this added downspout piping acceptable. Therefore, the staff finds the proposed FSAR revisions noted above to be acceptable.

B.3 Technical Specifications

In a letter dated February 7, 2014, the applicant submitted an exemption request titled “Supplement 3 to Submittal of Exemption Request and Design Change Description for Departure from AP1000 DCD Revision 19 to Address Containment Condensate Return Cooling Design,” for LNP Units 1 and 2. As a result of the condensate return testing conducted at the Waltz Mill Test Facility, modifications to the polar crane girder, internal stiffener, and IRWST gutter designs were made. In addition, extensions of the gutter were added above the upper personnel airlock and upper equipment hatch. A downspout system was also added to capture condensation at the polar crane girder and stiffener locations. These modifications result in minor editorial changes in a few sections of the TS and Bases (Chapter 16) in the COL application.

In a letter dated November 17, 2014, and titled “Supplement 5 to Submittal of Exemption Request and Design Change Description for Departure from AP1000 DCD Revision 19 to Address Containment Condensate Return Cooling Design,” the applicant provided further details on the condensate return issue including other editorial modifications to the TS and Bases.

These changes are necessary to ensure that the TS and Bases accurately reflect the updated design and are described below.

LCO Section of B3.3.3 (Postaccident Monitoring (PAM) Instrumentation)

On page B3.3.3-4, in the last line of the first paragraph in Section 11, “In-Containment Refueling Water Storage Tank (IRWST) Water Level,” the text “...via a gutter.” is updated to “...via a gutter and downspouts.”

Background Section of B3.5.4 (Passive Residual Heat Removal Heat Exchanger (PRHR HX) – Operating)

On page B3.5.4-1, in the first and second lines of the third paragraph of the Background section, the text "...PRHR HX operation, a gutter is provided..." is updated to "...PRHR HX operation, downspouts and a gutter are provided..."

Also in that paragraph, the text in the fourth and fifth line is updated from "...collected by the gutter is directed..." to "...collected by the downspouts or gutter is directed..."

TS and SR Sections for B3.5.4.7

On page 3.5.4-3 of the TS, the text in SR 3.5.4.7 is updated from "...gutter is..." to "...gutter and downspout screens are..."

On page B3.5.4-7, the text in the first and second lines of the only paragraph in SR 3.5.4.7 is updated from "...IRWST gutters to verify..." to "...IRWST gutters and downspout screens to verify..."

Also in that paragraph, the text in the fourth and fifth lines is updated from "...the gutters could become restricted." to "...the gutter or downspout screens could become restricted."

The staff finds the proposed changes in both Supplement 3 and 5 acceptable because the changes make the TS and Bases consistent with the revised design. Therefore, the staff finds the proposed revisions noted above to be acceptable.

B.4 Risk Results and Insights

The proposed departure did not entail any change to the models used for plant-specific PRA. However, FSAR Table 19.59-202, "AP1000 PRA-Based Insights" item 1.e. was clarified to reflect how long the PRHR HX, IRWST, PCS, and condensate return features can now be relied on for core cooling.

The plant-specific PRA results and insights have been updated to account for this design change and departure. This is consistent with 10 CFR 52.79(d)(1) and is, therefore, acceptable to the staff.

Based on the above evaluation, and pending the staff's confirmation that the proposed revisions are incorporated in the Turkey Point Units 6 and 7 COL application, the staff finds the proposed revisions acceptable. The staff is tracking the proposed FSAR, TS, and TS Bases revisions proposed in the applicant's May 9, 2016, letter (ADAMS Accession No. ML16132A293), to be included in a future revision of the COL application, as **Confirmatory Item 21.1-1**.

Resolution of Turkey Point Confirmatory Item 21.1-1

Confirmatory Item 21.1-1 is a commitment by the applicant to revise the Turkey Point Units 6 and 7 COL application to provide additional information as indicated in the letter dated May 9, 2016. The staff confirmed that the Turkey Point Units 6 and 7 COL application, Revision 8 has been appropriately revised. As a result, Confirmatory Item 21.1-1 is now closed.

21.1.5 Post Combined License Activities

There are no post-COL activities related to this section.

21.1.6 Conclusion

The NRC staff reviewed the Turkey Point Units 6 and 7 application and the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the design change of the passive core cooling system, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the regulatory requirements and guidance discussed in Section 21.1.3 of this SER. The staff based its conclusion on the following:

- PTN DEP 6.3-1 and PTN DEP 3.2-1 will be acceptable once the applicant's commitments to revise the FSAR have been included in the COL application, because the described changes permit the applicant to meet the licensing basis within the bounds of the updated licensing document.

21.2 Main Control Room Dose Departure

21.2.1 Introduction

At a meeting with the staff on July 23, 2014 (ADAMS Accession Nos. ML14220A110, ML14220A111, and ML14220A113), Westinghouse Electric Company, vendor for the AP1000 design, presented some self-identified discrepancies in underlying calculations supporting the AP1000 DCD, Revision 19, DBA MCR habitability dose analyses. Westinghouse identified the need to update the DBA analyses in order to show compliance with the control room habitability regulatory requirements in 10 CFR Part 50, Appendix A, GDC 19, "Control Room," because: (1) the analyses did not account for the MCR emergency habitability system (VES) filter direct dose in the control room, (2) the nuclear island nonradioactive ventilation system (VBS) radiation monitor setpoints for control room ventilation system actuation did not account for all DBA release scenarios, and (3) the analyses that estimated the MCR dose contribution from direct radiation and skyshine used methodology that are not up-to-date. Subsequently, the staff issued RAI 7661, dated September 24, 2014 (ADAMS Accession No. ML14259A094), to the LNP Units 1 and 2 COL applicant requesting them to address this information from the AP1000 design vendor.

21.2.2 Summary of Application

FPL incorporated in Turkey Point Units 6 and 7 COL application, Revision 8, the same information that DEF incorporated into the LNP COL application related to the voluntary submittal of an exemption request and design change description for departure from the AP1000 DCD to address main control room dose. The information was originally submitted in endorsement and exemption request letter dated May 16, 2016 (ADAMS Accession No. ML16140A087).

Tier 1 and Tier 2 Departure

The applicant proposed the following Tier 1 and Tier 2 departure (DEP) from the AP1000 DCD, Revision 19:

- PTN DEP 6.4-1

In PTN DEP 6.4-1, the applicant included a departure from the AP1000 DCD, Tier 1 and Tier 2 information to reflect revised DBA dose analyses and design changes. As described in the letters referenced above, the proposed Tier 2 departure includes changes to FSAR Chapters 1, 3, 6, 7, 9, 11, 12, 14, and 15 in the Turkey Point Units 6 and 7 COL application, as well as TS and TS Bases appearing in Part 4 of the COL application and cited in FSAR Chapter 16. In addition, the applicant requested an exemption from the incorporation by reference of AP1000 DCD Tier 1 information, specifically Tier 1 Section 2.7.1, to change the VES actuation signal name from “high-high” to “High-2” and to revise Tier 1 Section 2.2.5 and Tables 2.2.5-1 and 2.2.5-5 to add information on ITAAC for added shielding below the VES filter.

For the PTN DEP 6.4-1 revisions to FSAR Chapter 15 discussed above, the DBA dose analysis calculations that supported the DCD text are effectively replaced in full by site-specific DBA dose calculations that support departure PTN DEP 6.4-1. All seven of the DBA dose analyses documented in AP1000 DCD Chapter 15 are affected by at least one change to the analysis proposed in PTN DEP 6.4-1. The revisions to the DBA dose analyses affect both the MCR and offsite dose results.

This exemption request involves departures from Tier 1 Subsection 2.7.1 and the generic TS with other Tier 2 involved departures. Therefore, these departures require NRC approval and are evaluated below.

21.2.3 Regulatory Basis

The staff reviewed the departures related to the evaluation of control room habitability systems in accordance with NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition” (SRP), Section 6.4, “Control Room Habitability System.” This guidance includes acceptance criteria that have been found acceptable by the staff for meeting the following control room habitability systems requirement:

- GDC 19, regarding providing a control room from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions

The staff used a dose criterion of 0.05 Sievert (Sv) (5 roentgen equivalent man (rem)) total effective dose equivalent (TEDE) for evaluating the control room radiological consequences resulting from DBAs, pursuant to GDC 19 of Appendix A to 10 CFR Part 50.

Because the proposed revisions to the DBA dose analyses affected the offsite dose results, the staff also evaluated the radiological consequences of DBAs against the dose criteria specified in 10 CFR 52.79(a)(1)(vi), of 0.25 Sv (25 rem) TEDE at the exclusion area boundary (EAB) for any 2-hour period, following the onset of the postulated fission product release, and 0.25 Sv

(25 rem) TEDE at the outer boundary of the low population zone (LPZ) for the duration of exposure to the release cloud.

The staff used applicable guidance in SRP Section 6.4, "Control Room Habitability System," SRP Section 15.0.3, "Design Basis Accident Radiological Consequences Analyses for Advanced Light Water Reactors," and RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," in its review of the revised AP1000 DBA radiological consequence analyses.

21.2.4 Technical Evaluation

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (LNP Units 1 and 2) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the LNP COL FSAR, Revision 9 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

Evaluation of Site Specific Content Related to Standard Content

The pertinent site-specific information that affects the DBA dose analyses supporting PTN DEP 6.4-1 is the site characteristic short-term (accident) atmospheric dispersion factor (χ/Q) values. In LNP SER Section 21.2, the staff found that the revised DBA dose analyses were appropriately incorporated by reference in the LNP FSAR because the LNP site characteristic accident χ/Q values are less than the site parameter accident χ/Q values used in the revised DBA dose analyses in LNP DEP 6.4-1, which are the same values as used in the AP1000 DCD. The Turkey Point Units 6 and 7 site characteristic accident χ/Q s are different than the LNP site characteristic accident χ/Q s. However, the Turkey Point Units 6 and 7 site characteristic accident χ/Q values are unchanged by PTN DEP 6.4-1, and for each of the DBAs, the Turkey Point Units 6 and 7 site specific χ/Q values for each time averaging period are less than the comparable design reference χ/Q values used both in the AP1000 DCD and the revised DBA dose analyses provided in PTN DEP 6.4-1. Because the staff finds that the revised DBA dose analyses are appropriately incorporated by reference by comparison of the site characteristic accident χ/Q s to the values used in the revised DBA dose analyses, any site-specific differences in the values are not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

Tier 1 and Tier 2 Departure

- PTN DEP 6.4-1

The following portion of this technical evaluation section is reproduced from Section 21.2.4 of the LNP COL application FSER.

- *LNP DEP 6.4-1*

LNP DEP 6.4-1 proposes to (1) revise the design description of the VBS to reflect the correct name of the actuation signal (high-high to High-2) for isolating the MCR penetrations, (2) reduce the allowable secondary coolant iodine activity to meet GDC 19 requirements for the main steam line break accident, and (3) address a number of other DCD changes based on issues that were identified through the design finalization process that challenge the ability of the AP1000 certified design to satisfy GDC 19.

LNP DEP 6.4-1 also provides site-specific adoption of generic revisions to the AP1000 DBA dose analyses, including calculation of the MCR dose, and proposes a design change to add radiation shielding to the VES filter. Changes are made to each of the DBA dose analyses evaluated in Chapter 15 of the AP1000 DCD as referenced in the LNP Units 1 and 2 FSAR. Staff review of the specific changes will be discussed below in the technical evaluation of the departure.

In addition, the staff reviewed a request for an exemption submitted by the applicant. The request proposed changes to Tier 1 Sections 2.2.5 and 2.7.1, Tier 1 Tables 2.2.5-1 and 2.2.5-4, and generic TS limiting condition for operation (LCO) 3.7.4 and surveillance requirement (SR) 3.7.4.1 and the related TS Bases in the AP1000 DCD. The regulatory evaluation of the exemption request appears in Subsection A, below, and the technical evaluation of the exemption request and departure appears in Subsection B, below.

A. Regulatory Evaluation of Exemption Request

A.1 Summary of Exemption

The applicant requested an exemption from the provisions of 10 CFR Part 52, Appendix D, Section III.B, "Design Certification Rule for the AP1000 Design, Scope and Contents," that require the applicant referencing a certified design to incorporate by reference Tier 1 information.³ Specifically, the applicant proposed

³ While the applicant describes the requested exemption as being from Section III.B of 10 CFR Part 52, Appendix D, the entirety of the exemption pertains to proposed departures from Tier 1 information and generic TS in the generic DCD. In the remainder of this evaluation, the NRC will refer to the exemption as an exemption from Tier 1 information and generic TS to match

to revise Tier 1 Section 2.2.5 and Tables 2.2.5-1 and 2.2.5-5 to add information on ITAAC related to the radiation shielding below the VES filter. Also, the applicant proposed to revise Tier 1 Section 2.7.1 to reflect a change to the name of the actuation signal for isolating the MCR penetrations and initiating the VES from “high-high” to “High-2”. In addition, the applicant proposed a departure from the AP1000 generic TS, specifically TS LCO 3.7.4 and TS SR 3.7.4.1 to lower the allowable value for secondary coolant iodine activity concentration from 0.1 $\mu\text{Ci/gm}$ dose equivalent iodine-131 (DEI-131) to 0.01 $\mu\text{Ci/gm}$ DEI-131.

A.2 Regulations

- 10 CFR Part 52, Appendix D, Section VIII.A.4 states that exemptions from Tier 1 information are governed by the requirements of 10 CFR 52.63(b) and 10 CFR 52.98(f). It also states that the Commission may deny such a request if the design change causes a significant reduction in plant safety otherwise provided by the design. This subsection of Appendix D also provides that a design change requiring a Tier 1 change shall not result in a significant decrease in the level of safety otherwise provided by the design.
- 10 CFR Part 52, Appendix D, Section VIII.C.4 states that an applicant may request an exemption from the generic TS or other operational requirements. The Commission may grant such a request only if it determines that the exemption will comply with the requirements of 10 CFR 52.7.
- 10 CFR 52.63(b)(1) allows an applicant or licensee to request NRC approval for an exemption from one or more elements of the certification information. The Commission may only grant such a request if it complies with the requirements of 10 CFR 52.7 which in turn points to the requirements listed in 10 CFR 50.12 for specific exemptions, and if the special circumstances present outweigh the potential decrease in safety due to reduced standardization. Therefore, any exemption from the Tier 1 information certified by Appendix D to 10 CFR Part 52 must meet the requirements of 10 CFR 50.12, 52.7, and 52.63(b)(1).

A.3 Evaluation of Exemption

As stated in Section VIII.A.4 of Appendix D to 10 CFR Part 52, an exemption from Tier 1 information is governed by the requirements of 10 CFR 52.63(b)(1) and 52.98(f). Additionally, the Commission will deny an exemption request if it finds that the requested change to Tier 1 information will result in a significant decrease in safety. As required by 10 CFR 52.63(b)(1), the Commission may, upon application by an applicant or licensee referencing a certified design, grant exemptions from one or more elements of the certification information, so long as the criteria given in 10 CFR 50.12 are met and the special circumstances as defined by 10 CFR 50.12 outweigh any potential decrease in safety due to reduced standardization.

the language of Sections VIII.A.4 and VIII.C.4 of 10 CFR Part 52, Appendix D, which specifically govern the granting of exemptions from Tier 1 information and generic TS.

As stated in Section VIII.C.4 of Appendix D to 10 CFR Part 52, the Commission may grant an exemption from generic TS of the DCD only if it determines that the exemption will comply with the requirements of 10 CFR 52.7. As stated above, Section 52.7 points to 10 CFR 50.12 for specific exemptions.

Applicable criteria for when the Commission may grant the requested specific exemption are provided in 10 CFR 50.12(a)(1) and (a)(2). Section 50.12(a)(1) provides that the requested exemption must be authorized by law, not present an undue risk to the public health and safety, and be consistent with the common defense and security. The provisions of 10 CFR 50.12(a)(2) list six special circumstances for which an exemption may be granted. It is necessary for one of these special circumstances to be present in order for NRC to consider granting an exemption request. The applicant stated that the requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subsection defines special circumstances as when “[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.” The staff’s analysis of each of these findings is presented below.

A.3.1 Authorized by Law

This exemption would allow the applicant to implement approved changes to Tier 1 Sections 2.2.5 and 2.7.1, Tier 1 Tables 2.2.5-1 and 2.2.5-5 and generic TS LCO 3.7.4 and SR 3.7.4.1. This is a permanent exemption limited in scope to particular Tier 1 information and generic TS, and subsequent changes to this information or any other Tier 1 information or generic TS would be subject to full compliance with the change processes specified in Sections VIII.A.4 and VIII.C.4 of Appendix D to 10 CFR Part 52. As stated above, 10 CFR 52.63(b)(1) allows the NRC to grant exemptions from one or more elements of the certification information, namely, as discussed in this exemption evaluation, the requirements of Tier 1. Moreover, Section VIII.C.4 allows the NRC to grant exemptions from generic TS if the exemption meets the requirements of 10 CFR 52.7 and 50.12. The staff has determined that granting of the applicant’s proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the NRC’s regulations. Therefore, as required by 10 CFR 50.12(a)(1), the exemption is authorized by law.

A.3.2 No Undue Risk to Public Health and Safety

The underlying purpose of AP1000 Tier 1 Sections 2.2.5, 2.7.1, Tier 1 Tables 2.2.5-1 and 2.2.5-5 and generic TS LCO 3.7.4 and SR 3.7.4.1 is to ensure that the plant will be constructed and operated with appropriate protection of the public health and safety and provide radiation protection to workers in the event of an accident, including radiation shielding and limitation of radioactive material that could be released to the environment.

Addition of radiation shielding below the VES filter improves worker protection from the effects of radiation and ensures that the control room operators can occupy the control room in order to take actions to maintain the plant in a safe condition during accident conditions; this change, therefore, supports the system’s intended design functions. Reducing the allowable iodine activity

concentration in the secondary coolant limits the amount of radioactive material that is available for release to the environment during accidents and, therefore, reduces the potential dose to the public from accidents to meet the offsite dose criteria for the plant siting and safety assessment. Changing the name of the VES actuation signal for isolating the MCR penetrations in Tier 1, Section 2.7.1, ensures consistency with Tier 2 design information and does not change the function of the actuation signal.

The plant-specific Tier 1 DCD and TS will continue to meet regulatory requirements for protecting public health and safety and will maintain a level of detail consistent with that which is currently provided elsewhere in Tier 1 of the plant-specific DCD. The affected design description in the plant-specific Tier 1 DCD will continue to provide the detail necessary to support the performance of the associated ITAAC. The proposed changes to Tier 1 information and generic TS are evaluated and found to be acceptable in Section 21.2.B of this safety evaluation. Therefore, the staff finds the exemption presents no undue risk to public health and safety as required by 10 CFR 50.12(a)(1).

A.3.3 Consistent with Common Defense and Security

The proposed exemption would allow the applicant to implement modifications to the Tier 1 information and generic TS requested in the applicant's submittal. This is a permanent exemption limited in scope to particular Tier 1 information and a specific TS. Subsequent changes to this information or any other Tier 1 information or generic TS would be subject to full compliance with the change processes specified in Sections VIII.A.4 and VIII.C.4 of Appendix D to 10 CFR Part 52. This change is not related to security issues. Therefore, as required by 10 CFR 50.12(a)(1), the staff finds that the exemption is consistent with the common defense and security.

A.3.4 Special Circumstances

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever application of the regulation in the particular circumstances would not serve the underlying purposes of the rule or is not necessary to achieve the underlying purpose of the rule. The underlying purpose of the specific Tier 1 Tables 2.2.5-1 and 2.2.5-5 and TS LCO 3.7.4 and SR 3.7.4.1 being modified in the exemption request is to identify and conduct surveillances of the components that will be added to the design of the VES and also the control of radioactive material in the secondary coolant. The additional components and new surveillance requirements for those components are needed so that the MCR can perform its intended functions, that is, to (1) provide a control room from which actions can be taken to operate the nuclear power unit safely under normal conditions, (2) maintain the nuclear power unit in a safe condition under accident conditions, with adequate radiation protection, and (3) permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposure in excess of 0.05 Sv (5 rem) TEDE for the duration of the accident, in accordance with GDC 19. The proposed change to the VES actuation signal name in Tier 1 Section 2.7.1 does not affect the design function of the VBS to isolate the MCR penetrations and ensures consistency with Tier 2 design information.

Using the “high-high” name for the VES actuation signal in Tier 1, Section 2.7.1, and application of the requirements in Tier 1, Tables 2.2.5-1 and 2.2.5-5 (related to the VBS and VES design description and ITAAC) and generic TS LCO 3.7.4 and SR 3.7.4.1 (related to the specific activity limit in the secondary coolant), as was previously approved for the AP1000 design certification, is not necessary to achieve the underlying purpose of those portions of the rule, given that the departures proposed by the applicant improve consistency with Tier 2 design information and improve the function of systems designed to limit doses to workers and the public. The proposed additions to the VES filter shielding supports the MCR’s intended design functions, as does the addition of ITAAC for those additional components. Likewise, the changes to the allowable iodine activity concentration in the secondary coolant supports the MCR’s intended design function and compliance with the siting and safety assessment offsite dose requirements. Reducing the TS limit for DEI-131 improves accident consequence margins for DBAs involving secondary coolant release. These changes do not affect the ability of any structures, systems, or components to perform their functions or impair safety and, therefore, meet the underlying purposes of the rule. Accordingly, because application of the requirements in Tier 1 Tables 2.2.5-1 and 2.2.5-5 and the generic TS LCO 3.7.4 and SR 3.7.4.1 is not necessary to achieve the underlying purpose of the rule, special circumstances are present. Therefore, the staff finds that special circumstances required by 10 CFR 50.12(a)(2)(ii) for the granting of an exemption from the Tier 1 information and generic TS described above are present.

A.3.5 Special Circumstances Outweigh Reduced Standardization

This exemption, if granted, would allow the applicant to change certain Tier 1 information incorporated by reference from the AP1000 DCD into the LNP COL application. An exemption from Tier 1 information may only be granted if the special circumstances of the exemption request, required to be present under 10 CFR 52.7 and 10 CFR 50.12, outweigh any reduction in standardization. The proposed exemption would add shielding under the VES filter and change the name of the VES actuation signal that isolates the MCR. The proposed changes to the VES filter shielding and VES actuation signal name support and maintain the MCR’s intended design functions.⁴

As described below in the technical evaluation, the changes to the VES filter shielding and the name of the VES actuation signal ensure the capability of the safety related VES to maintain habitability in the control room during accidents, as described in DCD Chapter 6.4 “Control Room Habitability Systems,” and meet the dose limit requirements of GDC 19. Consequently, although there is a small possibility that standardization may be slightly reduced by the granting the exemption from the specified Tier 1 requirements, the proposed exemption adding shielding to the VES filter will improve the reliability and effectiveness of the MCR and associated heating, ventilation, and air conditioning (HVAC) systems, to better allow the MCR and the VES to perform their intended

⁴ Based on the nature of the proposed changes to the plant-specific Tier 1 information in Sections 2.2.5 and 2.7.1, other AP1000 licensees and applicants may request the same exemption, preserving the intended level of standardization.

functions with respect to radiological habitability. For this reason, the staff determined that even if other AP1000 licensees and applicants do not request similar departures, the special circumstances supporting this exemption outweigh the potential decrease in safety due to reduced standardization of the AP1000 design, as required by 10 CFR 52.63(b)(1).

A.3.6 No Significant Reduction in Safety

The proposed exemption would add shielding under the VES filter and change the name of the VES actuation signal. As described below in the technical evaluation, these changes (1) ensure the design functions for the VES and the MCR are maintained, (2) ensure consistency with Tier 2 design descriptions, and (3) ensure that the requirements of GDC 19 are met for all DBAs. The proposed changes to the VES filter shielding design will maintain the MCR's key design functions and will not impair the function of the VES or the MCR. The proposed change to the VES actuation signal name does not affect the function of the VBS or VES, and, therefore, does not affect the function of the MCR. Because the proposed changes will ensure that the design functions for the VES and MCR are maintained and that the requirements of GDC 19 are met for all DBAs, there is no reduction in safety. Therefore, the staff finds that granting the exemption would not result in a significant decrease in the level of safety otherwise provided by the design, as required by 10 CFR Part 52, Appendix D, Section VIII.A.4.

A.4 Conclusion

The staff has determined that pursuant to Section VIII.A.4 of Appendix D to 10 CFR Part 52, the exemption: (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, (4) has special circumstances that outweigh the potential decrease in safety due to reduced standardization, and (5) does not significantly reduce the level of safety at the applicant's facility. The staff has also determined, pursuant to Section VIII.C.4 of Appendix D to 10 CFR Part 52, that the generic TS portion of the exemption request: (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, and (4) demonstrates the existence of special circumstances. Therefore, the staff grants the applicant an exemption from the requirements of Tier 1 Sections 2.2.5 and 2.7.1, Tables 2.2.5-1 and 2.2.5-5 and generic TS LCO 3.7.4 and generic TS SR 3.7.4.

B. Technical Evaluation of Exemption Request and Departure

As summarized above in Section 21.2.2 of this safety evaluation, the applicant proposed LNP DEP 6.4-1 to depart from the AP1000 DCD. The applicant's departure is based on new DBA radiological consequence analyses instead of the generic site analyses that AP1000 DCD Chapter 15 is based on. The remainder of the analysis assumptions, inputs, and methodologies are the same as given in AP1000 DCD that the staff previously evaluated and found acceptable in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," Initial Report, Section 15.3.

In addition to review of the departure information submitted by letter and incorporated into the FSAR and Parts 2, 4, 7, 9, and 10 of the COL application, the staff performed an audit of the applicant's proprietary calculation packages and had the opportunity during public meetings to discuss the contents of both the submittals and the audited calculations (ADAMS Accession No. ML15231A003). During the audit, the staff verified that the changes to the DBA dose analyses presented in LNP DEP 6.4-1 and reflected in the provided markups of DCD were included in the supporting DBA dose analysis proprietary calculation packages and that the calculations did not contain additional changes not reflected in LNP DEP 6.4-1. The staff's review of the proposed design changes and revisions to the DBA radiological consequences analyses, including calculation of the MCR dose, is discussed below in this section.

DBAs analyzed for radiological consequences and the corresponding AP1000 DCD sections where the radiological consequences analyses for those DBAs are discussed are given below.

<u>DCD Section</u>	<u>Design Basis Accident</u>
15.1.5.4	Main Steam Line Break (MSLB)
15.3.3.3	Reactor Coolant Pump Shaft Seizure (Locked Rotor, LRA)
15.4.8.3	Control Rod Ejection Accident (REA)
15.6.2	Small Line Break
15.6.3.3	Steam Generator Tube Rupture (SGTR)
15.6.5.3	Loss of Coolant Accident (LOCA)
15.7.4.3	Fuel Handling Accident (FHA)

B.1 MCR direct dose analysis revisions

At a public meeting with the staff on July 23, 2014, Westinghouse Electric Company presented information about some self-identified discrepancies in underlying calculations supporting the AP1000 DCD DBA MCR habitability dose analyses. Westinghouse identified the need to update the analyses in order to show compliance with GDC 19 because the analyses did not account for the MCR VES filter direct dose in the control room, and the MCR dose contribution from direct radiation and skyshine calculations used a methodology that was not up-to-date. Following this meeting, on September 24, 2014, the staff issued RAI Letter No. 121, RAI 7661 (ADAMS Accession No. ML14259A106). Section 1c of Question 06.04-2 of this RAI specifically asked for additional information regarding intended revisions to the MCR direct radiation and skyshine dose calculations.

At a public meeting held on February 26, 2015, the applicant for the LNP Units 1 and 2 COL presented information on the approaches to address three departures from the AP1000 DCD: estimated dose to MCR operators, MCR heatup, and hydrogen vent location ITAAC (ADAMS Accession No. ML15056A091). The purpose of the meeting was to discuss ways for resolving the issues identified in the July 2014 meeting, including RAI 7661, and to discuss the path for conducting the relevant staff reviews. In this meeting, the applicant indicated that

it was changing the methods for calculating direct radiation and skyshine doses to MCR operators from those used in AP1000 DCD.

Information contained in Tier 2 Sections 6.4, 9.4.1, and 11.5, of the AP1000 DCD Tier 2 describes how the two ventilation systems operate during normal and accident conditions. In summary, the VBS system, provides heating, cooling, and air exchange during normal operation. The fans, controls, and air conditioning equipment receive power from non-safety-related alternating current sources. Radiation monitors are located in the outside air inlets to the VBS system. When the safety-related radiation monitors detect a release of radioactive material, non-safety-related signals activate controls to realign non-safety-related dampers that direct airflow through charcoal and high-efficiency particulate air (HEPA) filters. These actions help reduce the amount of activity added to the MCR air and act to reduce the amount of activity already present. If inlet radioactivity levels continue to rise, a safety-related signal (High-2) from the radiation monitors actuates safety-related controls that isolate the MCR from the VBS system and actuate the safety-related VES ventilation system. The VES system uses high-pressure air from compressed air bottles to supply make-up air to the MCR. The air flows through an eductor that recirculates air in the MCR through safety-related HEPA and charcoal filters. The operation of the safety-related radiation monitors, VBS dampers, and VES actuation on a High-2 signal serve to maintain MCR operator doses less than the dose criterion of GDC 19 during accidents.

The applicant's VBS analysis supporting LNP DEP 6.4-1 assumed that the VES system did not actuate when the safety-related High-2 signal actuated. The applicant's supporting calculation for the total dose resulting from exclusive use of the VBS system without transitioning to the VES system is conservative and unnecessary for the staff to reach a safety finding.

On February 24, 2015, the staff began auditing MCR-dose-related calculation packages. The packages reviewed indicated that the direct dose contribution for some portions of the MCR dose analysis were performed using the Monte Carlo N-Particle (MCNP) radiation-transport code, Version 5, developed by Los Alamos National Laboratory. The calculation packages initially reviewed by the staff did not contain listings of the MCNP input or output files used for these calculations. Information provided in the calculation packages indicated that in one area of the plant located adjacent to the MCR, the design used a flexible radiation shielding material to reduce post-loss-of-coolant accident (LOCA) dose rates from Zone IX to Zone VIII. Radiation Zones are defined in AP1000 DCD, Tier 2 Chapter 12, "Radiation Protection," Section 12.3 "Radiation Protection Design Features," of the AP1000 DCD (ADAMS Accession No. ML11171A354), Figure 12.3-2 (Sheet 1 of 16,) "Radiation Zones, Post-Accident Legend." Zone VIII is defined as greater than 100 rem/hr (1 Sv/hr) and less than or equal to 500 rem/hr (5 Sv/hr), and Zone IX as greater than 500 rem/hr (5 Sv/hr). Other portions of the calculation packages indicated that no shielding material is included in penetration models between the Shield Building wall opening and piping or electrical cabling passing through penetrations.

The June 5, 2015, response to RAI 7661 contained in Enclosure 1 to NPD-NRC-2015-014 (ADAMS Accession No. ML15161A042), stated that

site-specific revisions for direct radiation and skyshine dose would be included in the LNP COL application. These revisions would include updated direct radiation and skyshine dose calculations to account for MCR penetrations shielding differences between the AP1000 and AP600 designs. In the AP1000 DCD, dose contributions from adjacent structure direct and skyshine radiation included in the MCR operator dose results for LOCA are based upon AP600 post-accident dose calculations and assume the presence of shielding that was not included in the AP1000 design. In LNP DEP 6.4-1, the applicant revised the post-accident radiological dose calculations to use updated AP1000 detailed design inputs and analyses for skyshine and direct radiation.

The information gathered by the staff during audits and the applicant's June 5, 2015, response to RAI 7661 led the staff to issue RAI Letter No. 130, RAI 8028, on August 7, 2015. RAI 8028 contained Questions 12.03-2 through 12.03-9, seeking additional information and clarification regarding the methods, models, and assumptions used to determine the direct and skyshine dose to the MCR operators. The applicant provided the initial response to this RAI in NPD-NRC-2015-042, dated November 2, 2015.

The calculation packages reviewed by the staff indicated that all penetrations greater than 6 inches in diameter were included in the applicant's MCNP model. The calculation packages further stated that contributions from penetrations less than 6 inches in diameter were not included in the MCNP model, but their contribution to the MCR dose was analyzed. The analysis of the contribution to MCR dose from penetrations less than 6 inches in diameter was not included in the set of initial documents reviewed by the staff.

It was not clear to the staff how the AP1000 design ensured that the contribution of direct radiation streaming through penetrations in the MCR envelope shield walls would result in MCR operator doses less than the requirements of GDC 19. In RAI 8028 Question 12.03-2, the staff asked the applicant to: (1) identify penetrations to the MCR shielding boundary, (2) identify the radiation protection design features credited for attenuating streaming radiation into the MCR, and (3) describe the direct radiation dose contribution to the MCR operators from MCR shielding penetrations. The applicant's response stated that Westinghouse had evaluated the control room layout and designed openings to identify penetrations with significant implications for radiation streaming. These penetrations were included in the MCNP model. The applicant excluded smaller penetrations from the model because "... previous analyses and informal work (using the Rockwell equations) showing streaming contributions through small penetrations is expected to be insignificant." "Reactor Shielding Design Manual," Editor Theodore Rockwell III, McGraw-Hill Book Company, Inc., 1956, available as TID-7004, Chapter 8, "Effects of Irregularities in Shields," Section 3, "Gammas," describes the referenced Rockwell equations. Using the referenced Rockwell equations, some penetration sizes representative of those portrayed in the RAI response, and the dose rates referred to in AP1000 DCD, Tier 2 Section 12.3, Figure 12.3-2, the staff performed some scoping calculations to ascertain the potential impact from penetrations on MCR operator dose. Because the Rockwell equations are not directly applicable to the radiation and shielding environment surrounding the MCR shielding envelope, the staff also performed an MCNP-based scoping analysis representing a penetration into the

MCR at a right angle to the incident radiation. The analysis performed by the staff indicated that a potential existed for exceeding the requirements of GDC 19 to some MCR operators due to radiation streaming through penetrations under the conditions analyzed in the DCD.

From the audit reviews conducted, it was not clear to the staff how the AP1000 design used flexible shielding material to prevent radiation streaming through penetrations into areas located adjacent to the MCR envelope. The staff was concerned because the environmental conditions of some of the locations where this material was located could exceed the design characteristics of the shielding material. It was not clear to the staff to what extent the AP1000 MCR shielding design relied on the use of a flexible shielding material to maintain MCR operator doses less than the requirements of GDC 19. In RAI 8028 Questions 12.03-3 and 12.03-4, the staff asked the applicant to: (1) describe where radiation protection design features such as penetration sealants are credited for attenuating direct radiation entering the MCR, and (2) identify those locations where environmental conditions could limit the serviceability of radiation protection design features such as penetration sealants that are credited for attenuating direct radiation entering the MCR. The applicant's response dated November 2, 2015, acknowledged that there were inconsistencies in the calculation packages regarding crediting the use of flexible shielding material for the MCR dose calculations. The response stated that the MCR dose provided in Enclosure 1 to NPD-NRC-2015-014 and currently certified post-accident radiation zone results do not require penetration sealant materials to be credited, and that the associated dose calculation packages were being revised to clarify this position. Because flexible shielding material is not credited in the MCR post-accident dose analysis used to demonstrate compliance with GDC 19, the staff finds this response acceptable.

NPD-NRC-2015-027 Enclosure 3, Figure 9.4.1-1 (Sheet 5 of 7), "Nuclear Island Non-Radioactive Ventilation System," shows the particulate, iodine, and noble gas airborne radiation monitor sample points upstream of the isolation valves V186 and V187. AP1000 DCD, Tier 2 Figure 7.2-1, Sheet 13 of 21, "Functional Diagram Containment and Other Protection," shows that the MCR radiation monitors are de-energized and the MCR isolation is actuated on either a High-2 radiation signal or a low battery charger input voltage for greater than 10 minutes. DCD Tier 2 Tables 8.3.2-1 through 8.3.2-4, describing 250V dc Class 1E divisional battery nominal load requirements, do not show any MCR airborne activity radiation monitors or MCR area radiation monitors, nor does it indicate any provisions for power to supply portable airborne activity monitoring equipment. Therefore, in RAI 8028 Question 12.03-7, the staff asked how the applicant would perform the surveys required by 10 CFR 20.1501 needed to ensure that the MCR filtration system was maintaining MCR dose less than the requirements of GDC 19 during post-accident conditions. The applicant's response stated that results of manual surveys are not credited as part of the AP1000 design. Such actions and the scope for the surveys mentioned in this question would likely fall within an Emergency Planning and Response Program. In addition, the applicant stated that grab samples could be taken using battery-operated equipment or a supply of ac power from a battery-backed control room outlet could be temporarily diverted to sampling equipment to obtain a grab sample of the MCR atmosphere. Because of the limited duration of

sampling and the minimal heat load provided by this type of equipment, such activities are expected to have an insignificant impact on temperatures in the MCR. The samples would be analyzed in laboratory space located outside of the MCR envelope. Because this response meets the requirements of 10 CFR 20.1501 for performing surveys, the staff finds this response acceptable.

During the audit reviews, the staff identified a number of individually minor differences between information contained within design basis documents, such as the density of concrete specified in DCD, discussions provided in calculation packages and the MCNP input/output files used to calculate MCR dose. Also, AP1000 DCD Tier 1 Table 3.3-1 "Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building," Footnote 2, states that the wall thicknesses have a tolerance of plus or minus 1 inch. The staff determined that the MCNP input/output files (proprietary) provided by the applicant used to calculate MCR dose calculations specified the nominal wall thicknesses instead of the minimum allowable wall thicknesses (ADAMS Accession Nos. ML15132A101 and ML15148A574). Using Grove Software, MicroShield Version 9.06 and MCNP6, the staff performed some scoping calculations to ascertain the potential effect on MCR operator dose. Based on the results of these calculations, it was not clear to the staff that the AP1000 design ensured that MCR operator doses would be maintained less than the requirements of GDC 19. Therefore, in RAI 8028 Questions 12.03-8 and 12.03-9, the staff asked the applicant to provide sufficient information to demonstrate that the shielding provided for MCR operators would be sufficient to maintain MCR operator doses within the limits of GDC 19, under the conditions analyzed in the DCD. The applicant's response stated that the AP1000 DCD specified the use of the Westinghouse Quality Program to define how the company meets customer and regulatory requirements. This program was designed to meet the quality requirements of the U.S. nuclear industry including 10 CFR Part 50 Appendix B and ASME NQA-1. Westinghouse procedures control the use of external computer software applied in safety-related design applications (in this case, the MCNP5 software) acquired from Non-Qualified Suppliers. The inputs to the MCNP5 code were made in accordance with the high-level Westinghouse Policies and Procedures, and the related configuration control procedures in place for design analysis applications. The applicant and Westinghouse further noted that information regarding shield walls and dimensions are noted in Tier 1, Table 3.3-1, of the licensing basis, and that the ITAAC text that introduces this table (Tier 1, Section 3.3, Item 3) states that this information is for "shielding during normal operations." Therefore, information in this table is not indicative of methods and inputs used in post-accident radiation shielding calculations and is not intended to be used for post-accident MCR operator dose calculations. The applicant and Westinghouse also stated that other conservative assumptions, such as source term assumptions, elemental make up, and concrete density during construction versus concrete density specified within the MCNP input files, provided sufficient margin to ensure that MCR dose remained within the GDC 19 dose criterion.

Following staff scoping calculations performed to evaluate the effects on MCR dose from MCR shield wall penetrations and changes in shielding thicknesses and densities, and technical discussions with the applicant during the audit, the applicant made available for audit additional information about MCR

penetrations. After reviewing the additional information, the staff continued audit discussions with the applicant and Westinghouse shielding design technical experts. The applicant agreed to provide additional information about: (1) some additional specific penetrations that were being evaluated, (2) treatment of penetrations and embedded piping running through floor shielding, (3) relative value of assumed conservatisms, and (4) a discussion of conservative assumptions that would balance against non-conservatism (ADAMS Accession No. ML16020A355).

The applicant submitted additional information to address these concerns in NPD-NRC-2016-010, dated February 9, 2016 (ADAMS Accession No. ML16042A081). As stated above, in RAI 8028 Question 12.03-2, the staff asked the applicant to provide information about potential dose to MCR operators due to radiation streaming through penetrations in the MCR shield wall envelope. The supplemental response contained in NPD-NRC-2016-010 described a sensitivity study used to ascertain the total effect of all existing penetrations included in the MCNP model to the calculated MCR operator dose. The applicant's supplemental response provided additional information to address the staff's concerns. The response stated that these studies showed that the dose resulting from penetrations was a small fraction of the total direct dose to the MCR operators. The response compared the existing modeled penetrations to the penetrations identified during the staff review. Most of the extra penetrations identified by the staff were similar in size and location to already modeled penetrations, so any incremental increase in dose from those penetrations should be small. The response provided information showing that in several cases, such as for horizontal runs of piping through shielding material, the actual dose rates within the areas adjacent to the location of the lines were only a fraction of the maximum dose rate listed for the zone.

The staff also used the response to assess treatment of penetrations and embedded piping running through floor shielding. The information contained in DCD Tier 2 Figure 3H.5-9, Sheet 2 of 3, "Auxiliary Building Finned Floor," showing the steel plate referenced in the response, in conjunction with the note on Figure 3H.5-9 stating that staff approval is required prior to implementing a change to Figure 3H.5-9, provided confirmation to the staff that other structural components not credited in the MCNP calculations were present in the design. The staff used MicroShield scoping calculations to assess the relative attenuation of an air-filled void horizontal drain system pipe combined with the additional steel plate not credited in the applicant's MCNP calculation to a solid concrete floor without the void and steel plate. The attenuation provided by the void and steel plate appeared to be less than a solid concrete floor. However, by using the information provided in the supplemental response about the localized dose rates in the adjacent rooms, the conservatisms used in the model for the operation of the VBS system, and the directional nature of the radiation in the adjacent rooms, the staff ascertained that any incremental increase in MCR dose resulting from the embedded pipe would be insignificant.

The information in supplemental response NPD-NRC-2016-010 also addressed the potential contribution to MCR dose from some staff-identified penetrations in the MCR shield wall into an area of the plant next to the Shield Building. This area contains large penetrations through the Shield Building wall which can result

in radiation streaming. The response noted that the radiation zoning for the room is due to the radiation levels next to the Shield Building penetrations. Because of the location of the penetrations in the MCR wall with respect to the Shield Building penetrations, the dose rates near the MCR wall penetrations would be significantly lower than the maximum dose rate associated with the zone designation of the room. The response also noted that because of the directional nature of the radiation streaming through the MCR wall penetrations and the location of the dose receptor point of interest inside of the MCR area, further attenuation would occur. Staff-based MCNP6 scoping calculations to assess the magnitude of the expected attenuation were consistent with the information provided in the supplemental response.

The supplemental response contained in NPD-NRC-2016-010, also addressed the staff request to have information demonstrating an understanding of the full extent of penetrations through the MCR shield wall envelope. To help quantify direct dose to operators in the MCR from the existing AP1000 control room penetrations, Westinghouse stated that, based on their analysis, the contribution from the existing penetrations was a small fraction of the total direct dose to the MCR operators. Westinghouse stated that they reviewed archived concrete drawings, reviewed archived penetration drawings, and reviewed completed design change packages, to ensure that the full scope of penetrations were identified and considered. Through reviews of the AP1000 plant three-dimensional software model, they verified that all penetrations into radiologically significant areas were identified.

Because the information provided in the supplemental response contained in NPD-NRC-2016-010 shows that the contribution to MCR operator dose from penetrations through the MCR shielding envelope would not result in exceeding the operator dose requirements of GDC 19, under the conditions analyzed in the DCD, the staff considers the issue identified in RAI 8028 Question 12.03-2 resolved.

As stated above in RAI 8028 Questions 12.03-8 and 12.03-9, the staff asked the applicant to provide sufficient information to demonstrate that the shielding provided for MCR operators would be sufficient to maintain MCR operator doses within the limits of GDC 19. The supplemental response contained in NPD-NRC-2016-010 discussed materials and construction details of the Shield Building wall that were not echoed in the applicant's/Westinghouse's MCNP shielding model. The staff also performed some scoping calculations using MCNP6 to evaluate the relative effectiveness of regular concrete versus regular concrete with embedded rebar. The staff scoping calculations showed that the degree of radiation attenuation is sensitive to variations in the location, size, or distribution of the rebar material. The level of detail in the DCD regarding location of rebar within walls and rebar size used in various walls of the plant does not support the staff performing a reliable evaluation of the relative attenuation effectiveness for generic walls.

To address the staff concerns related to the shielding design assumptions, the applicant provided a description of the conservatisms present in other portions of the MCR dose calculation, to show that any realistic non-conservatism in the shielding design assumptions were well exceeded by the conservatisms present

in the airborne activity dose calculations. In the supplemental response contained in NPD-NRC-2016-010, the applicant quantitatively discussed the relative significance of operation of the VBS system below the safety-related High-2 setpoint that would result in the transition from the non-safety-related VBS system to the safety-related VES system. The calculation used by the applicant estimated the total dose resulting from exclusive use of the VBS system without transitioning to the safety-related VES system, even though the VBS inlet airborne radioactivity concentrations would exceed the High-2 setpoints. Because the calculation assumes the non-safety related VBS system continues to operate with inlet airborne radioactivity levels above the safety related High-2 setpoint (the threshold at which the safety-related VES system actuates), this results in over estimating MCR operator dose because of airborne activity concentrations within the MCR. This is a very conservative approach, and unnecessary for the staff to reach a safety finding. As a result, a large margin exists between the 0.05 Sv (5 rem) TEDE criterion used for evaluating the VBS system performance and the total dose estimate derived from operating the VBS system below the High-2 setpoint. Because this margin ensures that the potential additional contribution to MCR operator dose resulting from the use of minimum wall thicknesses would not result in exceeding the operator dose requirements of GDC 19, under the conditions analyzed in the DCD, the staff considers the issue identified in RAI 8028 Question 12.03-8 and 12.03-9 to be resolved.

B.2 Control room filter direct dose

In its initial response to RAI 7661, dated February 6, 2015, the applicant identified that radiation contributions from MCR HVAC filters were not considered in the MCR dose analyses reported in the AP1000 DCD, Chapters 6.4 and 15. The applicant's revised DBA dose analyses include the contribution to the total MCR operator dose due to direct radiation from radioactive material estimated to accumulate on the VES and VBS filters during the accident.

The staff reviewed applicant-provided information about the direct dose from the VES and VBS filters. Because the VBS filter is located outside of the MCR envelope shielding boundary, the direct radiation dose from the VES filter is more limiting than the direct radiation dose from the VBS filter. Based on this consideration, the staff developed a scoping model using MCNP6 for the VES filter. The scoping model developed by the staff did not indicate the presence of any significant differences between the staff approach and that evidenced in the applicant's MCNP input and output files for the VES and VBS reviewed by the staff. The applicant's submittal dated July 1, 2015, states that shielding of the VES filtration unit is accomplished by safety-related metal shielding. The attenuating capability that is required is stated using tungsten as a reference. An equivalent amount of attenuation using stainless steel is also acceptable. However, neither AP1000 DCD Tier 1, Table 3.3-1, "Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building," nor DCD Tier 1, Section 2.2.5, "Main Control Room Emergency Habitability System," including Table 2.2.5-5, "Inspections, Tests, Analyses, and Acceptance Criteria," and Figure 2.2.5-1, "Main Control Room Emergency Habitability System," describe an ITAAC for verifying the presence, quantity, and the material properties of the VES shielding material. Therefore, in RAI 8028 Question 12.03-

5, the staff asked the applicant whether an ITAAC for verifying the installation of the VES shielding material required to ensure compliance with GDC 19 is necessary. In the response dated November 2, 2015, the applicant revised the proposed departure to identify the VES filter shield in Tier 1, Tables 2.2.5-1 and 2.2.5-5, including a new ITAAC item 7e, which is consistent with modifications to Tier 2 of the licensing basis presented in the proposed FSAR Section 12.3.2.2.7. Because an ITAAC exists to ensure installation of design features needed to meet the regulatory requirements of GDC 19, the staff finds this response acceptable. The staff did not identify any additional issues associated with direct radiation exposure from the VES or VBS filters.

Through the addition of the additional shielding at the VES filter and the addition of the related ITAAC, the deficiency in the DCD analysis related to the direct dose contribution from the VES filter identified in the applicant's revised analysis provided as part of LNP DEP 6.4-1 is resolved. Because additional shielding ensures that the incremental increase to MCR operator dose resulting from the use of the VES filter would not result in exceeding the operator dose requirements of GDC 19, under the conditions analyzed in the DCD. Therefore, the staff finds the proposed changes acceptable.

B.3 Radiation monitor setpoint changes

As discussed in the response to RAI 7661, dated July 1, 2015, during its re-evaluation of MCR doses to include the direct dose contribution from HVAC filters, the applicant identified that the VBS radiation monitor setpoints in the AP1000 DCD, which were based on LOCA releases, were not selected in a manner that ensures that GDC is met for non-LOCA DBAs. In addition, they determined that the setpoints did not ensure the AP1000 design objective that the non-safety-related VBS supplemental filtration mode would be used when available, instead of initiating the safety-related VES. As stated in item 4 on page 5 of Enclosure 1 to the response to RAI 7661:

For postulated accident conditions involving a reduced source term or release rate other than evaluated for DBAs as part of the certified design, there may not be sufficient radioactivity within the MCR Envelope to prompt actuation of VES, and yet, enough radioactivity could exist that would lead to operator doses in excess of 5 rem [0.05 Sv] without manual actuation. The radiation monitor setpoint values are therefore updated to ensure VBS or VES filtration mode actuation occurs for any radiological release event that could result in MCR operator doses in excess of GDC-19.

Specifically, the applicant stated on page 3 of Enclosure 1 to the response to RAI 7661:

To ensure that GDC-19 is met for all design basis accidents, site-specific revisions to the radiation monitor setpoints will be included in the LNP COL application. These revised setpoints for MCR VES actuation will be based upon concentrations for any particular monitoring channel (particulate or iodine) not exceeding an operator dose of 1 rem [0.01 Sv]—regardless of release or accident scenario. This methodology will allow for airborne radioactivity in the

control room to reach concentrations in each of the three channels at the setpoint and maintain compliance with GDC-19.

The applicant ensured that the postulated radioactive material releases for each DBA were conservatively compared to the setpoints to determine the timing of the initiation of the VES or the non-safety-related VBS supplemental filtration mode used as input to the MCR dose analyses. As the staff verified through audit of the proprietary radiation monitor setpoint calculation, the radiation monitor setpoints are calculated to correspond to a radioactive material concentration at the MCR HVAC intake that results in an MCR operator dose of 0.01 Sv (1 rem) in any channel because of the airborne release. Therefore, although the calculation of the VBS radiation monitor setpoints does not explicitly include the direct dose component of the MCR operator dose, the setpoint radioactive material concentration values provide sufficient margin to accommodate the addition of direct dose in the MCR and ensure that the GDC 19 dose criterion of 0.05 Sv (5 rem) TEDE is met. The staff finds these changes related to the VBS radiation monitor setpoints acceptable because they appropriately reflect the expected MCR HVAC system operation and provide acceptable input assumptions for use in each of the revised DBA dose analyses.

B.4 DBA dose analysis changes that affect the MCR airborne dose calculation

In addition to making changes to the DBA dose analyses to correct errors in the AP1000 DCD analysis of the direct dose component of the MCR dose as described above, the applicant revised the modeling of the MCR in the calculation of the dose to MCR operators from immersion in and inhalation of the airborne release. The applicant made these changes to the AP1000 DCD Chapter 15 analyses modeling of the MCR to partially offset the increase in MCR operator dose because of the revised direct dose calculations and to reflect general updates to the detailed design. The staff's review of these DBA dose analysis changes that affect the calculation of MCR airborne dose are discussed in the following B.4 subsections.

Although LNP DEP 6.4-1 is a site-specific departure from the AP1000 DCD, the revised DBA dose analyses provided by the applicant are generic analyses in that they use the same short-term (accident) atmospheric dispersion factor (χ/Q) values given as site parameters in AP1000 DCD, Section 2.3.4. For LNP DEP 6.4-1, no changes were made to the LNP site characteristic short-term χ/Q s given in FSAR 2.3.4; therefore, in accordance with the discussion of LNP COL 2.3-4 in Section 15A.4 of this safety evaluation, the LNP site-specific short-term χ/Q values are less than those used in the revised generic analysis supporting LNP DEP 6.4-1. The applicant did not provide site-specific doses at the EAB, LPZ, or MCR for the DBAs referenced in AP1000 DCD, Chapter 15, but instead provided the results of the revised generic DBA dose analysis, which are bounding for the LNP site.

The estimated DBA dose calculated for a particular site is affected by the site characteristics through the calculated χ/Q input to the analysis; therefore, the resulting dose would be different than that calculated generically for the AP1000

design in the revised generic analyses. All other inputs and assumptions in the radiological consequences analyses remain the same as in the revised generic analyses. Smaller χ/Q values are associated with greater dilution capability, resulting in lower radiological doses. When comparing a DCD site parameter χ/Q value and a site characteristic χ/Q value, the site is acceptable for the design if the site characteristic χ/Q value is smaller than the site parameter χ/Q value. Such a comparison shows that the site has better dispersion characteristics than that required by the reactor design.

For each of the DBAs, the LNP site-specific χ/Q values for each time averaging period are less than the comparable design reference χ/Q values used in the AP1000 DCD and the revised DBA dose analyses provided in LNP DEP 6.4-1. Because the result of the radiological consequences analysis for a DBA during any time period of radioactive material release from the plant is directly proportional to the χ/Q for that time period, and because the LNP site-specific χ/Q values are less than the comparable AP1000 design reference χ/Q values for all time periods and all accidents, the LNP site-specific estimated total dose at the EAB, LPZ, and the MCR for each DBA is, therefore, less than the generic revised estimated total dose at the same receptor location for each DBA, as provided in LNP DEP 6.4-1.

B.4.1 Increase in VES filter efficiency for organic iodine

As discussed in the response to RAI 7661, dated July 1, 2015, the applicant increased the assumed VES charcoal filter efficiency for organic iodine to 90 percent from the 30 percent value used in the AP1000 DCD Chapter 15 DBA dose analyses and the estimation of the DBA dose to the MCR operators as reported in AP1000 DCD Chapter 6.4. The applicant proposed this change to partially offset increases in the total dose to the operators related to the revised consideration of direct dose from VES filter shine and other refinements in the MCR direct dose calculations. The change in the VES filter organic iodine efficiency is noted as a revision to DCD Table 15.6.5-2, Sheet 2 of 3. The change in the assumed organic iodine efficiency for the VES filter is based upon the applicant's updated evaluation of the relative humidity expected in the MCR during post-accident operation of the VES and upon conformance with the guidance in RG 1.52, Revision 2, "Design, Testing, and Maintenance Criteria for Postaccident Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants."

As stated in Section 6.4.2.3 of the DCD incorporated by reference in the LNP COL application, the LNP VES charcoal adsorber is designed in accordance with ASME AG-1, Section FD, and RG 1.52. Each charcoal adsorber is an assembly with 2-inch deep Type II adsorber cells. RG 1.52 specifies the use of a safety factor of at least 2 when determining the appropriate methyl iodide penetration acceptance criterion in the TS for the representative sample of the charcoal adsorber. According to NRC Generic Letter 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal," the following equation is used to determine the appropriate methyl iodide allowable penetration:

$$\text{penetration} = (100\% - \text{organic iodide efficiency credited in accident analysis}) / \text{safety factor}$$

In AP1000 DCD, Table 15.6.5-2, the charcoal filter efficiency for organic iodine credited in accident analysis has been revised from 30 percent to 90 percent. The efficiencies for elemental iodine, 90 percent, and particulates, 99 percent, remain the same. Section 5.5.13 of the LNP TS requires the laboratory testing of the VES charcoal filters at 30 degrees Celsius (C) (86 degrees Fahrenheit (F)) and 95 percent RH using the American Society for Testing and Materials standard ASTM D3803, "Standard Test Method for Nuclear-Grade Activated Carbon," with a test penetration of 5 percent.

Applying the above equation, the safety factor of two is satisfied.

Therefore, the required LNP TS laboratory test will ensure that the DBA dose analysis credited efficiency of 90 percent organic iodine will conservatively be met with margin (i.e. safety factor of 2) which accounts for potential degradation over the 24-month operating cycle.

B.4.2 Changes to MCR design input assumptions

The applicant's DBA dose analyses included revisions to the analysis input assumptions on MCR and MCR HVAC volume based on updated detailed design data. In addition, the VBS intake and VBS ancillary fan intake flow rates include a 10-percent uncertainty on the nominal flow rates used in the DCD Revision 19 Chapter 15 DBA dose analyses.

The staff finds these changes acceptable because they are based on detailed design data and include appropriate consideration of uncertainty.

As discussed in the response to RAI 7661, dated July 1, 2015, the applicant determined that the time modeled in the AP1000 DCD, Chapter 15, DBA analyses for the switchover from VBS normal operation to the VBS supplemental filtration mode based on the VBS radiation monitor reaching the non-safety-related High-1 MCR HVAC system setpoint was not bounding for non-LOCA analyses when the updated detailed design information was taken into account. Similarly, the VES initiation time assumed in the DCD non-LOCA DBA analyses was not bounding. To address this concern, the applicant revised the DBA dose analyses using updated detailed design information and included a longer delay interval between the time that the VBS radiation monitor reaches the High-1 setpoint concentration and the time when the non-safety-related VBS supplemental filtration mode is operational. The applicant's revised DBA dose analyses that show compliance with GDC 19 included consideration of a longer delay interval between the time that the VBS radiation monitor reaches the High-2 setpoint concentration and the time when the safety-related VES is operational, based on updated detailed design information.

In RAI Letter No. 129, dated July 13, 2015 (ADAMS Accession No. ML15194A263), RAI 8004 Question 06.04-10, the staff asked for more information on the calculated time after the beginning of the accident that the VBS radiation monitor setpoints are reached and the timing of initiation of the

VES or VBS supplemental filtration mode. The applicant's response, dated October 13, 2015 (ADAMS Accession No. ML15289A228), provided information that listed the calculated times that the radiation monitor setpoints are reached and the times that the VES or VBS supplemental filtration mode begins operation for each of the DBAs based on the calculated radioactive material release for the specific DBA. Additional proprietary information was also provided on the estimated delay time for each event related to system initiation, including the time to detect the radioactive material, time for signal processing, and time to complete damper movement. The staff determined that the more detailed information supports the changes to the assumptions on timing of the VES and VBS systems operation made in the revised DBA dose analyses. The staff also determined that the proposed changes to DBA dose analysis input related to MCR HVAC system operation appropriately address the issue that the applicant identified where the DCD MCR dose analysis would not be bounding for non-LOCA DBAs. Therefore, the staff finds acceptable the proposed changes to the MCR design assumptions used as input to the DBA dose analyses, and RAI 8004, Question 06.04-10, is resolved.

B.5 Other DBA dose analysis changes that affect both the MCR dose and the offsite dose results

The applicant made additional changes to selected DBA dose analysis assumptions to reflect general detailed design updates. Because the proposed analysis changes result in a change of the calculated amount of radioactive material that is assumed to be released to the environment, the offsite dose results are also affected. The staff's review of these DBA dose analysis changes are discussed below in the following B.5 subsections.

B.5.1 Iodine re-evolution modeling in LOCA dose analysis

As discussed in the response to RAI 7661, dated July 1, 2015, to partially offset increases in the MCR operator dose because of addition of the VES filter shine and other analyses changes proposed in LNP DEP 6.4-1, the applicant made changes to the modeling assumptions regarding iodine re-evolution from the IRWST in the DBA LOCA dose analysis. Specifically, the proposed changes involve refining the assumed water/vapor partition factor for elemental iodine to be consistent with guidance in RG 1.183 and using updated AP1000 design information to determine revised timing associated with the conversion of elemental iodine to organic iodine and its availability for release from the IRWST fluid.

On page 6 of Enclosure 1 of the July 1, 2015, submittal, the applicant provided the following description of the specific proposed changes:

The iodine source term applied in the LOCA dose analysis supporting DCD Revision 19 is based upon the NUREG-1465 source term described in Regulatory Guide 1.183. The analysis models a staged release of core activity (i.e. gap release and early in-vessel) to the containment atmosphere over the first 2 hours following the start of the event. The chemical form of iodine released is assumed to be 95% particulate, 4.85% elemental, and 0.15% organic, consistent with Regulatory Guide 1.183. Particulate removal via passive

processes (i.e., diffusiophoresis, thermophoresis, and sedimentation) and elemental iodine removal via deposition are modeled. Organic iodine removal via processes other than decay or leakage from containment is not modeled.

Particulates removed to the containment shell are assumed to be washed off the shell by the flow of water resulting from condensing steam (i.e. condensate flow). The particulates may be either washed into the sump, which is controlled to a pH > 7 post-accident or into the IRWST, which is not pH controlled post-accident. Due to the assumed conditions in the IRWST, the particulate iodine washed into the IRWST may chemically convert to an elemental form and re-evolve, subject to partitioning, as airborne. A portion (3%) of that airborne elemental iodine is then assumed to convert to an organic form. This is consistent with elemental organic split assumed for the initial release from the core (4.85/0.15 = 97/3) and is consistent the Regulatory Guide 1.183 guidance for other events.

The calculational approach to account for the iodine that is assumed to re-evolve from the IRWST post-LOCA is overly conservative in the certified design analysis. The certified design analysis applies a water-steam partition factor of 5 for elemental iodine and neglects the time dependent formation of organic iodine from elemental iodine; the organic iodine that would be formed over time is assumed to be present at time zero.

NUREG-1465 states that "It is unduly conservative to assume that organic iodine is not removed at all from containment atmosphere, once generated, since such an assumption can result in an overestimate of the long-term doses to the thyroid." The revised analysis approach applies a conservative water/vapor elemental iodine partition factor of 10, selected to conservatively bound the time-dependent partition factors calculated using the NUREG/CR-5950 models and IRWST temperature and pH as a function of time. Additionally, the conversion of elemental iodine to organic iodine is modeled on a time-dependent basis in which 3% of the evolved elemental iodine is assumed to convert to an organic form upon its release to containment. It is noted that this does not impact the percentage of iodine assumed to convert to the organic form.

Although this description of the proposed changes to the modeling of iodine re-evolution from the IRWST fluid during a DBA LOCA was given in Enclosure 1 of the submittal dated July 1, 2015, no markup of DCD text was given to document the site-specific changes in the LNP FSAR. In RAI Letter No. 129, the staff issued RAI 8005 Question 15.00.03-4 asking for additional detail on the revised modeling of iodine re-evolution from the IRWST, including values for the time-dependent pH and partition coefficients for the water in the IRWST. The staff also asked that the applicant document the specifics of this departure from the DCD dose analysis in the LNP FSAR.

In the response to RAI 8005 Question 15.00.03-4, dated October 13, 2015, the applicant provided the requested detailed information marked as proprietary information. The staff was able to audit the proprietary LOCA DBA calculation package and verified that the LOCA DBA dose calculation inputs agreed with the information given in the RAI response. The response to Question 15.00.03-4 also provided text to describe the LNP DEP 6.4-1 change to iodine re-evolution

modeling, which the staff verified was added to Revision 8 of the LNP FSAR, Section 15.6.5.3.2.

The staff finds through review of the description of the departure that the applicant's revisions to the iodine re-evolution analysis use models and methods that have been previously found acceptable to the staff, as noted in RG 1.183. The staff also determined through review of the proprietary information provided that the applicant's inputs and assumptions reflect the AP1000 design information and are acceptable. A description of the changes made to the LOCA dose analysis modeling of iodine re-evolution from the IRWST was added to the LNP FSAR. Therefore, the staff finds the proposed changes to the modeling of IRWST iodine re-evolution acceptable and RAI 8005, Question 15.00.03-4, is resolved.

B.5.2 Increase in containment elemental iodine deposition removal coefficient

In the revised LOCA and REA dose analyses, the applicant increased the passive containment elemental iodine deposition coefficient value to 1.9 hr^{-1} from the AP1000 DCD value of 1.7 hr^{-1} . The change in the deposition removal coefficient value was calculated based on a larger containment surface area available for deposition, as determined in the AP1000 updated detailed design.

Through audit of the revised LOCA and REA dose analyses, the staff verified that the calculations used the increased containment elemental iodine deposition coefficient as input. The staff finds the increased containment elemental iodine deposition coefficient acceptable because the value was calculated using the same method that was found acceptable in review of the DCD, with the only change the incorporation of updated detailed design information as input to the calculation of the deposition coefficient.

B.5.3 Revised steam release rates for the MSLB dose analysis

The applicant calculated revised steam release rates from the secondary coolant system based on calculation of an earlier time for steam generator dry-out, which would be limiting for MCR dose estimation. As stated on page 7 of Enclosure 1 to the response to RAI 7661, dated July 1, 2015:

The AP1000 steam line break accident analysis described in DCD Revision 19 assumes a 10 minute faulted steam generator (SG) blowdown based on a Hot Zero Power (HZIP) SG mass released at an average rate. This HZIP case is conservative for offsite dose. It was determined, however, that a full power SG mass could lead to SG dry-out occurring at ~200 seconds. Earlier dry-out is more limiting for the purposes of operator post-accident dose calculations. To ensure a conservative dose for both offsite and MCR, the HZIP initial mass was retained, a bounding release rate was modeled until 300 seconds, and any remaining activity was released thereafter.

Through audit of the revised MSLB dose analyses, the staff verified that the calculation used revised steam release rates as input. Calculating an earlier time for steam-generator dry-out results in an earlier increase in the estimated release

of radioactive material to the environment because of reduced retention in the steam generators. Because there is a delay in the timing of the control room VES initiation, the calculation of the MCR dose is more sensitive to the timing of the increase in the SGTR releases, as compared to the calculation of the offsite doses. The staff finds the revised steam release rates acceptable because the values were calculated using the same method that was found acceptable in review of the DCD, with the only change to the calculation of the mass releases being the use of a more limiting power condition for the estimation of the timing of steam generator dry-out and the subsequent effect on the calculation of the MCR dose.

B.5.4 *TS secondary coolant iodine activity concentration limit reduced to 0.01 $\mu\text{Ci/gm}$ DEI-131*

In the revised dose analyses for the MSLB, REA, SGTR and LRA, in order to offset increases in the calculated MCR operator dose due to other changes in the DBA dose analyses, particularly the MSLB steam releases as discussed above in Section B.5.3, the applicant reduced the assumed secondary coolant iodine activity concentration to 0.01 $\mu\text{Ci/gm}$ DEI-131. To reflect this change, the applicant also proposed to revise the TS LCO 3.7.4 limit for secondary coolant iodine concentration from the AP1000 generic value of 0.1 $\mu\text{Ci/gm}$ DEI-131 to 0.01 $\mu\text{Ci/gm}$ DEI-131.

The site-specific departure on the TS LCO limit for secondary coolant allowable iodine concentration results in a lower amount than allowed by the AP1000 generic TS of radioactive material available for release during DBAs that include release of the secondary coolant through break flow or through steaming to cool down the RCS). The staff verified that the revised MSLB, REA, SGTR and LRA dose analyses assume that the secondary coolant is at the TS allowable limit at the beginning of the accident in accordance with the guidance in RG 1.183. Therefore, the staff finds that the proposed LNP DEP 6.4-1 change to TS LCO 3.7.4 was appropriately accounted for in the safety analyses provided to support the departure.

B.5.5 *Change in methodology to estimate fuel damage in the REA dose analysis*

The applicant revised the method to estimate fuel damage for the REA to be based on an updated accepted methodology. As stated on page 8 of Enclosure 1 to the response to RAI 7661, dated July 1, 2015:

The method for performing the REA dose analysis has changed from that applied in DCD Revision 19. As stated in NUREG-1793, the NRC accepted the use of NUREG-0800 Section 4.2 Revision 2 for design certification of the AP1000 plant. However, in NUREG-1793 Supplement 2 it is stated that:

"For COL applicants or licensees who reference the AP1000 or AP600 certified designs, the staff will review any change or departure from the certified design that requires prior NRC approval as specified in Section VIII of Appendices C and D to 10 CFR Part 52, respectively.

The staff will evaluate the reactivity-initiated accidents such as rod ejection accidents based on the acceptance criteria in effect 6 months before docketing the amendment request, such as the interim acceptance criteria specified in Appendix B to NUREG-0800 Section 4.2, Revision 3, if a change or departure in fuel design or other aspects is proposed that requires a reevaluation of final safety evaluation report Chapter 4, "Reactor," or Chapter 15, "Transient and Accident Analysis."

Due to the need to incorporate other design changes in the REA MCR operator dose calculations, NUREG-0800, Section 4.2, Revision 3, is used for recalculation of the rod ejection dose analysis, which results in a significant impact to the rod ejection dose analysis. NUREG-0800, Section 4.2, Revision 3, precludes fuel melt, providing a dose benefit, but also connects the source term to the fuel enthalpy increase, which is a significant dose penalty. The dominant contributor to the increased dose is the increase by a factor of more than 5 in alkali metal releases.

The staff evaluated the information provided in the July 1, 2015, response to RAI 7661 and through audit of the proprietary calculation package verified that the revised fuel failure assumptions were reflected in the revised REA dose analysis. The method the applicant used to estimate fuel failure and fission product release during the REA is in conformance with the guidance in SRP, Revision 3, Section 4.2, which the staff stated in NUREG-1793 is an acceptable methodology for this purpose. The staff also determined that the fuel enthalpy input to the calculation of the fuel failure was consistent with the AP1000 design information. Therefore, the staff finds acceptable the proposed changes in LNP DEP 6.4-1 related to the estimation of fuel failure for the REA dose analysis.

B.5.6 Increase in SG moisture carryover assumptions

In the revised dose analyses for the REA, SGTR, and LRA, the assumed full-power moisture carryover from the steam generators was increased from the value of 0.1 percent used in AP1000 DCD to 0.35 percent to be consistent with the updated AP1000 detailed design.

In RAI Letter 129, RAI 8005, Question 15.00.03-2, dated July 13, 2015, the staff noted that using the increased full-power moisture carryover from the steam generators of 0.35 percent to model alkali metal releases to the environment in the revised DBA analyses that assume release through the secondary system is consistent with guidance in Appendix E of RG 1.183 (ADAMS Accession No. ML15194A263). However, the staff also noted that the value for the full-power moisture carryover is larger than the maximum weight percent moisture carryover value of 0.25 percent listed in AP1000 DCD Table 5.4-4, "Steam Generator Design Requirements," and asked that applicant clarify this apparent discrepancy. In its response to RAI 8005, Question 15.00.03-2, dated October 13, 2015, the applicant stated that the value of 0.35 percent for moisture carryover used in the REA, SGTR, and LRA dose analyses was chosen to be a conservative bounding value for analysis purposes, and is considered to be an upper bound for the amount of moisture carryover that could be expected during plant operation and is consistent with the value considered in RCS design (ADAMS Accession No. ML15289A228). The staff agrees that using the larger

moisture carryover assumption in the DBA dose analyses is conservative for the design. Therefore, the staff finds that the use of a conservative steam generator moisture carryover assumption in the DBA dose analyses is acceptable, and RAI 8005, Question 15.00.03-2, is resolved.

B.5.7 Additional changes to SGTR dose analysis assumptions

In addition to changes to the steam generator moisture carryover and the assumed secondary coolant iodine activity concentration in the revised SGTR dose analysis, the applicant proposed to increase the duration of steam releases from the values used in the AP1000 DCD and decrease the initial values assumed for the reactor coolant mass and secondary coolant mass.

In RAI Letter 129, RAI 8005, Question 15.00.03-3, the staff requested that the applicant provide the basis for these proposed changes to the SGTR dose analysis. In the response to RAI 129, Question 15.00.03-3, the applicant stated that the changes were conforming changes to reflect the updated AP1000 detailed design and are conservative values to provide additional margin for future design updates. Through audit of the revised SGTR dose analyses, the staff verified that the calculation used the proposed revisions to the duration of steam release and the primary and secondary coolant mass values as input to the analyses. Because the applicant made these changes to reflect the updated detailed design and to provide additional analysis margin, the staff finds the changes acceptable, and RAI 8005, Question 15.00.03-3, is resolved.

B.5.8 Change in assumed fuel radial peaking factor to account for advanced first core design

In the revised dose analyses for the REA, LRA, and FHA, the applicant changed the fuel radial peaking factor to a value of 1.75, which is higher than the value of 1.65 used in the AP1000 DCD DBA dose analyses. The increase in the fuel radial peaking factor was proposed in order to provide additional analysis margin for future core design changes. This results in a 6 percent increase to the estimated amount of radioactive material released from the fuel.

Through audit of the revised REA, LRA, and FHA dose analyses, the staff verified that the calculations used the increased fuel radial peaking factor as input to the analyses. Because the applicant proposed the increased fuel radial peaking factor as a conservative multiplying factor to provide additional analysis margin, the staff finds the increased radial peaking factor acceptable.

B.5.9 Small line break flashing fraction increased based on updated detailed design

The applicant's revised small line break dose analysis included an increase in the assumed fraction of reactor coolant flashing to steam from the value that was used in AP1000 DCD small line break dose analysis. The flashing fraction is increased from 0.41 to 0.47 based on the updated AP1000 detailed design and the determination that the RCS hot leg temperature should be used to calculate the flashing fraction instead of basing it on the vessel average temperature as was done in the AP1000 DCD small line break dose analysis.

Through audit of the revised small line break dose analyses, the staff verified that the calculation used increased flashing fraction as input. The staff finds the revised flashing fraction acceptable because the value was calculated using the same method that was found acceptable in review of the AP1000 DCD, with the only change to the calculation of the flashing fraction being the correction of the coolant temperature, which was based on updated detailed design information.

B.6 *Comparison of revised DBA doses to regulatory criteria*

Because the revised generic DBA dose analyses that support LNP DEP 6.4-1 show that the offsite radiological consequences meet the regulatory dose requirements of 10 CFR 52.79(a)(1)(vi), and because, by the reasoning above in Section B.4, the LNP site-specific DBA radiological consequences are estimated to be less than those calculated in the revised generic DBA dose analyses, the applicant has sufficiently shown that the DBA offsite radiological consequences meet the requirements 10 CFR 52.79(a)(1)(vi).

Because the revised generic DBA dose analyses that support LNP DEP 6.4-1 show that the DBA MCR radiological consequences meet the regulatory dose requirements of GDC 19, and because, by the reasoning above in Section B.4, the LNP site-specific DBA MCR radiological consequences are estimated to be less than those calculated in the revised generic DBA MCR dose analyses, the applicant has sufficiently shown that the DBA MCR radiological consequences meet the requirements of GDC 19.

Based on the technical evaluation discussion above in Section B, the staff finds that LNP DEP 6.4-1 sufficiently addresses the concerns raised in RAI 7661, Question 06.04-2. Therefore, RAI 7661, Question 06.04-2 is resolved.

B.7 *Risk Results and Insights*

This design departure does not alter the description of AP1000 design features relevant to human performance in the control room. It does not modify the plant-specific PRA model used for licensing. Consequently, there is no change to the risk profile described in the COL application or the risk insights concerning the control room AP1000 DCD Revision 19, Table 19.59-18, item 20. Instead, the change improves confidence in the validity of the reported risk results and insights. Consistent with DC/COL ISG 003, "PRA Information to Support Design Certification and Combined License Applications," the plant-specific PRA remains acceptable to the staff.

Based on the above evaluation, and pending the staff's confirmation that the proposed revisions are incorporated in the Turkey Point Units 6 and 7 COL application, the staff finds the proposed revisions acceptable. The staff is tracking the proposed FSAR, ITAAC, TS, and TS Bases revisions proposed in the applicant's May 16, 2016, letter (ADAMS Accession No. ML16140A087), to be included in a future revision of the COL application, as **Confirmatory Item 21.2-1**.

Resolution of Turkey Point Confirmatory Item 21.2-1

Confirmatory Item 21.2-1 is a commitment by the applicant to revise the Turkey Point Units 6 and 7 COL application to provide additional information as indicated in the letter dated May 16, 2016. The staff confirmed that the Turkey Point Units 6 and 7 COL application, Revision 8 has been appropriately revised. As a result, Confirmatory Item 21.2-1 is now closed.

21.2.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff finds acceptable Item 7e proposed to be inserted in DCD Table 2.2.5-5, reproduced below in Table 21.2-1.

Table 21.2-1: DCD ITAAC Item 7e from DCD Table 2.2.5-5, as Revised by PTN DEP 6.4-1

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7e) Shielding below the VES Filter is capable of providing attenuation that is sufficient to ensure main control room doses are below an acceptable level during VES operation.	Inspection will be performed for the existence of a report verifying that the as-built shielding meets the requirements for functional capability.	A report exists and concludes that the as-built shielding identified in Table 2.2.5-1 meets the functional requirements and exists below the filtration unit, and within its vertical projection.

21.2.6 Conclusion

The staff reviewed the application for proposed departure number PTN DEP 6.4-1 and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to the departure, including the design change and revised DBA dose analyses related to addressing errors in the AP1000 DCD MCR dose assessment, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the regulatory requirements and guidance discussed in Section 21.2.3 of this SER. The staff based its conclusion on the following:

- Based on the evaluation discussed above, the staff concludes that the revised DBA dose departure from the AP1000 design certification rule at the Turkey Point Units 6 and 7 site meets the 10 CFR 52.79(a)(1)(vi) dose criteria and the offsite dose acceptance criteria, as given in SRP 15.0.3 and RG 1.183 for these accidents.
- The staff finds reasonable assurance that the VES, under High-2 radiological conditions as described in FSAR Section 6.4 and PTN DEP 6.4-1, can mitigate the dose in the MCR following DBAs to meet the dose acceptance criterion specified in GDC 19.
- The staff finds it reasonable that if available, the non-safety-related VBS as described in FSAR Sections 6.4 and 9.4.1, and in PTN DEP 6.4-1 can mitigate the dose in the MCR following DBAs to be within 0.05 Sv (5 rem) TEDE.

21.3 Main Control Room Heat Load

21.3.1 Introduction

The AP1000 DCD Tier 2, Section 6.4.3.2, describes how the temperature and humidity in the MCR pressure boundary remain within limits for reliable human performance over a 72-hour period. At a public meeting held on July 23, 2014 (ADAMS Accession Nos. ML14192A803 and ML14220A113), with Westinghouse, the staff received information that a more limiting transient had been identified and that additional heat sources exist in the control room that were not accounted for in the original analysis that may challenge the ability of the plant to meet control room habitability requirements and equipment qualification limits.

The AP1000 design normally uses the non-safety related nuclear island VBS to provide heating, ventilation, cooling, and filtration to the MCR when power is available. During events where VBS is unavailable, however, the MCR VES uses a combination of bottled air and passive heat sinks to maintain the MCR in a habitable state. As a result of development of the detailed AP1000 design, the applicant identified that the VES is not capable of maintaining the MCR in an acceptable condition for human performance during certain transients. Acceptability, in the certified design, is defined as an MCR effective temperature of 85 °F (29 °C), which corresponds to a dry bulb temperature of 95 °F (35 °C) with a relative humidity (RH) of 50 percent.

During events where the MCR is isolated (e.g., because of radiological conditions exceeding the VES actuation setpoint or both trains of VBS are unavailable) and VES is actuated, but offsite power is available to power other plant equipment, the heat loads in the MCR further exceed those set forth in the certified design. In a letter dated May 6, 2016 (ADAMS Accession No. ML16131A674), the applicant endorsed RAI responses on the LNP docket stating that the heat sources in the MCR exceeded those assumed in the DCD. As such, an event resulting in MCR isolation with offsite power available would result in significantly higher heat loads than described in the DCD, and so a revised approach to evaluate the heat load in the MCR was required. The applicant proposed a design change to add a load shedding arrangement to some of the MCR heat loads, changed the acceptance criteria for the MCR temperature for human performance to a wet bulb globe temperature of 90 °F (32 °C) (consistent with NUREG-0700, Revision 2, "Human-System Interface Design Review Guidelines" for an unlimited stay time), revised the curve defining equipment qualification limits, revised the analysis supporting the habitability of the MCR to incorporate the new heat loads and other analysis changes, and changed the classification of a set of valves in the VES from inactive to active.

21.3.2 Summary of Application

FPL incorporated in Turkey Point Units 6 and 7 COL application, Revision 8, the same information that DEF incorporated into the LNP COL application related to the voluntary submittal of an exemption request and design change description for departure from the AP1000 DCD to address main control room heat load. The information was originally submitted in endorsement and exemption request letter dated May 6, 2016 (ADAMS Accession No. ML16131A674).

Tier 1 and Tier 2 Departure

The applicant included the following Tier 1 and Tier 2 departure from the AP1000 DCD:

- PTN DEP 6.4-2

AP1000 DCD, Revision 19, Tier 2 Section 6.4.3.2, describes how the temperature and humidity in the MCR are maintained within the limits for reliable human performance. The applicant requested an exemption and site specific departure PTN DEP 6.4-2 from the AP1000 DCD, Revision 19, for the Turkey Point Units 6 and 7 COL application to address newly identified limiting transients and heat sources in the MCR.

This exemption request proposes changes to plant-specific DCD Tier 1 information and generic TS with other Tier 2 involved departures. Therefore, these departures require NRC approval and are evaluated below.

21.3.3 Regulatory Basis

The acceptance criteria for the staff review of the design and qualification of the MCR habitability system include the following:

- 10 CFR Part 50, Appendix A, GDC 2 requires that safety-related portions of the control room ventilation system be designed to withstand the effects of natural phenomena. Meeting the requirements associated with GDC 2 provides assurance that the habitability of the control room area will be maintained and that equipment in the control room will operate as designed, thereby minimizing the potential for loss of function.
- GDC 4 requires that SSCs important to safety be designed to accommodate the effects of environmental conditions of normal operation, maintenance, testing, and postulated accidents. Meeting the requirements associated with GDC 4 provides assurance that control room ventilation system will support the functioning of systems and components important to safety by maintaining suitable environmental conditions for performance of safety functions.
- GDC 19 requires that the control room remain functional to the degree that actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain the plant in a safe condition under accident conditions. This is accomplished by providing adequate protection to equipment and operators to permit access to and occupy the control room under accident conditions.

The acceptance criteria associated with the human factors review include the following:

- 10 CFR 50.34(f)(2)(iii), which requires a control room design that reflects state-of-the-art human factor principles. Guidance applicable to design-related human factors principles is set out in NUREG-0700.

The acceptance criteria for the staff review of the design and qualification of the instrumentation and controls include the following:

- 10 CFR 50.55a(h)(3), "Protection and Safety Systems," requires compliance with Institute of Electrical and Electronics Engineers (IEEE) Std. 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," and the correction sheet dated January 30, 1995. Clause 5.1 of IEEE Std. 603-1991, "Single Failure Criterion," requires, in part, that safety systems shall perform all safety functions required for a design-basis event in the presence of (1) any single detectable failure within the safety systems concurrent with all identifiable but non-detectable failures, (2) all failures caused by the single failure, and (3) all failures and spurious system actuations that cause or are caused by the design-basis event requiring the safety functions. Clause 5.6.3 of IEEE Std. 603-1991, "Between Safety Systems and Other Systems," requires, in part, that the safety system design shall be such that credible failures in and consequential actions by other systems, as documented in Clause 4.8 of the design basis, shall not prevent the safety systems from meeting the requirements of this standard.
- GDC 13, "Instrumentation and Control," requires, in part, that instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety.
- Clause 5.4 of IEEE Std. 603-1991, "Equipment Qualification," requires safety system equipment be qualified by type test, previous operating experience, or analysis, or any combination of these three methods, to substantiate that it will be capable of meeting, on a continuing basis, the performance requirements as specified in the design basis.

The acceptance criteria for the staff review of the design, qualification (functional, seismic, and environmental), and inservice testing (IST) programs for safety-related valves include the following:

- GDC 1 requires that valves important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. Meeting the requirements of GDC 1 provides assurance that valves important to safety are capable of performing their intended safety functions.
- GDC 2 requires that components important to safety be designed to withstand the effects of expected natural phenomena, combined with appropriate effects of normal and accident conditions, without loss of capability to perform their safety functions. Meeting the requirements of GDC 2 provides assurance that valves important to safety are capable of withstanding the effects of expected natural phenomena while performing their safety functions during and after the occurrence of those phenomena, as applicable.
- GDC 4 requires that components important to safety be designed to accommodate the effects of, and be compatible with, the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents. Meeting the requirements of GDC 4 provides assurance that the components can withstand those effects and perform their intended safety functions.
- 10 CFR 50.55a(f) requires that applicable valves whose function is required for safety be assessed for operational readiness in accordance with the applicable revision to the

ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code). Meeting the requirements of 10 CFR 50.55a(f) provides assurance that applicable valves important to safety are capable of performing their intended safety function.

21.3.4 Technical Evaluation

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (LNP Units 1 and 2) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the LNP COL FSAR, Revision 9 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant, with the exception discussed below.

Evaluation of Site Specific Content Related to Standard Content

In Section 6.2 this safety evaluation report, the staff evaluated departure PTN DEP 2.0-3, which increased the maximum safety wet bulb (noncoincident) air temperature from 30.06 °C (86.1 °F) to 30.78 °C (87.4 °F) and PTN DEP 2.0-2, which increased the maximum normal wet bulb (noncoincident) air temperature from 26.72 °C (80.1 °F) to 27.5 °C (81.5 °F). The staff evaluated the impact of these changes on various SSCs, including the impact on subsequent departure requests. These design changes are generally applicable to the AP1000, but because of the higher maximum safety wet-bulb used by the Turkey Point applicant, the staff evaluated the impact of these increased temperatures on the design changes.

With regards to MCR heatup, the departure regarding the maximum safety wet bulb air temperature has an impact only on the MCR heatup analysis in the first 72 hours. The ambient outdoor humidity has a negligible impact on the MCR conditions because the MCR remains isolated for the first 72 hours (and thus the humidity in the MCR is unaffected by the new outdoor wet bulb temperature). There is no change in maximum outdoor dry bulb temperature, which provides a minor input to the analysis as the initialization condition of the exterior walls. The change to the normal wet bulb temperature impacts the post-72 hour period. The assumed wet bulb temperature after 72 hours is based on the normal wet bulb temperature of the ambient air plus additional margin to account for the additional moisture added by the operators. The change in moisture content of the outside air reduces the margin available, but the normal outdoor wet bulb temperature remains lower than the wet bulb temperature of air in the control room assumed in the analysis. Staff evaluated the assumed inputs and control room parameters in comparison to conservative historical data and found the applicant's analyses

acceptable. Further impact on the findings related to MCR habitability due to the change in siting is addressed below in the technical evaluation for MCR heatup.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

Tier 1 and Tier 2 Departures

- PTN DEP 6.4-2

The following portion of this technical evaluation section is reproduced from Section 21.3.4 of the LNP COL application FSER.

- *LNP DEP 6.4-2*

LNP DEP 6.4-2 proposes to change the safety-related MCR VES to control the heat-up of the MCR envelope (MCRE) following VES actuation to meet the licensing basis requirements for equipment qualification and human factors engineering, described in DCD Tier 1 Subsection 2.2.5 and would also add generic TS to conduct surveillances of the revised components of the VES. The proposed changes do not change the VES safety-related design requirements and design functions.

The staff reviewed a request for an exemption submitted by the applicant. The request proposed changes to Tier 1 Tables 2.5.2-3, 2.5.2-4, 2.2.5-4, and 2.2.5-1 in the AP1000 DCD and generic TS 3.3.2, TS Table 3.3.2-1, TS 3.7.6, and TS surveillances (SRs) 3.7.6.3, 3.7.6.8, and 3.7.6.12. Additionally, the staff reviewed the associated changes to Tier 2 information for potential effects on safety functions of the MCR VES and the associated TS Bases in Chapter 16. The regulatory evaluation of the exemption request appears in Subsection A, below, and the technical evaluation of the exemption request and departure appears in Subsection B, below.

A. Regulatory Evaluation of Exemption Request

A.1 Summary of Exemption

The applicant requested an exemption from the provisions of 10 CFR Part 52, Appendix D, Section III.B, "Design Certification Rule for the AP1000 Design, Scope and Contents," that require the applicant referencing a certified design to incorporate by reference Tier 1 information. Specifically, the applicant proposed to revise Tier 1 Tables 2.5.2-3, 2.5.2-4, 2.2.5-4, and 2.2.5-1 (1) to ensure the VES design functions to maintain heat loads inside the MCRE within design-basis assumptions to limit the heat-up of the room, (2) to ensure a 72-hour supply of breathable-quality air for the occupants of the MCRE, (3) to maintain the MCRE pressure boundary at a positive pressure with respect to the

surrounding areas, and (4) to provide a passive recirculation flow of MCRE air to maintain MCR dose rates below an acceptable level during VES operation.⁵

A.2 Regulations

- 10 CFR Part 52, Appendix D, Section VIII.A.4 states that exemptions from Tier 1 information are governed by the requirements of 10 CFR 52.63(b)(1) and 10 CFR 52.98(f). It also states that the Commission will deny such a request if the design change causes a significant reduction in plant safety otherwise provided by the design. This subsection of Appendix D also provides that a design change requiring a Tier 1 change shall not result in a significant decrease in the level of safety otherwise provided by the design.
- 10 CFR Part 52, Appendix D, Section VIII.C.4 states that an applicant may request an exemption from the generic TS or other operational requirements. The Commission may grant such a request only if it determines that the exemption will comply with the requirements of 10 CFR 52.7.
- 10 CFR 52.63(b)(1) allows an applicant or licensee to request NRC approval for an exemption from one or more elements of the certification information. The Commission may only grant such a request if it complies with the requirements of 10 CFR 52.7, which in turn points to the requirements listed in 10 CFR 50.12 for specific exemptions, and if the special circumstances present outweigh the potential decrease in safety due to reduced standardization. Therefore, any exemption from the Tier 1 information certified by Appendix D to 10 CFR Part 52 must meet the requirements of 10 CFR 50.12, 52.7, and 52.63(b)(1).

A.3 Evaluation of Exemption

As stated in Section VIII.A.4 of Appendix D to 10 CFR Part 52, an exemption from Tier 1 information is governed by the requirements of 10 CFR 52.63(b)(1) and 52.98(f). Additionally, the Commission will deny an exemption request if it finds that the requested change to Tier 1 information will result in a significant decrease in safety. Pursuant to 10 CFR 52.63(b)(1), the Commission may, upon application by an applicant or licensee referencing a certified design, grant exemptions from one or more elements of the certification information, so long as the criteria given in 10 CFR 50.12 are met and the special circumstances as defined by 10 CFR 50.12 outweigh any potential decrease in safety due to reduced standardization.

⁵ Although the applicant describes the requested exemption as being from Section III.B of 10 CFR Part 52, Appendix D, the entirety of the exemption pertains to proposed departures from Tier 1 information and generic TS in the generic DCD. In the remainder of this evaluation, the NRC will refer to the exemption as an exemption from Tier 1 information and generic TS to match the language of Sections VIII.A.4 and VIII.C.4 of 10 CFR Part 52, Appendix D, which specifically govern the granting of exemptions from Tier 1 information and generic TS.

As stated in Section VIII.C.4 of Appendix D to 10 CFR Part 52, the Commission may grant an exemption from generic TS of the DCD only if it determines that the exemption will comply with the requirements of 10 CFR 52.7. As stated above, Section 52.7 points to 10 CFR 50.12 for specific exemptions.

Applicable criteria for when the Commission may grant the requested specific exemption are provided in 10 CFR 50.12(a)(1) and (a)(2). Section 50.12(a)(1) provides that the requested exemption must be authorized by law, not present an undue risk to the public health and safety, and be consistent with the common defense and security. The provisions of 10 CFR 50.12(a)(2) list six special circumstances for which an exemption may be granted. It is necessary for one of these special circumstances to be present in order for NRC to consider granting an exemption request. The applicant stated that the requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subsection defines special circumstances as when “[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.” The staff’s analysis of each of these findings is presented below.

A.3.1 Authorized by Law

This exemption would allow the applicant to implement approved changes to Tier 1 Tables 2.5.2-3, 2.5.2-4, 2.2.5-4, and 2.2.5-1 and generic TS 3.3.2, TS Table 3.3.2-1, TS 3.7.6, and TS SRs 3.7.6.3, 3.7.6.8, and 3.7.6.12. This is a permanent exemption limited in scope to particular Tier 1 information and generic TS, and subsequent changes to this information or any other Tier 1 information or generic TS would be subject to full compliance with the change processes specified in Sections VIII.A.4 and VIII.C.4 of Appendix D to 10 CFR Part 52. As stated above, 10 CFR 52.63(b)(1) allows the NRC to grant exemptions from one or more elements of the certification information, namely, as discussed in this exemption evaluation, the requirements of Tier 1. Moreover, Section VIII.C.4 allows the NRC to grant exemptions from generic TS if the exemption meets the requirements of 10 CFR 52.7 and 50.12. The staff has determined that granting of the applicant’s proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the NRC’s regulations. Therefore, as required by 10 CFR 50.12(a)(1), the exemption is authorized by law.

A.3.2 No Undue Risk to Public Health and Safety

The underlying purpose of AP1000 Tier 1 Tables 2.5.2-3, 2.5.2-4, 2.2.5-4, and 2.2.5-1 and generic TS 3.3.2, TS Table 3.3.2-1, TS 3.7.6, and TS SRs 3.7.6.3, 3.7.6.8, and 3.7.6.12 is to ensure that the plant will be constructed and operated with a safe and reliable VES in the event of an accident.

The changes to the VES system description and associated TS (1) ensure the VES design functions to maintain heat loads inside the MCRE within design-basis assumptions to limit the heat-up of the room, (2) ensure a 72-hour supply of breathable-quality air for the occupants of the MCRE, (3) maintain the MCRE pressure boundary at a positive pressure with respect to the surrounding areas, and (4) provide a passive recirculation flow of MCRE air to maintain MCR dose rates below an acceptable level during VES operation. The changes to the

VES system therefore support the system's intended design functions. The plant-specific Tier 1 DCD and TS will continue to meet regulatory requirements for protecting public health and safety and will maintain a level of detail consistent with what is provided elsewhere in Tier 1 of the plant-specific DCD. The affected design description in the plant-specific Tier 1 DCD will continue to provide the detail necessary to support the performance of the associated ITAAC. The proposed changes to Tier 1 information and generic TS are evaluated and found to be acceptable in Section 21.3 of this safety evaluation. Therefore, the staff finds the exemption presents no undue risk to public health and safety as required by 10 CFR 50.12(a)(1).

A.3.3 Consistent with Common Defense and Security

The proposed exemption would allow the applicant to implement modifications to the Tier 1 information and generic TS requested in the applicant's submittal. This is a permanent exemption limited in scope to particular Tier 1 information and a specific TS. Subsequent changes to this information or any other Tier 1 information or generic TS would be subject to full compliance with the change processes specified in Sections VIII.A.4 and VIII.C.4 of Appendix D to 10 CFR Part 52. This change is not related to security issues. Therefore, as required by 10 CFR 50.12(a)(1), the staff finds that the exemption is consistent with the common defense and security.

A.3.4 Special Circumstances

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever application of the regulation in the particular circumstances would not serve the underlying purposes of the rule or is not necessary to achieve the underlying purpose of the rule. The underlying purposes of the specific Tier 1 Tables 2.5.2-3, 2.5.2-4, 2.2.5-4, and 2.2.5-1 modified in the exemption request is (1) to ensure the VES design functions to maintain heat loads inside the MCRE within design-basis assumptions to limit the heat-up of the room, (2) to ensure a 72-hour supply of breathable-quality air for the occupants of the MCRE, (3) to maintain the MCRE pressure boundary at a positive pressure with respect to the surrounding areas, and (4) to provide a passive recirculation flow of MCRE air to maintain MCR dose rates below an acceptable level during VES operation. The underlying purposes of the specific generic TS 3.3.2, TS Table 3.3.2-1, TS 3.7.6, and TS SRs 3.7.6.3, 3.7.6.8, and 3.7.6.12 modified in the exemption request is to identify and conduct surveillances of the components that will be revised in the design of the VES. The revised components and new surveillance requirements for those components ensure that the VES can perform its intended function.

Application of the requirements in Tier 1 Tables 2.5.2-3, 2.5.2-4, 2.2.5-4, and 2.2.5-1 and generic TS 3.3.2, TS Table 3.3.2-1, TS 3.7.6, and TS SRs 3.7.6.3, 3.7.6.8, and 3.7.6.12 is not necessary to achieve the underlying purpose of those portions of the rule. The proposed revisions to the VES support the system's intended design functions, as does the addition of generic TS to conduct surveillances of those revised components. The system and tables listing its components and surveillances, as modified in the requested exemption, will continue to perform its intended function and will, therefore, meet the underlying purpose of the rule. Accordingly, because application of the requirements in

Tier 1 Tables 2.5.2-3, 2.5.2-4, 2.2.5-4, and 2.2.5-1 and generic TS 3.3.2, TS Table 3.3.2-1, TS 3.7.6, and TS SRs 3.7.6.3, 3.7.6.8, and 3.7.6.12 is not necessary to achieve the underlying purpose of the rule, special circumstances are present. Therefore, the staff finds that special circumstances required by 10 CFR 50.12(a)(2)(ii) for the granting of an exemption from the Tier 1 information and generic TS described above.

A.3.5 Special Circumstances Outweigh Reduced Standardization

This exemption, if granted, would allow the applicant to change certain Tier 1 information incorporated by reference from the AP1000 DCD into the LNP COL application. An exemption from Tier 1 information may only be granted if the special circumstances of the exemption request, required to be present under 10 CFR 52.7 and 10 CFR 50.12, outweigh any reduction in standardization. The proposed exemption would modify the VES to support the system's intended design functions. The proposed additions to the system support the system's intended design functions and the key design functions of the VES will be maintained.⁶

As described below in the technical evaluation, the changes to the VES (1) maintain heat loads inside the MCRE within design-basis assumptions to limit the heat-up of the room, (2) ensure a 72-hour supply of breathable-quality air for the occupants of the MCRE, (3) maintain the MCRE pressure boundary at a positive pressure with respect to the surrounding areas, and (4) provide a passive recirculation flow of MCRE air to maintain MCR dose rates below an acceptable level during VES operation. While there is a small possibility that standardization may be slightly reduced by granting the exemption from the specified Tier 1 requirements, the proposed exemption modifying the VES will result in no reduction in the level of safety. For this reason, the staff determined that, even if other AP1000 licensees and applicants do not request similar departures, the special circumstances supporting this exemption outweigh the potential decrease in safety because of reduced standardization of the AP1000 design, as required by 10 CFR 52.63(b)(1).

A.3.6 No Significant Reduction in Safety

The proposed exemption would modify the VES from the design presented in the original application. As described below in the technical evaluation, the changes to the VES (1) maintain heat loads inside the MCRE within design-basis assumptions to limit the heat-up of the room, (2) ensure a 72-hour supply of breathable-quality air for the occupants of the MCRE, (3) maintain the MCRE pressure boundary at a positive pressure with respect to the surrounding areas, and (4) provide a passive recirculation flow of MCRE air to maintain MCR dose rates below an acceptable level during VES operation. Because the proposed changes will ensure that the VES design will support the system's intended design functions and will not adversely affect its function, there is no reduction in the level of safety. Therefore, the staff finds that granting the exemption would

⁶ Based on the nature of the proposed changes to the generic Tier 1 information in Tables 2.5.2-3, 2.5.2-4, 2.2.5-4, and 2.2.5-1, which maintain and support the design functions of the VES, other AP1000 licensees and applicants may request the same exemption, preserving the intended level of standardization.

not result in a significant decrease in the level of safety otherwise provided by the design, as required by 10 CFR Part 52, Appendix D, Section VIII.A.4.

A.4 Conclusion

The staff has determined that, as required by Section VIII.A.4 of Appendix D to 10 CFR Part 52, the exemption: (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, (4) has special circumstances that outweigh the potential decrease in safety because of reduced standardization, and (5) does not significantly reduce the level of safety at the applicant's facility. The staff has also determined, pursuant to Section VIII.C.4 of Appendix D to 10 CFR Part 52, that the generic TS portion of the exemption request: (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, and (4) demonstrates the existence of special circumstances. Therefore, the staff grants the applicant an exemption from the requirements of Tier 1 Tables 2.5.2-3, 2.5.2-4, 2.2.5-4, and 2.2.5-1 and generic TS 3.3.2, TS Table 3.3.2-1, TS 3.7.6, and TS SRs 3.7.6.3, 3.7.6.8, and 3.7.6.12.

B. Technical Evaluation of Exemption Request and Departure

B.1 Main Control Room Temperature and Humidity

To maintain conditions in the control room within limits for reliable human performance and maintain equipment within qualified limits, the applicant proposed changes to the calculated heat loads, as well as changes to the acceptance criteria for conditions resulting in no restrictions to stay times for operators. Because in events where the MCR is isolated—for instance, because of radiological conditions exceeding the VES actuation setpoint or having both trains of VBS out of service at the onset of an accident—and VES is actuated, but offsite power is available to power other plant equipment, the heat loads in the MCR exceed those set forth in the certified design. The applicant's proposed changes to rectify this issue are evaluated below.

FSAR Tier 1 Departure

FSAR Tier 1, Section 2.2.5, "Main Control Room Habitability System," provides a functional description of the MCR VES. This includes a limit on the heat-up of the MCR, instrumentation and control (I&C) equipment rooms, and dc equipment rooms to provide assurance that acceptance criteria for reliable human performance and equipment qualification are not exceeded. This is accomplished by limiting the heat loads in these rooms to values specified in FSAR Tier 1, Table 2.2.5-4. The proposed departure includes changes to the table for the values in the control room based on the new load shedding scheme and expectation of the as-installed heat loads, including operators. The staff finds this change acceptable, given that the proposed limiting heat loads are reflected in the GOTHIC analysis (discussed further below) and that the values in Table 2.2.5-4 will be confirmed as limiting in the as-built design by ITAAC 7.c in Table 2.2.5-5. In addition, these values correspond with the changes to FSAR Tier 2, Table 6.4-3.

FSAR Tier 2 Departure

In a letter dated November 12, 2015, the applicant proposed to change the acceptance criteria for acceptable conditions for control room habitability from the effective temperature of 85 °F (29 °C) in the certified AP1000 design to a wet bulb globe temperature of less than 90 °F (32 °C) in the LNP FSAR. The wet bulb globe temperature (WBGT) is defined as 0.7 times the natural wet bulb temperature of the air plus 0.3 times the dry bulb temperature of the air. The WBGT stay-time criteria, defined in NUREG-0700, was referenced by the applicant. The staff considered that, according to NUREG-0700, Table 12.6, at less than 90 °F (32 °C) WBGT, there is no stay time limit if workers are performing low-metabolism work. The temperature ranges in Table 12.6 are intended to minimize performance decrements and potential harm to workers because of excessive heat. These temperature ranges are ceiling values (i.e., they assume that protective practices, such as acclimatization, training, and a cool place to rest, are in place). Further discussion related to this topic is located in the "Impact of control room habitability changes on operator performance" subsection presented below.

The staff views an unlimited stay time as an appropriate method for meeting the GDC 19 requirement to permit operators to occupy the control room under accident conditions. The other aspect required by GDC 19, adequate protection for equipment, is addressed via maintaining MCR conditions under those specified in revised FSAR Figure 3D-201, "Typical Abnormal Environmental Test Profile: Main Control Room (Sheet 1 of 3)," which the applicant identified as a departure from AP1000 DCD Figure 3D.5-1, Sheet 1 of 3. The staff's review of the applicant's analysis justifying that limits for reliable human performance and equipment qualification, following the limiting DBA conditions, is below, and is divided into two parts: the first 72 hours, during which the VES system operates to provide air to the main control room, and post-72 hours, when ancillary fan(s) are placed in operation to ventilate the MCRE.

First 72 hours

As discussed earlier, the heat loading values in FSAR Tier 2, Table 6.4-3, have been changed to correspond with the new load shedding design and revised LNP FSAR heat loads expected in the MCR for the limiting DBA with ac power still available. The staff reviewed the GOTHIC calculations supporting the temperature evaluation, and the revised heat loads including the new timing resulting from the load shed are reflected in the GOTHIC analyses.

The applicant's GOTHIC heat load analyses calculated MCR and I&C equipment room temperatures during a DBA. The temperature and RH values calculated during the 72 hours following a DBA with ac power available equate to a maximum average WBGT index for the control room of less than 90 °F (32 °C). The 90 °F (32 °C) WBGT index is the design limit for minimizing performance decrements and potential harm, and preserving well-being and effectiveness of the control room staff for an unlimited duration. Under the load shed, non-1E MCR heat loads are de-energized by automatic actions of the protection and safety monitoring system (PMS) within 3 hours after VES is actuated, and the 24-hour battery heat loads are terminated or exhausted at 24 hours to maintain

the assumed heat load values, which then maintain the occupied zone of the MCR and the zones containing qualified safety-related equipment within the temperature constraints at 72 hours following VES actuation. The occupied zone is considered to be the area between the raised floor and 7 ft (2.13 m) above the floor, which encompasses the reactor operators and senior reactor operator consoles. In the event that power to the VBS is unavailable for more than 72 hours, MCR habitability is maintained by operating one of the two MCR ancillary fans to supply outside air to the MCR. Discussion of the post-72-hour conditions can be found below in the "Post 72 hours" subsection below. These conditions are reflected in the GOTHIC model, which was audited by the staff.

The GOTHIC calculation used the following conservatisms:

- Finned surfaces areas are conservatively reduced to account for construction tolerances and embedments in the as-built design that could inhibit the heat transfer from the fins*
- Heat transfer is conservatively calculated to account for thermal resistances associated with coatings and fouling (minimal fouling is expected over the life of the plant)*
- Initial room temperatures are conservatively initialized above expected conditions*

Related to the above, the applicant revised the FSAR to include new TS surveillance requirements (and changes to the associated TS Bases) for the rooms surrounding the MCR, as well as the I&C and dc equipment rooms, to verify the average temperature is less than 85 °F (29 °C). This is conservative with respect to the value used in the applicant's analysis and therefore is acceptable to the staff, as provisions to ensure that the initial values are bounded, in concert with limits on the design heat loads, are necessary to meet GDC 4 (specifically, the aspect of maintaining operation under the environmental conditions associated with both normal operations and following a postulated accident).

The applicant proposed to revise LNP FSAR Subsection 6.4.3.2 to state that the bounding initial values of temperature and RH in the MCR are 75 °F (24 °C)/60 percent. The temperature and RH values calculated during the 72 hours following a DBA equate to a maximum average WBGT Index for the control room of less than 90 °F (32 °C).

The humidity of the air in the MCR also represents an important parameter in the acceptance criteria of the WBGT and is not calculated in the applicant's GOTHIC analysis. The applicant instead calculated the moisture content in the MCR in a separate spreadsheet calculation. During the first 72 hours, the safety-related VES system supplies air to the MCR.

During the first 72 hours, the RH in the control room (and therefore the wet bulb temperature) is a function of the initial moisture in the room, any moisture input from heat loads in the room (e.g., the operators), and any moisture stored in the

VES bottles. Uncertainty regarding the allowed level of moisture in the VES bottles led staff to ask RAI 09.04.01-1, as the DCD did not specify a moisture specification for the air stored in the VES bottles. This lack of a moisture specification had potential effects on both the MCR analysis for human performance limits and operability of the VES system under conditions that could lead to freezing of the VES regulator.

In the certified design, given a potential scenario where the VES moisture content was sufficiently high, the potential existed to cause freezing at the VES regulator because of the Joule-Thomson effect. The air stored in the VES bottles is at high pressure. It is expanded through a pressure regulator before being supplied to the main control room. During the expansion process, the air cools below the freezing point for water. At higher moisture contents (a higher dew point or wet bulb temperature), moisture could condense out of the air and form ice on the regulator, potentially inhibiting the expected flow of air from the VES system to the MCR. In addition, a higher moisture content input from the VES bottled air could result in humidity values in the MCR that may challenge the human performance acceptance criteria outlined above.

In a letter dated December 22, 2015, the applicant submitted a revised RAI response proposing revisions to the FSAR and the TS. The proposed changes to FSAR Sections 6.4.5.3 and 9.3.1.1.2, TS Surveillance 3.7.6.8, and the associated TS bases state that the air in the VES bottles will be supplied as ANSI/CGA-7.1 Quality Level E with a pressure dew point temperature not to exceed 40 °F at 3,400 psig (4.4 °C at 23.5 MPa) or greater. Adding a VES moisture specification to the licensing basis that requires a relatively low-pressure dew point (i.e., dry air) in VES prevents moisture from affecting proper operation of VES components, such as the pressure regulator, given that the VES temperatures are maintained in a temperature range of 60–80 °F (16–27 °C) (from TS Bases Figure B3.7.6-2, “VES Operability Requirements”) and the VES has insulated piping and components.

In addition, the applicant states that the moisture specification is conservative with respect to maintaining acceptable conditions for habitability in the MCR during the first 72 hours following a transient even with maximum occupancy in the MCR. The staff audited the calculation supporting the RH in the MCR with maximum occupancy. The applicant calculated the humidity content of the control room under limiting conditions with 11 operators and initial values of 75 °F (24 °C) and 60 percent RH, and found that humidity conditions in the control room asymptotically approach a roughly steady-state condition because control room air is exhausted at the same rate it enters the control room not long into the transient (as the control room does not continually increase in pressure). The staff audited the applicant’s calculation, which showed the control room reached a limiting humidity content of approximately 78 °F (26 °C) wet bulb. Because the TS do not impose a limit on the humidity in the control room, the staff performed confirmatory calculations using initial values of 75 °F (24 °C), 100 percent RH with the limiting moisture content added by 11 operators to determine the effect of adding the small amount of moisture present in the bottles using a 40 °F (4.4 °C) pressure dew point at 3,400 psig (4.4 °C at 23.5 MPa). The staff calculated a dew point in the control room of approximately 79 °F (26 °C) wet bulb at 72 hours, less than the value of 80.1 °F (26.7 °C) assumed by the

applicant in the submittal. Given the above discussion, staff finds the proposed changes to the air quality acceptable. The staff is tracking the revisions discussed above to the FSAR as **LNP Confirmatory Item 21.3-1**.

Resolution of LNP Confirmatory Item 21.3-1

LNP Confirmatory Item 21.3-1 is a commitment by the applicant to revise the LNP COL application to provide additional information in the FSAR as indicated in the letters dated November 12, December 11, and December 22, 2015, including information related to limiting moisture content in the VES bottled air. The staff confirmed that the LNP COL FSAR has been appropriately revised. As a result, LNP Confirmatory Item 21.3-1 is now closed.

Post 72 hours

After 72 hours, the bottled air in the VES system has been depleted. If no non-safety system recovery has taken place, one of two ancillary fans is placed in operation to blow approximately 1,500 cfm (42,475 lpm) of outside air through the MCR envelope such that the maximum average WBGT index for the control room is less than 90 °F (32 °C). Likewise, outside air is supplied to Division B and C I&C rooms in order to maintain the ambient temperature below the qualification temperature of the equipment. In an RAI response dated July 17, 2015 (ADAMS Accession No. ML15201A540), the applicant stated that beyond 7 days, if VBS is still not operable, offsite support is available to extend habitability system operations. As such, the post-72-hour analyses are performed for a four-day period beginning at 72 hours and ending at 7 days after the onset of the transient.

Operation of the ancillary fans results in conditions in the MCR closely resembling ambient outdoor air conditions. In a November 12, 2015, RAI response (ADAMS Accession No. ML15322A009), the applicant performed an MCR habitability analysis in GOTHIC using a diurnal outdoor air input, with a maximum of 101 °F (38.3 °C) and a minimum of 86 °F (30 °C) for the dry bulb temperature. The corresponding wet bulb temperature in the analysis was assumed to be a constant 82.4 °F (28.0 °C) for 4 days. The applicant stated 101 °F (38.3 °C) is the maximum normal temperature for the certified design (FSAR Tier 2, Table 2-1); this value corresponds to the 1 percent seasonal exceedance temperature (or 0.4 percent annual exceedance temperature) for sites referencing the AP1000. The staff has evaluated the applicability of these values to the LNP site and found them acceptable, and further discussion of the staff evaluation is located in Section 2.3 of this SER. The constant 82.4 °F (28.0 °C) wet bulb temperature is a bounding assumption with respect to the value of 80.1 °F (26.7 °C) corresponding wet bulb coincident with the maximum normal dry bulb temperature as reflected in FSAR Tier 2, Table 2-1. FSAR Tier 2, Sections 6.4.2, 9.4.1.1.2, and 9.4.1.2.3.1 have been revised to reflect that, post-72 hours, the ventilation system is designed to maintain the MCR below the limits associated with reliable human performance, as defined in the "Impact of Control Room Habitability Changes on Operator Performance," section of this SER, below, and the equipment qualification limits in DCD Figure 3D.5-1, Sheet 2 of 3, based on operation at the maximum normal site ambient temperature.

Using the temperature data discussed above, the applicant's analysis demonstrated that the MCR remained below a WBGT index of 90 °F (32 °C) during the 4-day period between 72 hours and 7 days. The staff reviewed the temperature input values and assumptions in the applicant's analysis and performed its own analysis to confirm the acceptability of the temperature inputs. The staff analysis consisted of reviewing data from National Weather Service stations near the Levy site. As part of its review, the staff identified the worst consecutive 4-day period with respect to the WBGT index, and compared this data set to the applicant's inputs and assumptions. The staff found that the applicant's analysis conservatively bounds the staff calculated WBGT index recorded near the site. In addition, in the staff's analysis, the staff found that the dry and wet bulb temperatures for the entirety of the 4-day period that resulted in the worst WBGT index were bounded by the applicant's assumption of a daytime peak of 101 °F (38.3 °C) with an 15 °F (8.3 °C) diurnal swing and a wet bulb temperature of 82.4 °F (28.0 °C).

In addition, the staff also identified the worst 1-hour period with respect to the WBGT index that was recorded at National Weather Service stations near the Levy site. The staff compared this data to the applicant's MCR habitability inputs and assumptions. Using the worst 1-hour data, the staff found that the applicant's peak conditions bound the staff calculated peak WBGT index recorded near the site.

The staff recognizes that the use of a WBGT index as an appropriate metric to assess MCR habitability consists of a calculation that combines the dry bulb and wet bulb temperatures using appropriate scaling factors. In the staff's review of the worst recorded 1-hour WBGT index, an individual temperature input that contributed to calculating the WBGT index (i.e., wet bulb temperature) exceeded the assumed value in the applicant's analysis. However, when the wet bulb temperature was combined with the coincident dry bulb temperature to form the calculated WBGT index, the staff found that the WBGT index was bounded by the applicant's analysis.

The staff reviewed temperature data for National Weather Service stations near the Turkey Point site. Similar to the LNP review, the staff identified the worst consecutive 4-day period with respect to the WBGT index, and compared this data set to the applicant's inputs and assumptions. The staff found the values used in the applicant's analysis conservatively bounds the staff calculated WBGT index recorded near the site. In addition, the staff also identified the worst 1-hour period with respect to the WBGT index that was recorded at National Weather Service stations near the Turkey Point site. The staff compared this data to the applicant's MCR habitability inputs and assumptions. Using the worst 1-hour data, the staff found that the applicant's peak conditions bound the staff calculated peak WBGT index recorded near the site. In the staff's review of the worst recorded 1-hour WBGT index, an individual temperature input that contributed to calculating the WBGT index (i.e., wet bulb temperature) exceeded the assumed value in the applicant's analysis. However, when the wet bulb temperature was combined with the coincident dry bulb temperature to form the calculated WBGT index, the staff found that the WBGT index was bounded by the applicant's analysis.

The following portion of this technical evaluation is reproduced from Section 21.3.4 of the LNP COL SER:

Humidity in the control room after 72 hours is primarily a function of the initial humidity of the control room at 72 hours combined with the moisture content of the outside ambient air, as an ancillary fan operates to blow approximately 1500 cfm of air through the MCR and Division B and C I&C rooms. The FSAR was revised to state the fans are expected to maintain the environment in the MCR near the daily average outdoor air temperature. Operators inside the control room represent a substantially smaller contribution to the ambient humidity as compared to the case prior to 72 hours, given the flow rate through the MCR from the fans. As stated earlier, the applicant uses conservative values for the temperature and moisture content of the air.

Finally, the applicant revised FSAR Figure 3D-201 to reflect the post-72-hour limits for equipment qualification to 110 °F (43.3 °C) with 35 percent RH at this temperature. This change results in different acceptance criteria for equipment qualification and human performance after 72 hours. In addition, staff audited an analysis performed by the applicant demonstrating that even in conditions where 101 °F (38.3 °C) outside air was input to the control room for the entirety of the period between 72 hours and 7 days, the limits in FSAR Figure 3D 201 were not exceeded. As such, based on the above discussion, staff finds the proposed change to the FSAR acceptable, as the applicant's analysis provides reasonable assurance that the requirements associated with GDC 2 (with respect to natural phenomena, including ambient conditions) and GDC 4 are met. The calculated dry bulb temperature in the control room in this analysis was lower than the equipment qualification curve in Figure 3D-201, demonstrating further margin as compared to the diurnal temperature analysis discussed above.

The applicant's calculation showed that the WBGT remains below the 90-degree F (32.2-degree C) index associated with unlimited stay times for the operators. Additionally, the temperatures remain within the bounds for equipment qualification specified in DCD Figure 3D.5-1, Sheet 2 of 3. Based on the above review, the conservatism used by the applicant, and the staff's confirmatory analysis, the staff believes that the applicant's control room temperature calculation is acceptable, and therefore meets NRC regulations as specified in GDC 2, GDC 4, and GDC 19.

B.2 Impact of Control Room Habitability Changes on Operator Performance

In response to an RAI on control room habitability dated October 10, 2014 (ADAMS Accession No. ML14283A522), the applicant submitted a response dated March 26, 2015 (ADAMS Accession No. ML15089A193) stating that:

The MCRE temperature profile contained in the DCD is incorrect because of the following errors:

- (1) MCRE heat loads during operation with or without normal ac power sources exceed the values documented in the DCD.*
- (2) Analyses that were performed to support the DCD were non-conservative because these analyses assumed that:*

- VES actuation is always coincident with station blackout (SBO); however, MCRE heat load challenge is most severe during events that result in isolation of the control room with offsite power available.
- EDS batteries are exhausted at exactly 1 hour beyond minimum mission time when there is a high probability that these batteries would last considerably longer.

These errors could result in the MCR becoming a limited tolerance hot zone according to the referenced licensing basis standard, MIL-STD-1472E. This results in a 2- to 4-hour stay time for control room personnel, as stated in the applicant's RAI response dated July 17, 2015 (ADAMS Accession No. ML15201A540).

In the applicant's RAI responses dated November 12, 2015 (ADAMS Accession Nos. ML15320A025, ML15320A028, and ML15322A009), the applicant proposed to change the acceptance criteria for control room habitability from the effective temperature of 85 °F (29 °C) in the certified AP1000 design to a WBGT of less than 90 °F (32 °C) in the LNP FSAR. NUREG-0700, Table 12.6, "Ranges of WBGT for Different Ranges of Stay Times," was used by the applicant as the basis for stay time limits. In accordance with NUREG-0700, Table 12.6, at 90 °F (32 °C) WBGT or less under control room working conditions (low-activity levels, normal work clothing), there is no stay time limit. The temperature ranges in Table 12.6 are intended to minimize performance decrements and potential harm to workers because of excessive heat. These temperature ranges are ceiling values (i.e., they assume that protective practices, such as acclimatization, training, and a cool place to rest, are in place).

The staff finds the change in licensing basis from MIL-STD-1472E to NUREG-0700 to be acceptable and confirmed that the change was incorporated into the FSAR. Both documents establish stay time limits above 90-degree F (32.2-degree C) WBGT with NUREG-0700 providing a more detailed set of limitations based on temperature, clothing, and work activity. NUREG-0700 is also the established NRC-approved standard for human factors guidance. The staff finds the change of acceptance criteria for control room habitability from the effective temperature of 85 °F (29 °C) in the certified AP1000 design to a WBGT of less than 90 °F (32 °C) in the LNP FSAR to be acceptable. The new limit, as did the old limit, maintains an unlimited stay time in the control room and provides reasonable assurance that operator performance will not be affected by the control room environment.

B.3 Addition of Load Shed

The safety-related PMS and post-accident monitoring (PAM) system in the certified AP1000 DCD, Revision 19, as modified by LNP DEP 6.4-2, were reviewed to meet the above regulatory requirements. Chapter 7 of AP1000 DCD, Revision 19, as incorporated by reference in the LNP COL application includes the certified PMS and PAM systems. However, in response to RAI Question 06.04-4 on the MCR heat-up concern, dated October 10, 2014, the LNP COL applicant proposed in a submittal dated March 26, 2015, two new safety-related load shedding panels with associated other components to receive

commands from the PMS to de-energize some non-safety-related electrical loads in the MCR (ADAMS Accession Nos. ML14283A522 and ML15089A193). In the RAI response, the applicant also stated that the PAM system would be revised to include some status signals. The above design changes were assessed below by the staff to ensure the regulatory requirements in Section 21.3.3 of this SER are still met. In addition, in response to RAI Question 06.04-4 on the MCR heat-up issue, the applicant stated the environmental conditions in the MCR after a design-basis event are changed from the certified, original conditions of 95 °F (35 °C) and 70 percent RH to 115 °F (46.1 °C) and 35 percent RH for an extended time duration of 4 days. The above changes to the environmental conditions in the MCR were also evaluated below by the staff to ensure the related regulatory requirement on equipment qualification in Section 21.3.3 of this SER is still met for the safety-related I&C equipment located in the MCR.

In order for the safety-related main control room VES to maintain heat loads for the MCRE within design-basis assumptions to limit the heat-up of the MCR, the applicant stated in response to NRC RAI Question 06.04-4 that two safety-related MCR load shedding panels containing Class 1E equipment will be added to automatically or manually de-energize some non-safety-related electrical loads in the MCR. The applicant also stated in response to NRC RAI Question 06.04-4 that automatic actuation of the two new MCR load shedding panels is added to the existing PMS VES system actuation signal for VES MCRE isolation, pressurization, and filtration on a high iodine or particulate MCRE air supply radioactivity signal or a loss of all ac power for longer than 10 minutes signal by the low Class 1E battery charger input voltage parameter. In addition, the existing manual actuation signal for VES MCRE isolation, pressurization, and filtration is added to the two new MCR load shedding panels. De-energized, non-safety-related electrical loads are separated into two stages (Stage 1 and Stage 2) to maximize the availability of some non-safety-related wall panel information system, which is de-energized with other Stage 2 loads. Timers controlling the de-energization of electrical loads in both Stage 1 and Stage 2 are internal to each MCR load shedding panel and actuate relays to de-energize the associated loads. Stage 1 loads are de-energized by both panels immediately after the timers in each load shedding panel receive the PMS VES system actuation signal. Stage 2 loads are de-energized by both load shedding panels within 180 minutes after the timers in each load shedding panel receive the PMS VES system actuation signal. Component Interface Modules (CIMs) in PMS Divisions A and C are provided to de-energize non-safety-related electrical loads powered by the two MCR load shedding panels. In the staff's evaluation, it was not clear in the response to NRC RAI Question 06.04-4 how the above proposed design changes meet the regulatory requirement for the single failure criterion, as required in Clause 5.1 of IEEE Std. 603-1991, for the two new load shedding panels. Hence, the staff issued RAI Question 07.03-1 requesting the applicant to provide design information to demonstrate its compliance with the single failure criterion. In the response to RAI Question 07.03-1, the applicant stated that either PMS Division A or C is capable of de-energizing the two new MCR load shedding panels. Each load shedding panel de-energizes separate, non-essential, non-safety-related electrical loads from both Stage 1 and Stage 2. Each MCR load shedding panel contains redundant load shedding relays and timers that are actuated by both PMS Divisions A and C; therefore, actuation of either PMS Division A or C

de-energizes all required non-safety-related electrical loads. The staff found that the additional information submitted in the RAI response demonstrated the compliance with Clause 5.1 of IEEE Std. 603-1991 for the single failure protection.

During the staff's evaluation, it was not clear in the response to NRC RAI Question 06.04-4 how physical separation and electrical isolation were achieved between the two safety-related MCR load shedding panels and non-safety electrical loads controlled by them. In addition, the description on how the non-safety-related electrical loads will be controlled by the two new MCR load shedding panels was not clear in the response to RAI Question 06.04-4. For example, in Section 3.0 of Enclosure 2 in its response to RAI Question 06.04-4, the applicant states that two redundant MCR load shedding panels are added. However, later it states that each panel de-energizes separate nonessential non-safety-related electrical loads. Therefore, in RAI Question 07.03-1 dated May 20, 2015, the staff requested the applicant to demonstrate clearly how the proposed changes meet the regulatory requirements for separation and isolation between safety systems and other systems, as required in Clause 5.6.3 of IEEE Std. 603-1991 (ADAMS Accession No. ML15140A475). In its response dated July 16, 2015, the applicant stated that each of the two load shedding panels contains two independent, isolated, in-series sets of relay contacts, one controlled by PMS Division A and the other controlled by PMS Division C (ADAMS Accession No. ML15201A542). In the RAI response, the applicant also provided schematic diagrams showing how the control and feedback signals are designed. Power for the non-safety-related loads, which may be de-energized, passes through both sets of relay contacts in one of the two new load shedding panels. Spatial separation between PMS Division A and Division C within the panel and between Class 1E and non-Class 1E circuits on the two load shedding panels is also provided to meet the requirements of IEEE Std. 384 and Regulatory Guide 1.75, "Criteria for Independence of Electrical Safety Systems," in accordance with the certified AP1000 commitments and exceptions. The applicant also stated in its response that the non-Class 1E loads to be shed by the two MCR load shedding panels are isolated from each of the Class 1E PMS Divisions A and C through the use of two fuses in series. These fuses provide Class 1E to non-Class 1E isolation and PMS Division to Division isolation. The staff found that the additional design information and schematic diagrams provided by the applicant in its response to RAI Question 07.03-1 demonstrated compliance with the regulatory requirements in Clause 5.6.3 of IEEE Std. 603-1991 regarding separation and isolation between safety systems and other systems.

In response to NRC RAI Question 06.04-4, the applicant stated the PAM system will be revised to include the status of the two new MCR load shedding panels. However, the revised Table 7.5-1 provided in the response only identified the MCR electrical load status, which would be added as PAM parameters. The staff found there is an inconsistency in the above description on what new parameters will be added to the PAM system. Therefore, the staff issued RAI Question 07.03-1 requesting the application to clarify what parameters will be added to the existing PAM system. In its response dated July 16, 2015, the applicant stated that each load shedding panel provides feedback to the PMS through individual digital input and output for affirmative display of de-energization of non-safety MCR electrical load status on the primary dedicated safety panel.

Two Stage 1 feedbacks and two Stage 2 feedbacks per Division (a total of eight signals) are provided. Each MCR electrical load status signal is reported as closed when the contactor is closed (and MCR loads are energized). When the contactor input is open, the PMS inverts the signal to report that the contactor is open (and MCR loads are de-energized). The staff found that the above additional design information clarified which new parameters will be added to the existing PAM system. Therefore, the staff found that the response to RAI Question 07.03-1 is acceptable to meet the regulatory requirements in GDC 13 for variables to be monitored.

The staff found that electrical loads to be shed includes non-safety-related electrical equipment, such as wall panel information system displays, office equipment, water heater, kitchen appliances, and non-emergency lighting. However, it does not include the non-safety-related, but important to safety diverse actuation system equipment. Therefore, the staff found that the proposed changes do not affect the certified design in the AP1000 DCD, Revision 19, approach to diversity and defense-in-depth.

Safety-related I&C equipment located in the MCR must meet the regulatory requirements on equipment qualification as entailed in Clause 5.4 of IEEE Std. 603-1991. Chapter 7 of AP1000 DCD, Revision 19, as incorporated by reference in the LNP COL application, includes description of the PMS hardware, which will use the approved Common Qualified (Common-Q) platform, as described in Topical Report WCAP-16097-P-A, Revision 2, "Common Qualified Platform Topical Report." Table 7-1 in Topical Report WCAP-16097-P-A identifies the environmental design requirements for the Common-Q equipment, which includes a maximum temperature at 120 °F (48.9 °C) and 95 percent RH, and a minimum temperature of 40 °F (4.4 °C) and 20 percent RH for a time duration of 12 hours. In response to NRC RAI Question 06.04-4, the applicant stated the potential environmental conditions in the MCR after a design-basis event need to be revised from 95 °F (35 °C) and 70 percent RH, to 115 °F (46.1 °C) and 35 percent RH for an extended time duration of 4 days (between 4th and 7th day after a design-basis event).⁷ However, the response to NRC RAI Question 06.04-4, lacked discussion on how the safety-related Common-Q equipment, such as flat display panels, node boxes, AP1000 modems and their processors located in the MCR, is qualified for the changed environmental conditions and time duration. It was not stated in the response to NRC RAI Question 06.04-4 whether the qualification already conducted for the Common-Q platform equipment was to be credited for the COL application. Therefore, the staff issued RAI Question 07.01-1, dated October 1, 2015, requesting the applicant to demonstrate how the safety-related Common-Q equipment is qualified for the revised higher temperature with an extended time duration after a design-basis event (ADAMS Accession No. ML15275A000). The staff also requested the applicant to clarify whether the qualification conducted for the Common-Q equipment is credited for the LNP COL application, or if additional testing needs to be performed on safety-related Common-Q equipment in the MCR.

⁷ Subsequent to the RAI response discussed here, the applicant decreased the proposed limit for the environmental conditions during the period between 72 hours and 7 days from 115 °F (46.1 °C) to 110 °F (43.3 °C).

In its response to RAI Question 07.01-1 dated November 12, 2015, the applicant stated that qualification performed with the Common-Q platform is not utilized as the only basis for the environmental qualification for the AP1000 safety-related Common-Q equipment in the MCR (ADAMS Accession No. ML15320A022). Topical Report WCAP-16097-P-A provides a qualification basis for the Common-Q system as a whole, but is not specific to the MCR installation of the Common-Q equipment. The MCR safety-related I&C equipment is listed in Table 3.11-1 of the AP1000 DCD, Revision 19. According to AP1000 DCD Tier 2 Appendix 3D, "Methodology for Qualifying AP1000 Safety-Related Electrical and Mechanical Equipment," the safety I&C equipment in the MCR requires an equipment qualification data package to demonstrate environmental qualification. After the proposed changes in potential environmental conditions to 115 °F (46.1 °C) and 35 percent RH post-72 hours, various test programs that environmentally qualified similar safety-related equipment were used to show the safety Common-Q equipment is qualified for the changed environmental conditions. No further additional testing is expected because these safety-related I&C components have been qualified in other test programs.⁸ The equipment qualification data package for the Common-Q equipment in the MCR, which are lower-level design documents, is being updated to reflect the revised environmental conditions in the MCR and reference the evaluation performed to ensure the Common-Q equipment in the MCR remains qualified for the changed environmental conditions with an extended time duration. The staff found the additional design information provided by the applicant demonstrated compliance with Clause 5.4 of IEEE Std. 603-1991.

Based on the evaluation above on meeting regulatory requirements for protection and safety systems, the staff finds the design changes meet the requirements identified in 10 CFR 50.55a(h)(3) and GDC 13.

B.4 Impact of Load Shed on Operator Performance

To limit control room maximum temperature during VES operation, a two-stage load shed of selected MCR equipment is automatically initiated on a high iodine or particulate MCRE air supply radioactivity signal or a loss of all ac power for greater than 10 minutes. Select, non-safety loads are de-energized by the Stage 1 load shed, which occurs coincident with VES actuation. Consisting primarily of office equipment and non-battery-backed lighting, specific loads include:

⁸ Subsequent to the RAI response discussed here, the applicant decreased the proposed limit for the environmental conditions during the period between 72 hours and 7 days from 115 °F (46.1 °C) to 110 °F (43.3 °C).

- *large screen displays used for weather or plan of the day information*
- *water heater*
- *coffee machine*
- *refrigerator*
- *microwave*
- *dishwasher*
- *drinking fountain/icemaker*
- *site-supplied desktop computer, monitors, copy machine, printers*
- *normal ELS lighting (i.e., not battery-backed)*
- *convection heater (2)*
- *non-safety-related MCR area radiation monitor*

Additional non-safety-related loads de-energized by the Stage 2 load shed include the

- *local area network consoles*
- *wall panel information system (WPIS) Displays.*

This occurs 3 hours after the Stage 1 load shed.

The staff confirmed that the Stage 1 load shed, with the exception of normal lighting, does not affect operational decision making or plant control. The applicant stated in the July 1, 2015, supplement (ADAMS Accession No. ML15187A039) that the plant lighting system (ELS) in the control area will continue to be available throughout the event using Class 1E battery-backed power. This battery-backed lighting provides the necessary illumination for safe operation.

With battery-backed lighting available, the staff concludes the Stage 1 load shed does not affect operator performance.

The staff identified two concerns with the proposed Stage 2 load shed:

- (1) *The WPIS is credited with supporting teamwork, situational awareness, and command and control as part of the “control room design that reflects state-of-the-art human factor principles” required by 10 CFR 50.34(f)(2)(iii).*
- (2) *It is not clear whether the plant would remain at power and for how long it would stay at power following the initiation of VES followed by the subsequent load shed.*

The staff requested additional information on how the load shed affected these issues in RAI Letter No. 128, issued June 29, 2015 (ADAMS Accession No. ML15180A275). The applicant provided additional information addressing these issues in their RAI response dated August 5, 2015 (ADAMS Accession No. ML15219A202).

The July 1, 2015, supplement states that the Two-Stage Automatic Load Shed does not de-energize all non-safety equipment and that although the WPIS displays are de-energized, the information shown on these panels can be readily retrieved and displayed on any available console that is not de-energized. The consoles that are not de-energized are identified as:

- *shift manager office console*
- *senior reactor operator console*
- *reactor operator consoles (excluding business LAN)*

The staff concludes that the command and control and situational awareness functions are not significantly affected because the WPIS information is available to the control room personnel at their normal work station consoles, which are not de-energized. The information available on the WPIS is high-level, fundamental safety information that is available on the work station consoles typically at the first or second information level so information accessibility remains reasonably quick and simple. Also the safety-related consoles display the minimum inventory parameters that are used to monitor the status of critical safety functions and to manually actuate the safety-related systems that achieve these critical safety functions.

While the loss of the WPIS places additional emphasis on communications between operators, the staff concludes the control room communications are also not significantly affected. The normal conduct of operations for MCR communications includes repeat backs, status announcements, and independent verifications to minimize human error and are used for normal and abnormal operations. During normal operations these communication practices reinforce information made readily available to the control room team via WPIS. During abnormal operations, the same practices would supplement the information each operator has available at his control station and compensate for loss of the centralized information on WPIS.

Although the control room design is sufficiently diverse to compensate for loss of the WPIS information, the reduction in defense-in-depth strategy within the control room human factors design caused by the removal of common indications, instantly and simultaneously available to all control room personnel that supports analysis and decision making warrants a better understanding of the conditions under which the loss of WPIS would occur. The staff prepared the following table based on the August 5, 2015, RAI response.

Table 21.3-1. VBS/VES Functionality

	<i>Scenario</i>	<i>Response</i>	<i>Standby Diesel Generator (DG) Functionality</i>	<i>VBS Functionality</i>
1	Station blackout	Rx trip; VES actuates 10 min after power loss; WPIS is de-energized 2 hours after power loss because of battery limit or immediately if non-safety EDS batteries are not functioning	None—Cannot be credited under definition of station blackout	VBS not functional, but after 72 hours, operators may be able to align the ancillary DG to the VBS fans
2	Loss of switchyard only (offsite power) with runback (rapid power reduction)	Rx power reduced to meet plant loads. VBS continues to operate.	Available but not needed	Fully functional
3	Loss of switchyard and turbine generator trip	Rx trip; VES 10-minute timer starts on loss of battery charger input voltage. If DGs not functional then plant is in a station blackout condition	Standby DG starts and provides power to VBS system	Fully functional on power from standby DG.
4	Spurious VES actuation because of component failures.	Simultaneous, independent failures actuate VES and isolate VBS. If repairs unsuccessful WPIS de-energized by auto load shed at 3 hours. Mode 3 required by TS about 26 hours from VES actuation. Exact time to shutdown is dependent on component(s) which failed.	No impact, failures assumed to be independent of power supply	After verification of plant condition, operators override VBS isolation and return system to service.
5	VBS isolation occurs because of simultaneous, independent component failures	Operator manually initiates VES. If VBS repairs unsuccessful, WPIS de-energized by auto load shed at 3 hours. Mode 3 required by TS about 26 hours from VES actuation.	No impact; failures assumed to be independent of power supply	System is unavailable
6	LOCA with fuel failure and leakage from containment. Offsite ac available.	Rx trip; High-1 setpoint shifts VBS to recirc mode. VBS designed to maintain MCR doses below GDC 19 limits during design-basis events.	Available but not needed	Fully functional

	<i>Scenario</i>	<i>Response</i>	<i>Standby Diesel Generator (DG) Functionality</i>	<i>VBS Functionality</i>
7	<i>LOCA with fuel failure and leakage from containment. Offsite ac not available.</i>	<i>Rx trip; VES 10-minute timer starts. If DG not credited then plant is in a station blackout condition with LOCA.</i>	<i>Standby DG starts and provides power to VBS system; High-1 shifts system to recirc</i>	<i>Fully functional on power from standby DG.</i>
8	<i>LOCA with fuel failure and leakage from containment from adjacent plant.</i>	<i>High-1 setpoint shifts VBS to recirc mode. VBS designed to maintain MCR doses below GDC 19 limits during design-basis events.</i>	<i>Available but not needed</i>	<i>Fully functional</i>
9	<i>LOCA with fuel failure and leakage from containment from adjacent plant with concurrent, simultaneous, independent failure of two VBS recirculation trains on intact unit</i>	<i>High-2 actuates VES on intact unit. WPIS de-energized by auto load shed at 3 hours. Mode 3 required by TS about 26 hours from VES actuation.</i>	<i>No impact; failures assumed to be independent of power supply</i>	<i>System is unavailable</i>

In summary:

- (1) *If the VES actuation occurs from a loss of power the plant is in a station blackout condition and the WPIS would not be available regardless of the load shed feature. This condition was accepted as part of the AP1000 design certification. If power is available either from offsite or the standby diesel generator, then the VBS system remains functional and VES actuation is unnecessary. The VBS system is designed to maintain MCR doses below GDC 19 limits.*
- (2) *If the VES actuation occurred because of spurious component failures or a valid High-2 actuation signal, then TS associated with room temperature limits would require a plant shutdown within 26 hours. These scenarios require multiple independent system or component failures to cause VES actuation.*

Scenarios 4, 5, and 9 would be most limiting in that the unit continues at power for up to 26 hours followed by a plant shutdown. However, these scenarios assume multiple, independent failures occur. The incorporation of independent systems and components into a design is a defense-in-depth strategy credited to effectively minimize the scenarios being postulated. Therefore the staff concludes that there is reasonable assurance that Scenarios 4, 5, and 9 will not occur because of the low probability of concurrent independent failures. If they should occur, the MCR operating staff still has the information necessary to

evaluate and diagnose plant condition and implement the necessary actions to place the plant in a safe condition. It should be noted that many of the scenarios evaluated above are beyond design requirements. They are being used to illustrate intersystem functionality and the defense-in-depth provided by the design and are not part of the applicant's design basis.

The combination of failures and/or events that would cause VES actuation are either beyond the design basis and already addressed in the station blackout regulation or require failure combinations that are beyond what regulation addresses because of their low probability of occurrence.

Regardless, should such a combination of events occur, the defense-in-depth strategy inherent to the control room design would be reduced. Given the limited time at power at which the condition exists, the fact that that time is governed by technical specifications, and that redundant information is readily available on each of the operator consoles the staff concludes there is reasonable assurance that the operators could complete the actions necessary to maintain plant safety. Accordingly, the staff finds that, given the low probability of events resulting in WPIS load shed and the availability of alternate indications, the WPIS load shed does not undermine the acceptability of the WPIS system under 10 CFR 52.34(f)(2).

B.5 Reclassification of VES-PL-V018 and VES-PL-V019 as Active Safety-Related Valves

This section evaluates provisions for the functional design, qualification (functional, seismic, and environmental), and IST for safety-related valves identified in the LNP Units 1 and 2 request for exemption regarding MCR heat load.

The staff reviewed the following proposed departures from DCD Revision 19 to verify that the appropriate provisions are specified for the design, qualification, and IST of valves VES-PL-V018 and VES-PL-V019.

FSAR Tier 1 Departures

DCD Tier 1, Section 2.2.5, "Main Control Room Habitability System," describes the design-related information for valves VES-PL-V018 and VES-PL-V019. The applicant proposed a departure from DCD Tier 1, Table 2.2.5-1, to add valves VES-PL-V018 and VES-PL-V019, and identified the design requirements as ASME Boiler & Pressure Vessel Code (BPV Code), Section III, and seismic Category I, with an active function as "Transfer Open." The proposed departure to DCD Tier 1, Table 2.2.5-1 also specifies that the valve design does not include remote operators, safety-related displays, or PMS controls.

DCD Tier 2, Section 3.9.3, "ASME Code Classes 1, 2, and 3 Components, Component Supports, and Core Support Structures," states that pressure retaining components classified as Class 1, 2, or 3, are constructed according to the rules of ASME BPV Code, Section III, Division 1. Also, DCD Tier 2, Section 3.10, "Seismic and Dynamic Qualification of Seismic Category I

Mechanical and Electrical Equipment,” describes seismic qualification requirements for seismic Category I valves.

The staff finds the applicant’s proposal to add valves VES-PL-V018 and VES-PL-V019 to DCD Tier 1, Table 2.2.5-1, to be acceptable because it includes the correct identification of the design criteria for the valves. The valves are designed and constructed in accordance with ASME BPV Code, Section III, requirements to withstand seismic design-basis loads without a loss of safety function to transfer open. Therefore, provisions are specified to meet the design and construction requirements of GDC 1 and the design requirements to withstand the effects of natural phenomena requirements of GDC 2. The valves are located in Environmental Zone 7 of the auxiliary building (not in the MCR itself), and are accessible for manual operation during normal, abnormal, and accident conditions as identified in Tables 3D.5-1, 3D.5-4, and 3D.5-5 of DCD Tier 2, and therefore do not require automatic operators.

FSAR Tier 2 Departures

The capability provisions for valves VES-PL-V018 and VES-PL-V019 are specified in DCD Tier 2, Section 3.9.3.2.2, “Valve Operability.” DCD Tier 2, Section 3.9.3.2.2 states that prior to installation, qualification of the functional capability of active valve assemblies is performed in accordance with the requirements of ASME Standard QME-1-2007, “Qualification of Active Mechanical Equipment Used in Nuclear Power Plants,” and that Tier 2, Table 3.9-12, “List of ASME Class 1, 2, and 3 Active Valves,” identifies the active valves in the AP1000 design. The applicant proposed a departure to add valves VES-PL-V018 and VES-PL-V019 to FSAR Tier 2, Table 3.9-12, and to classify the valve function as active.

The staff finds the applicant’s proposal to reclassify the function of valves VES-PL-V018 and VES-PL-V019 in DCD Tier 2, Table 3.9-12, from inactive valves to “active valves” to be acceptable because it is consistent with the active safety-related function of the valves, and provides identification of the functional qualification requirements in accordance with the provisions of ASME QME-1-2007 where implemented as accepted in NRC Regulatory Guide 1.100, “Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants” (Revision 3).

The IST (including preservice testing) provisions for valves VES-PL-V018 and VES-PL-V019 are described in DCD Tier 2, Section 3.9.6, “Inservice Testing of Pumps and Valves.” DCD Tier 2, Section 3.9.6, specifies that inservice testing of ASME BPV Code, Section III, Class 1, 2, and 3 valves is performed in accordance with the ASME OM Code as required by 10 CFR 50.55a(f), and that DCD Tier 2, Table 3.9-16, “Valve Inservice Test Requirement,” identifies components subject to the IST program. Table 3.9.6 also identifies the method and frequency of inservice testing for each valve. The applicant proposed a departure from DCD Tier 2, Table 3.9-16, to add valves VES-PL-V018 and VES-PL-V019, and identified the following test requirements: (1) the valves are active manual valves with a safety-related mission to maintain closed, transfer open, and maintain open, (2) the valves are ASME BPV Code, Class 3 and ASME OM

Code, IST Category B, and (3) the IST type is full stroke and the test frequency is 2 years.

The staff finds the applicant's proposal to be acceptable because the IST provisions are consistent with the requirements specified in ASME OM Code, Subsection ISTC, "Inservice Testing of Valves in Light-Water Reactor Nuclear Power Plants." The staff notes that leak testing and position indication testing per ASME OM Code, Subsection ISTC are not required because these valves are classified as Category B and do not have remote position indication.

The environmental qualification provisions for valves VES-PL-V018 and VES-PL-V019 are specified in DCD Tier 2, Section 3.11, "Environmental Qualification of Mechanical and Electrical Equipment." Section 3.11 states that mechanical components identified in DCD Tier 2, Table 3.11-1, "Environmentally Qualified Electrical and Mechanical Equipment," are qualified to perform their required functions under the appropriate environmental effects of normal, abnormal, accident, and post-accident conditions. For mechanical equipment, DCD Tier 2, Section 3.11, specifies two categories of components: (1) active equipment that performs a mechanical motion as part of its safety-related function, and (2) non-active equipment whose only safety function is to maintain its structural integrity. For active components, the environmental qualification program is based on a combination of design, test, and analysis of critical sub-components, which is supported by maintenance and surveillance programs. For non-active equipment, the only safety-related function is to maintain the structural integrity according to the ASME BPV Code, Section III. The applicant proposed a departure from DCD Tier 2, Table 3.11-1, to reclassify the function of valves VES-PL-V018 and VES-PL-V019 from "non-active valves" to "active valves."

The staff finds the applicant's proposal to be acceptable because reclassification of the valves VES-PL-V018 and VES-PL-V019 in DCD Tier 2, Table 3.11-1, from "non-active valves" to "active valves" is consistent with the active safety-related function of the valves, and provides identification of the environmental qualification requirements associated with active valves. Therefore, provisions are specified to meet the environmental requirements of GDC 4. Valves VES-PL-V018 and VES-PL-V019 are located in Environmental Zone 7 (auxiliary room). In addition, other mechanical equipment listed in DCD Tier 2, Table 3.11-1, and located in Environmental Zone 3 (MCR) is required to be environmentally qualified to the revised test profile identified in FSAR Figure 3D-201. Use of this revised test profile for environmental qualification is acceptable to the staff because it is consistent with the environmental assumptions for the location.

DCD Tier 2, Appendix 3I, "Evaluation for High Frequency Seismic Input," states that the seismic analysis and design of the AP1000 plant is based on the Certified Seismic Design Response Spectra (CSDRS). Ground Motion Response Spectra (GMRS) for some Central and Eastern United States rock sites show higher amplitude at high frequency than the CSDRS. Appendix 3I describes the methodology and criteria to evaluate equipment that might be sensitive to the high-frequency input. Equipment that is not sensitive to high frequency input is listed in DCD Tier 2, Table 3I.6-3, "List of AP1000 Safety-Related Electrical and Mechanical Equipment Not High Frequency Sensitive," and does not require high frequency evaluation per Appendix 3I. The applicant

proposed a departure to classify valves VES-PL-V018 and VES-PL-V019 as being “not high frequency sensitive,” and added the valves to FSAR Tier 2, Table 3I.6-3.

The staff finds the applicant’s proposal to classify valves VES-PL-V018 and VES-PL-V019 as “not high frequency sensitive,” and add the valves to Tier 2, Table 3I.6-3, to be acceptable because the valves are not within the high frequency sensitive criteria listed in Tier 2, Table 3I.6-1, “Potential High Frequency Sensitive Equipment List.” The criteria include attributes such as: (1) equipment or components with moving parts that are required to perform a switching function during the seismic event, and (2) components with moving parts that may bounce or chatter, such as relays and actuation devices.

The staff concludes that the LNP proposed departure to DCD, Revision 19, to reclassify valves VES-PL-018 and VES-PL-019 from non-active valves to active valves is acceptable because the applicant specified appropriate provisions for the design, qualification, and IST of valves VES-PL-V018 and VES-PL-V019 and meets NRC regulations as specified in GDC 1, GDC 2, GDC 4, and 10 CFR 50.55a(f).

B.6 Technical Specifications

In a letter dated March 26, 2015, the applicant submitted its response to RAI Letter 122, Question 06.04-4, related to a revised Auxiliary Building heat-up analysis to adequately support the safety function of the VES. This revised analysis results in modification of the VES design to add two new safety-related load-shed panels to allow automatic shutting off of various non-safety electrical loads during certain design-basis events, and a need to monitor the initial air temperatures in the MCRE as well as in selected adjacent rooms around the MCRE. These modifications result in changes in a few sections of the TS and TS Bases (Chapter 16) in the COL application.

In letters dated July 17 and November 12, 2015, the applicant submitted its responses to follow-up RAI Letter 126, Question 16-3, and RAI Letter 134, Question 16-4, to address the staff’s concerns related to proposed TS requirements and insufficient level of details provided in the TS Bases. Also, in its response letter dated December 22, 2015, to RAI Letter 132, Question 09.04.01-1, regarding the freezing issue in the VES air distribution lines, the applicant proposed changes to existing SR 3.7.6.5 (renumbered as SR 3.7.6.8) to address the potential high-moisture content of the air stored in the VES storage tanks.

These changes are necessary to ensure that the TS and TS Bases accurately reflect the updated design and are described below, with deleted text lined out and added text underlined.

- *LCO 3.3.2 (engineered safety features actuation system (ESFAS) Instrumentation)*

Required Action F.2.2 and Function 20 in Table 3.3.2-1 are revised to include the actuation of the new MCR Load Shed function as follows (with added text underlined):

The description of Function 20 is revised to read “Main Control Room Isolation, Air Supply Initiation, and Electrical Load De-energization” including a minor editorial correction for the input sensor description to read “a. Main Control Room Air Supply Radiation – High-2”

Required Action F.2.2 is revised to read “[V]erify main control room isolation, air supply initiation and electrical load de-energization manual controls are OPERABLE”

- Applicable Safety Analyses, LCOs, and Applicability (ASA) Section of TS Bases B3.3.2 (ESFAS Instrumentation)

On page B3.3.2-45, the discussion of Function 20 is revised as follows (with deleted text lined out and added text underlined):

“Main Control Room Isolation, Air Supply Initiation, and Electrical Load De-energization

Isolation of the main control room and initiation of the VES air supply provides a ~~protected environment from which operators can control the plant following an uncontrolled release of radioactivity~~ breathable air supply for the operators following an uncontrolled release of radiation. De-energizing non-essential main control room electrical loads maintains the room temperature within habitable limits. This Function is required to be OPERABLE in MODES 1, 2, 3, and 4, and during movement of irradiated fuel because of the potential for a fission product release following a fuel handling accident, or other DBA.

20.a. Main Control Room Air Supply Radiation – High 2”

- Actions Section of TS Bases B3.3.2 (ESFAS Instrumentation)

On pages B3.3.2-55 and 57, in the first and second paragraphs under Actions F.1, F.2.1, and F.2.1 and in the second paragraph under Action K.1, the phrase “main control room isolation and air supply initiation” is revised as follows (with deleted text lined out and added text underlined):

“Condition F is applicable to the Main Control Room (MCR) isolation, ~~and air supply initiation~~ and electrical load de-energization function which has only two channels of the initiating process variable ...”

“Alternatively, radiation monitor(s) which provide equivalent information and main control room isolation, ~~and air supply initiation~~ and electrical load de-energization manual controls may be verified to be OPERABLE ...”

“Condition K is applicable to the Main Control Room Isolation, ~~and~~ Air Supply Initiation, and Electrical Load De-energization (Function 20), during movement of irradiated fuel assemblies ...”

The staff finds the above proposed changes to TS LCO 3.3.2 and its associated bases acceptable because they reflect the change in the VES actuation logics described in FSAR Chapter 7.

- LCO 3.7.6 (VES)

A new condition, required action, and its associated completion time are added to address failure of the MCR load-shed panels to perform their safety function, as follows:

Condition B which reads “One PMS division inoperable in MCR load shed panel(s)”

Required Action B.1 which reads “Restore MCR load shed panel(s) to OPERABLE status” with a Completion Time of “7 days”

A new condition, required action, and its associated completion time are added to address nonconformance issues with monitored air temperature in adjacent rooms around the MCRE, as follows:

Condition D which reads “Air temperature in one or more required rooms not within limit”

Required Action D.1 which reads “Restore air temperature of required room(s) to within limit” with a Completion Time of “24 hours”

A new surveillance requirement is added to monitor the air temperature in the adjacent rooms around the MCRE, as follows:

SR 3.7.6.3 which reads “[V]erify the air temperatures of required rooms are $\leq 85^{\circ}\text{F}$ ” with a Frequency of “24 hours”

A new surveillance requirement is added to verify the automatic response of the electrical load shed function, as follows:

SR 3.7.6.12 which reads “[V]erify the MCR load shed function actuates upon receipt of an actual or simulated actuation signal” with a Frequency of “24 months”

The existing SR 3.7.6.5 for the verification of air quality in the VES high-pressure storage tanks is revised to address the freezing of air distribution lines because of high relative humidity condition of air in the tanks, as follows:

“Verify that the air quality of the air storage tanks meets the requirements of Appendix C, Table C-1 of ASHRAE Standard 62 with a pressure dew point of 40°F or lower at 3400 psig or greater.”

In addition, the order of all SRs is changed such that the one with the shorter Frequency would come first, and the one with the longer Frequency would come last to be consistent with the convention used in the STS.

- *Background Section of TS Bases B3.7.6*

On page B3.7.6-1, in the first paragraph, the last line is revised as follows (with added text underlined):

“... functional during an accident, via de-energizing (load shedding) non-essential, non-safety main control room (MCR) electrical equipment (e.g., wall panel information system displays, office equipment, water heater, kitchen appliances, and non-emergency lighting) and the heat absorption of passive heat sinks. The VES limits the maximum temperature in DC Equipment Rooms (12201, 12202, 12203, 12204, 12205, and 12207), I&C rooms (12301, 12302, 12304, and 12305), as well as the MCRE.

On page B3.7.6-2, the fourth paragraph is revised as follows (with deleted text lined out and added text underlined):

~~“Sufficient thermal mass exists in the surrounding concrete structure (including walls, ceiling and floors) to absorb the heat generated inside the MCRE, which is initially at or below 75°F~~ The VES also provides emergency passive heat sinks for the main control room (Room 12401), instrumentation and control rooms (Rooms 12301, 12302, 12304, and 12305), and dc equipment rooms (Rooms 12201, 12202, 12203, 12204, 12205, and 12207). Provided air temperatures in the rooms requiring monitoring are within their Surveillance Requirement limits, the VES passive heat sinks limit the temperature rise inside each room during the 72-hour period following VES actuation. Heat sources inside the MCRE include operator workstations, emergency lighting and occupants. ~~Sufficient insulation is provided surrounding the MCRE pressure boundary to preserve the minimum required thermal capacity of the heat sink. The insulation also limits the heat gain from the adjoining areas following the loss of VBS cooling.~~”

On page B3.7.6-2, new 5th through 13th paragraphs are added as follows:

“During normal operation, temperatures in the main control room, instrumentation and control rooms, dc equipment rooms, Class 1E electrical penetration rooms, and adjacent rooms are maintained within a specified range by the VBS. As described in Section 9.4.1.2, the VBS consists of independent subsystems, including the main control room / control support area HVAC subsystem and the Class 1E Electrical Room HVAC subsystem. The Class 1E Electrical room HVAC subsystem is further divided into two independent subsystems, with one serving the Division A & C Class 1E electrical division rooms and the other serving Division B & D Class 1E electrical division rooms. Each independent subsystem serves its associated rooms with two redundant, 100 percent capacity equipment trains, maintaining temperatures within the specified range.

Surveillance limits are required for rooms which have limits on allowable temperature increase, and conservatively established for some adjacent rooms of the VES passive heat sinks. Monitoring the air temperature is required for the

rooms with the following numerical designators: 12201, 12202, 12203, 12204, 12205, 12207, 12300, 12301, 12302, 12303, 12304, 12305, 12313, 12401, 12412, and 12501.

Initial temperatures assumed for remaining rooms modeled in the VES passive heat sinks analysis are selected to maximize operational flexibility in responding to abnormal conditions or equipment failures, while still maintaining sufficient margin below safety analysis limits.

Access corridors, stairwells, rooms separated by an air gap, and other rooms without significant heat loads are not monitored because these areas do not contain significant heat sources and their temperatures are assumed to match the connected spaces. The numerical designators for these unmonitored rooms are 12211, 12311, 12400, 12405, 12411, 21480, 40400, and Stairwells.

Initial temperatures assumed for remaining rooms are conservatively selected to match the outdoor ambient or do not have an appreciable impact on the analyses. The numerical designators of these unmonitored rooms are 12212, 12213, 12306, 12312, 12404, 12406, 12504, 12505, 12506, and Level 1 rooms.

Non-essential, non-safety MCR heat loads are de-energized by the PMS VES actuation signal, which is generated by the “Main Control Room Isolation, Air Supply Initiation and Electrical Load De-energization” ESFAS function, to maintain the MCRE within habitable limits for 72 hours.

Upon receipt of a “Main Control Room Isolation, Air Supply Initiation and Electrical Load De-energization” ESFAS signal, PMS Divisions A and C energize associated redundant relays in each of the two safety-related electrical panels (VES-EP-01 and VES-EP-02). Energizing one set of relays in each panel disconnects non-safety related electrical power to the non-safety electrical loads in the MCRE. Energizing just one set of relays in one panel de-energizes non-safety loads associated only with that panel.

De-energized non-safety loads are separated into stage 1 and stage 2 to maximize the availability of the non-safety related wall panel information system which is deenergized with stage 2 loads. Timers and associated relays, which actuate to deenergize the stage 1 and stage 2 non-safety loads, are internal to each safety-related load shed panel. Stage 1 loads are de-energized by both panels immediately after the timers in each panel receive the PMS VES system actuation signal. Stage 2 loads are de-energized by both panels within 180 minutes after the timers in each panel receive the “Main Control Room Isolation, Air Supply Initiation, and Electrical Load Deenergization” ESFAS signal.

OPERABILITY of two redundant divisions of MCR Class 1E load-shed relays and timers located in two safety-related panels is required to meet the single failure criteria. Each panel contains redundant load-shed relays and timers actuated by the two PMS divisions, such that actuation of either division de-energizes all required loads.”

- LCO Section of TS Bases B3.7.6

On page B3.7.6-3, in the third paragraph, the phrase “[T]his includes components listed in SR 3.7.6.3 through 3.7.6.10” is changed to read “[T]his includes components monitored under surveillance requirements” to accommodate the renumbering of all SRs as mentioned above.

On page B3.7.6-3, a new paragraph is added after the fourth paragraph as follows:

“The initial MCRE temperature (75°F), DC Equipment and I&C Rooms, and required room temperatures ($\leq 85^\circ\text{F}$) are initial conditions required to both meet the maximum MCRE temperature limit 72 hours after VES actuation, and to maintain DC Equipment and I&C rooms below the equipment qualification temperature limit throughout the duration of the postulated accidents.”

On page B3.7.6-4, a new paragraph is added at the end of the LCO Section as follows:

“All PMS divisions in the two safety-related electrical panels are required to be OPERABLE, so that non-safety stage 1 and stage 2 MCR heat loads can be de-energized by the VES system actuation signal within the required time. This maintains the MCR temperature within habitable limits.”

- Actions Section of TS Bases B3.7.6

On page B3.7.6-4, a discussion of the new Action B.1 is added as follows:

“If one division of MCR load shed panel(s) is inoperable, all divisions of both MCR load shed panels must be restored to OPERABLE status within 7 days. In this condition, the OPERABLE unaffected division of the panels is capable of providing 100% of the load shed function.

A Completion Time of 7 days is permitted to restore the inoperable division of MCR load shed panel(s) to OPERABLE status before action must be taken to reduce power. The Completion Time of 7 days is based on engineering judgment, considering the low probability of an accident that would require VES actuation, and that the remaining panel division can provide the required load shed function.

As described in Subsection 6.4.2.3 of Ref.1, any component failure in a PMS division of the load shed panel(s) renders that division inoperable. If this failure affects only one PMS division, leaving the remaining division of PMS unaffected, including the associated power and control circuit, it renders the panel(s) inoperable, while still maintaining the full load shed function.

An event or action that impacts both PMS divisions in either panel does not maintain the full load shed function, and Condition G or H of LCO 3.7.6 would apply.”

On page B3.7.6-5, a discussion of the new Action D.1 is added as follows:

“When the air temperature in one or more of the rooms requiring temperature monitoring is not within the required limit, action is required to restore it to within the limit. A Completion Time of 24 hours is based on engineering judgment, considering the low probability of an accident that would require VES actuation under the worst case temperature conditions. It is judged to be a sufficient amount of time allotted to correct the deficiency in the non-safety ventilation system before shutting down.”

On pages B3.7.6-6 and 7, in the discussions of Actions E.1, E.2, and F.1 (renumbered G.1, G.2, and H.1), editorial corrections are made to reflect the renumbered applicable Conditions which use the specified action to exit the Modes of Applicability.

- Surveillance Requirements Section of TS Bases B3.7.6

On page B3.7.6-7, the discussion of SR 3.7.6.1 is revised to clarify that temperature of air in the return air duct can be used for the performance of this surveillance.

On page B3.7.6-7, a discussion of the new SR 3.7.6.3 (for monitoring of air temperature in the required adjacent rooms around the MCRE) is added as follows:

“Using indication from temperature elements in each room, the air temperatures in the following rooms are checked at a Frequency of 24 hours: 12202, 12204, 12300, 12303, 12313, 12412, and 12501.

Using indication from temperature elements located in shared return air ducting, the air temperatures in the following rooms are checked at a Frequency of 24 hours: 12201/12301, 12203/12302, 12205/12305, and 12207/12304.

This is done to verify that the VBS is performing as required to maintain the initial conditions assumed in the safety analyses, and to show that the VES heat sinks provide adequate thermal capacity to limit the temperature increase in the MCRE, DC Equipment Rooms, and I&C Rooms from exceeding the allowable limits after VES actuation. The surveillance limit of 85°F is below the initial temperature assumed in the analysis.

The 24 hour Frequency is acceptable based on the availability of automatic VBS temperature controls, alarms and indication in the MCRE. Air temperatures may also be verified using local measurement.”

On page B3.7.6-10, a discussion of SR 3.7.6.5 (renumbered as SR 3.7.6.8) is revised as follows:

“Verification that the air quality of the air storage tanks meets the requirements of Appendix C, Table C-1 of ASHRAE Standard 62 with a pressure dew point of 40°F or lower at 3400 psig or greater, is required every 92 days. If air has not been added to the air storage tanks since the previous verification, verification may be accomplished by confirmation of the acceptability of the previous surveillance results along with examination of the documented record of air

makeup. The purpose of ASHRAE Standard 62 states: “This standard specifies minimum ventilation rates and indoor air quality that will be acceptable to human occupants and are intended to minimize the potential for adverse health effects.” Verification of the initial air quality (in combination with the other surveillances) ensures that breathable air is available for 11 MCRE occupants for at least 72 hours. Verification of the pressure dew point ensures that no water will form in the line, eliminating the potential for freezing at the pressure regulating valve during VES operation. In addition, the dry air ensures the MCRE will remain below the maximum relative humidity to support the 90°F WBGT required for human factors performance.”

On page B3.7.6-10, a discussion of the new SR 3.7.6.12 (for automatic response of the new MCR load shed panels) is added as follows:

“Verification that the MCR load shed function actuates on an actual or simulated signal from each PMS Division is required every 24 months to ensure that the non-safety stage 1 and stage 2 MCR heat loads can be de-energized by the VES system actuation signal within the required time. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage, to minimize the potential for adversely affecting MCR operations.”

The staff finds the above proposed changes to TS LCO 3.7.6 and its associated Bases acceptable because the newly established TS requirements are consistent with guidance in the STS with regards to format and content, the specified completion times and SR frequencies are consistent with those in similar LCOs in the AP1000 TS that are specifically relevant to this modified VES design, and these revised and new TS requirements also reflect the modified VES design described in FSAR Sections 6.4 and 9.4.1.

Based on the above evaluation, and pending the staff’s confirmation that the proposed revisions are incorporated in Part 4 of the LNP Units 1 and 2 COL application, the staff finds the proposed TS and Bases revisions meet the requirements of 10 CFR 50.36, “Technical specifications.” The staff is tracking these revisions as **LNP Confirmatory Item 21.3-1**.

Resolution of LNP Confirmatory Item 21.3-1

LNP Confirmatory Item 21.3-1 is a commitment by the applicant to revise the LNP COL application to provide additional information as indicated in the letters dated November 12, December 11, and December 22, 2015, including changes to TS and TS Bases. The staff confirmed that the TS and TS Bases have been appropriately revised. As a result, LNP Confirmatory Item 21.3-1 is now closed.

B.7 Risk Results and Insights

This design departure does not alter the description of AP1000 design features relevant to human performance in the control room. It does not modify the plant-specific probabilistic risk assessment (PRA) model used for licensing. Consequently, there is no change to the risk profile described in the COL application or the risk insights concerning the control room AP1000 DCD

Table 19.59-18, item 20. Instead, the change improves confidence in the validity of the reported risk results and insights. Consistent with DC/COL-ISG-3, "PRA Information to Support Design Certification and Combined License Applications," the plant-specific PRA remains acceptable to the staff.

Based on the above evaluation, and pending the staff's confirmation that the proposed revisions are incorporated in the Turkey Point Units 6 and 7 COL application, the staff finds the proposed revisions acceptable. The staff is tracking the proposed FSAR, TS, and TS Bases revisions proposed in the applicant's May 6, 2016, letter (ADAMS Accession No. ML16131A674), to be included in a future revision of the COL application, as **Confirmatory Item 21.3-1**.

Resolution of Turkey Point Confirmatory Item 21.3-1

Confirmatory Item 21.3-1 is a commitment by the applicant to revise the Turkey Point Units 6 and 7 COL application to provide additional information as indicated in the letter dated May 6, 2016. The staff confirmed that the Turkey Point Units 6 and 7 COL application, Revision 8 has been appropriately revised. As a result, Confirmatory Item 21.3-1 is now closed.

21.3.5 Post Combined License Activities

There are no post-COL activities related to this section.

21.3.6 Conclusion

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to the design change of the VES, and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR related to this section. As discussed above in the technical evaluation section, the staff finds the departure acceptable, as it meets the requirements associated with GDCs 1, 2, 4, 13, and 19, 10 CFR 50.34(f)(2)(iii); 10 CFR 50.55a(h)(3); and 10 CFR 50.55a(f).

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the regulatory requirements and guidance discussed in Section 21.3.3 of this SER. The staff based its conclusion on the following:

- PTN DEP 6.4-2 will be acceptable once the applicant's commitments to revise the FSAR and TS have been included in the COL application because the described changes permit the applicant to meet the licensing basis within the bounds of the updated licensing document.

21.4 Hydrogen Vent ITAAC

21.4.1 Introduction

The applicant requests a change to the AP1000 DCD Revision 19 information. The Turkey Point Units 6 and 7 COL application incorporates the AP1000 DCD by reference. The change involves a departure from DCD Tier 1 ITAAC as well as an associated DCD Tier 2 departure.

The applicant determined that the ITAAC described in Tier 1 Table 2.3.9-3 cannot be met by the certified design. Instead, the applicant requested to revise the ITAAC described in Tier 1 Table

2.3.9-3, Item 3, Acceptance Criterion iii. This ITAAC requires that 98 percent of the primary openings through the ceilings of the PXS valve/accumulator rooms in containment must be at least 19 feet (5.8 meters) away from the containment shell and all other openings must be at least 3 feet (0.9 meters) away.

The applicant also proposes to depart from Tier 2, Section 6.2.4.5.1, "Preoperational Inspection and Testing, Hydrogen Ignition Subsystem," and Tier 2, Section 19.41.7, "Diffusion Flame Analysis."

21.4.2 Summary of Application

FPL incorporated in Turkey Point Units 6 and 7 COL application, Revision 8, the same information that DEF incorporated into the LNP COL application related to the voluntary submittal of an exemption request and design change description for departure from the AP1000 DCD to address hydrogen vent ITAAC. The information was originally submitted in endorsement and exemption request letter dated April 29, 2016 (ADAMS Accession No. ML16124A922).

Tier 1 and Tier 2 Departure

The applicant included the following Tier 1 and Tier 2 departure from the AP1000 DCD:

- PTN DEP 6.2-1

PTN DEP 6.2-1 proposes to change the acceptance criteria to be applied to a specific ITAAC design commitment and associated inspection, test, or analysis in Tier 1 Table 2.3.9-3, Item 3 to establish consistency with the current detailed design of the plant. The ITAAC currently contained in the AP1000 DCD, Tier 1 Table 2.3.9-3, Item 3, for control of containment hydrogen concentration for beyond-design-basis accidents, was based on the original AP600 and AP1000 design. The applicant determined that changes during the development of the current detailed design have resulted in inconsistencies between the design and the ITAAC acceptance criteria for (1) the primary vent paths through the ceilings of the PXS valve/accumulator rooms and (2) the proximity of these paths to the containment shell.

The staff reviewed the applicant's request for an exemption. The request proposed changes to Tier 1 Table 2.3.9-3, Item 3. Additionally, the staff reviewed the Tier 2 changes for potential effects on safety functions and design criteria of the PXS valve/accumulator room vents as described in DCD Sections 6.2.4.5.1 and 19.41.7. Subsection A of this SER (below) shows the staff's regulatory evaluation of the exemption. Subsection B of this SER (below) shows the staff's technical evaluation of the exemption request and departure.

Below are the specific ITAAC and DCD changes the applicant proposed under PTN DEP 6.2-1.

- Tier 1, Table 2.3.9-3, Item 3, Acceptance Criteria iii, be revised to state:

"The equipment access opening and CMT-A opening constitute at least 98% of vent paths within Room 11206 that vent to Room 11300. The minimum distance between the equipment access opening and containment shell is at least 24.3 feet. The minimum distance between the CMT-A opening and the containment shell is at least 9.4 feet. The CMT-B opening constitutes at least 98% of vent paths within Room 11207 that vent to Room 11300 and is a minimum distance of 24.6 feet away from the containment shell."

Other openings through the ceilings of these rooms must be at least 3 feet from the containment shell.”

- Tier 2, Chapter 6.2.4.5.1 Preoperational Inspection and Testing, Hydrogen Ignition Subsystem, second paragraph be revised to read:

“Pre-operational inspection is performed to verify the location of openings through the ceilings of the passive core cooling system valve/accumulator rooms with respect to the containment pressure boundary. The primary openings are those that constitute 98% of the opening area. The primary openings in Room 11206 that vent to Room 11300 are the equipment access opening and CMT-A opening. These openings are verified to be a minimum distance of 24.3 feet and 9.4 feet, respectively, from the containment shell. The primary opening in Room 11207 that vents to Room 11300 is the CMT-B opening, which is verified to be a minimum distance of 24.6 feet away from the containment shell. Other openings through the ceilings of these rooms are verified to be at least 3 feet from the containment shell.”

- Tier 2, Chapter 19.41.7, “Diffusion Flame Analysis” the last two paragraphs should be revised to read:

“In the event that ADS stage 4 fails to adequately direct hydrogen away from combined compartments, the compartment vents are designed to release the hydrogen at locations where it burns, but does not challenge the containment shell integrity.

Vents from the PXS and CVS compartments to the CMT room are located away from the containment shell and containment penetrations. Access hatches to the subcompartments that are near the containment shell are covered and secured closed such that they will not open as a result of a pipe break inside the compartment. Therefore, hydrogen releases to the CMT room from the subcompartments have been shown to not challenge the containment integrity.”

This exemption request involves a departure from Tier 1 Table 2.3.9-3, with a Tier 2 involved departure. Therefore, these departures require NRC approval and are evaluated below.

21.4.3 Regulatory Basis

The regulatory basis for evaluating the requested departures is provided by the applicable change processes in the AP1000 design certification rule. Departures from Tier 1 and Tier 2 requirements shall comply with Appendix D to Part 52, Design Certification Rule for the AP1000 Design, Section VIII, “Processes for Changes and Departures.” Specifically, the Tier 1 departure shall comply with the requirements for exemptions from Tier 1 information, which are governed by the applicable requirements in 10 CFR 52.63(b)(1) and 52.98(f). The Commission will deny a request for an exemption from Tier 1 if it finds that the design change will result in a significant decrease in the level of safety otherwise provided by the design. An applicant may depart from Tier 2 information without prior NRC approval, subject to the conditions of 10 CFR Part 52, Appendix D, Section VIII.B.5.

The regulatory guidance applicable for this technical evaluation is found in SECY-93-087, “Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor Designs,” issued April 2, 1993, and the corresponding SRM, issued July 21, 1993, Section I.J, “Containment Performance,” which states that the containment should maintain its

role as a reliable, leak-tight barrier by ensuring that containment stresses do not exceed ASME Service Level C limits for a minimum period of 24 hours following the onset of core damage, and that following this 24-hour period the containment should continue to provide a barrier against the uncontrolled release of fission products.

21.4.4 Technical Evaluation

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (LNP Units 1 and 2) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the LNP COL FSAR, Revision 9 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

The following portion of this technical evaluation section is reproduced from Section 21.4.4 of the LNP COL application FSER.

A. Regulatory Evaluation of Exemption Request

A.1 Summary of Exemption

The applicant requested an exemption from the provisions of 10 CFR Part 52, Appendix D, Section III.B that require the applicant referencing a certified design to incorporate by reference Tier 1 information. Specifically, the applicant proposed to revise Tier 1 Table 2.3.9-3, Item 3, Acceptance Criteria iii, to make it consistent with the current detailed design of the plant.⁹

A.2 Regulations

- *10 CFR Part 52, Appendix D, Section VIII.A.4 states that exemptions from Tier 1 information are governed by the requirements of 10 CFR*

⁹ While the applicant describes the requested exemption as being from Section III.B of 10 CFR Part 52, Appendix D, the entirety of the exemption pertains to proposed departures from Tier 1 information in the generic DCD. In the remainder of this evaluation, the NRC will refer to the exemption as an exemption from Tier 1 information to match the language of Section VIII.A.4 of 10 CFR Part 52, Appendix D, which specifically governs the granting of exemptions from Tier 1 information.

52.63(b) and 10 CFR 52.98(f). It also states that the Commission may deny such a request if the design change causes a significant reduction in plant safety otherwise provided by the design. This subsection of 10 CFR Part 52 Appendix D also provides that a design change requiring a Tier 1 change shall not result in a significant decrease in the level of safety otherwise provided by the design.

- 10 CFR 52.63(b)(1) allows an applicant or licensee to request NRC approval for an exemption from one or more elements of the certification information. The Commission may only grant such a request if it complies with the requirements of 10 CFR 52.7, "Specific Exemptions," which in turn points to the requirements listed in 10 CFR 50.12, "Specific Exemptions," for specific exemptions. In addition, the special circumstances present outweigh the potential decrease in safety due to reduced standardization. Therefore, any exemption from the Tier 1 information certified by Appendix D to 10 CFR Part 52 must meet the requirements of 10 CFR 50.12, 10 CFR 52.7, and 10 CFR 52.63(b)(1).

A.3 Evaluation of Exemption

As stated in Section VIII.A.4 of Appendix D to 10 CFR Part 52, an exemption from Tier 1 information is governed by the requirements of 10 CFR 52.63(b)(1) and 10 CFR 52.98(f). Additionally, the Commission will deny an exemption request if it finds that the requested change to Tier 1 information will result in a significant decrease in safety. Pursuant to 10 CFR 52.63(b)(1), the Commission may, upon application by an applicant or licensee referencing a certified design, grant exemptions from one or more elements of the certification information, so long as the criteria given in 10 CFR 50.12 are met and the special circumstances as defined by 10 CFR 50.12 outweigh any potential decrease in safety due to reduced standardization.

The guidance of 10 CFR 50.12(a)(1) and 10 CFR 50.12(a)(2) provide the applicable criteria for when the Commission may grant the requested specific exemption. Section 50.12(a)(1) provides that the requested exemption must be authorized by law, not present an undue risk to the public health and safety, and be consistent with the common defense and security. The provisions of 10 CFR 50.12(a)(2) list six special circumstances for which an exemption may be granted. In order for NRC to consider granting an exemption request, at least one of these six special circumstances must be present. The applicant stated that the requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subsection defines special circumstances as when "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule." The staff's analysis of each of these findings is presented below.

A.3.1 Authorized by Law

This exemption would allow the applicant to implement approved changes to Tier 1 Table 2.3.9-3, Item 3. This is a permanent exemption limited in scope to particular Tier 1 information; subsequent changes to this information or any other

Tier 1 information would be subject to full compliance with the change processes specified in Section VIII.A.4 of Appendix D to 10 CFR Part 52. As stated above, 10 CFR 52.63(b)(1) allows the NRC to grant exemptions from one or more elements of the certification information, namely, as discussed in this exemption evaluation, the requirements of Tier 1. The NRC staff has determined that granting the applicant's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, as required by 10 CFR 50.12(a)(1), the exemption is authorized by law.

A.3.2 No Undue Risk to Public Health and Safety

The underlying purpose of AP1000 Tier 1 Table 2.3.9-3, Item 3 is to ensure that in the postulated beyond-design-basis accident scenarios discussed in DCD Subsections 19.34 and 19.41, hydrogen generated as a result of the accident which migrates to the PXS compartments is vented through large openings in the ceilings of these rooms such that, in the event of ignition of the hydrogen plume, the containment shell will not fail.

A change to Tier 1 Table 2.3.9-3, Item 3, Acceptance Criteria iii, is necessary to establish consistency with the current detailed design of the plant by changing the ITAAC acceptance criteria for the primary ventilation paths through the ceilings of the PXS valve/accumulator rooms and the proximity of the paths to the containment shell. This change maintains the design margins of the Containment Hydrogen Control System; therefore, the change supports the intended design functions. The plant-specific Tier 1 DCD will continue to protect public health and safety and will maintain a level of detail consistent with that which is currently provided elsewhere in Tier 1 of the plant-specific DCD. The affected design description in the plant-specific Tier 1 DCD will continue to provide the detail necessary to support the performance of the associated ITAAC. In Section 21.4.4 of this safety evaluation, the NRC staff evaluates the proposed changes to Tier 1 information and finds them to be acceptable. Therefore, the staff finds the exemption presents no undue risk to public health and safety as required by 10 CFR 50.12(a)(1).

A.3.3 Consistent with Common Defense and Security

The proposed exemption would allow the applicant to implement modifications to the Tier 1 information requested in the applicant's submittal. This is a permanent exemption limited in scope to particular Tier 1 information. Subsequent changes to this information or any other Tier 1 information would be subject to full compliance with the change processes specified in Section VIII.A.4 of Appendix D to 10 CFR Part 52. This change is not related to security issues. Therefore, as required by 10 CFR 50.12(a)(1), the staff finds that the exemption is consistent with the common defense and security.

A.3.4 Special Circumstances

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever application of the regulation in the particular circumstances would not serve the underlying purposes of the rule or is not necessary to achieve the

underlying purpose of the rule. The underlying purpose of the specific Tier 1 Table 2.3.9-3, Item 3, Acceptance Criteria iii, modified in the exemption request, is to ensure that, in the postulated beyond-design-basis accident scenarios discussed in DCD Subsections 19.34 and 19.41, the following will happen: hydrogen generated as a result of the accident which migrates to the PXS compartments is vented through large openings in the ceilings of these rooms such that, in the event of ignition of the hydrogen plume, the containment shell will not fail. A change to the ITAAC acceptance criteria is necessary to establish consistency with the current detailed design of the plant.

Application of the requirements in Tier 1 Table 2.3.9-3, Item 3, Acceptance Criteria iii, as stated in the certified design, is not necessary to achieve the underlying purpose of those portions of the rule. The proposed change to the ITAAC acceptance criteria maintains the design margins of the Containment Hydrogen Control System, therefore supporting the intended design functions. This change does not impact the ability of any structures, systems, or components to perform their functions or negatively impact safety; therefore, the change meets the underlying purposes of the rule. Because application of the current requirements in Tier 1 Table 2.3.9-3, Item 3 is not necessary to achieve the underlying purpose of the rule, special circumstances are present. Therefore, the staff finds that special circumstances exist, as required by 10 CFR 50.12(a)(2)(ii) for the granting of an exemption from the Tier 1 information described above.

A.3.5 Special Circumstances Outweigh Reduced Standardization

This exemption, if granted, would allow the applicant to change certain Tier 1 information incorporated by reference from the AP1000 DCD into the LNP COL application. An exemption from Tier 1 information may only be granted if the special circumstances of the exemption request, required to be present under 10 CFR 52.7 and 10 CFR 50.12, outweigh any reduction in standardization. The proposed exemption would modify the ITAAC acceptance criteria for the primary ventilation paths through the ceilings of the PXS valve/accumulator rooms and the proximity of the paths to the containment shell. The proposed changes to the ITAAC acceptance criteria maintain the design margins of the Containment Hydrogen Control System, therefore supporting the intended design functions.¹⁰

As described below in the technical evaluation, the change to the ITAAC acceptance criteria for the primary ventilation paths through the ceilings of the PXS valve/accumulator rooms and the proximity of the paths to the containment shell is necessary to establish consistency with the description of the hydrogen ventilation paths in the current detailed design of the plant. While there is a small possibility that standardization may be slightly reduced by granting the exemption from the ITAAC acceptance criteria in Tier 1 Table 2.3.9-3, Item 3, the proposed exemption modifying the ITAAC acceptance criteria for combustible gas control

¹⁰ Based on the nature of the proposed change to the Tier 1 Table 2.3.9-3, Item 3, Acceptance Criteria iii, and the understanding that this change is necessary to establish consistency with the current detailed design of the plant and does not impact the design function of the Containment Hydrogen Control System, other AP1000 licensees and applicants may request the same exemption, preserving the intended level of standardization.

will allow for application of acceptance criteria that are appropriate to evaluate a plant built according to the current detailed design. The proposed exemption modifying the ITAAC acceptance criteria for combustible gas control does not reduce the design margins of the Containment Hydrogen Control System and will result in no reduction in the level of safety. For this reason, the staff determined that even if other AP1000 licensees and applicants do not request similar departures, the special circumstances supporting this exemption outweigh the potential decrease in safety due to reduced standardization of the AP1000 design, as required by 10 CFR 52.63(b)(1).

A.3.6 No Significant Reduction in Safety

The proposed exemption would modify the ITAAC acceptance criteria for combustible gas control presented in the original application. As described below in the technical evaluation, the change to the ITAAC acceptance criteria for the primary ventilation paths through the ceilings of the PXS valve/accumulator rooms and the proximity of the paths to the containment shell is necessary to establish consistency with the current detailed design of the plant. Because the proposed change does not reduce the design margins of the Containment Hydrogen Control System, there is no reduction in the level of safety. Therefore, the staff finds that granting the exemption would not result in a significant decrease in the level of safety otherwise provided by the design, as required by 10 CFR Part 52, Appendix D, Section VIII.A.4.

A.4 Conclusion

The staff has determined that pursuant to Section VIII.A.4 of Appendix D to 10 CFR Part 52, the exemption: (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, (4) has special circumstances that outweigh the potential decrease in safety due to reduced standardization, and (5) does not significantly reduce the level of safety at the licensee's facility. Therefore, the staff grants the applicant an exemption from the requirements of Tier 1 Table 2.3.9-3, Item 3, Acceptance Criteria iii.

B. Technical Evaluation of Exemption Request and Departure

As discussed in Section 21.4.3 of this report, SECY-93-087 states that the containment should maintain its role as a reliable, leak-tight barrier by ensuring that containment stresses do not exceed ASME Service Level C limits for a minimum period of 24 hours following the onset of core damage, and that following this 24-hour period the containment should continue to provide a barrier against the uncontrolled release of fission products.

The purpose of the ITAAC in Tier 1 Table 2.3.9-3, Item 3 is to keep postulated diffusion flame sources away from the containment pressure boundary to mitigate potential for over temperature leading to failure of the containment shell, hatches, and penetrations.

The applicant's review of the assessment of the hydrogen diffusion flame locations and zones of influence for equipment survivability showed that a

burning hydrogen plume from the passive core cooling system (PXS)-A compartment (Room 11206) to the core makeup tank (CMT)-A Room 11300 in the current detailed design could potentially challenge containment thermal limits.

The staff's technical evaluation is largely based on the following Westinghouse documents, which were reviewed during an audit conducted by the staff (ADAMS Accession No. ML15156B062).

- *WEC Document No. APP-VLS-M3C-008, Revision 0, "Hydrogen Diffusion Flame and Containment Integrity Analysis," dated October 15, 2015.*
- *WEC Engineering & Design Coordination Report No. APP-VLS-GEF-017, Revision 0, "Containment Structural Assessment for Hydrogen Venting," which includes Appendix A, "Structural Assessment for Equipment Survivability of the Containment Pressure Boundary during Diffusion Flame in CMT Compartment." Appendix A will be added to the APP-VLS-M3C-008 calculation.*
- *WEC Document No. APP-VLS-M3C-008, Appendix A, which calculates temperature distributions on the containment pressure boundary near the lower equipment hatch for a hydrogen diffusion flame from the PXS-A room vent exit to the CMT-A room. The temperature distribution will be input to a containment structural model to assess the containment pressure boundary severe accident survivability under the heat load of a hydrogen diffusion flame.*
- *WEC Document No. APP-VLS-M3C-007, Revision 0, "Thermal Analysis of Hydrogen Venting and Burning from the PXS-A compartment." This document describes a computational fluid dynamics (CFD) analysis which models a hydrogen diffusion flame in the CMT-A room that creates a containment wall temperature response. The CFD analysis, which models the hydrogen plumes exiting both the CMT-A opening and the floor hatch opening, shows that plume behavior is affected by the cutout for the equipment hatch in the CMT-A compartment ceiling. The hot plume is drawn toward the containment wall at the location of the lower equipment hatch, creating a hot spot. The applicant used the CFD analysis only as a sensitivity analysis and to identify non-conservative assumptions.*

B.1 Hydrogen Diffusion Flame and Temperature Distribution Evaluation

The applicant first performed a computational fluid dynamics (CFD) sensitivity analysis to evaluate location of hot spots and any flow split variation effects from the PXS-A room below. Using the insights gained from the CFD analysis, the applicant then performed a one-dimensional (1D) analysis to calculate temperature distributions on the containment pressure boundary in the CMT-A area near the lower equipment hatch for a hydrogen diffusion flame from the PXS-A room vents following a beyond design basis accident. This 1D calculation was based on first principle heat transfer and thermodynamic correlations. A conservative hydrogen plume temperature is calculated and the radiation and convection heat transfer is assessed to calculate a maximum containment wall

temperature. The temperature distribution was then used as input to a containment structural model to assess the containment pressure boundary severe accident survivability under the heat load from a hydrogen diffusion flame.

The hydrogen venting scenario from the PXS-A room is for a beyond-design-basis event involving significant core damage and hydrogen generation due to fuel cladding oxidation. The scenario pertains to only one specific initiating event, a direct vessel injection (DVI) double-ended or large-line break which spills into the PXS-A compartment below the CMT room floor. The break must be large enough to defeat injection through the DVI line for the accident to progress to core damage. The PXS-B line must also fail to inject. Multiple failures of the ADS-4 valves must occur for the hydrogen generated in the core to reach the DVI line break and be released into the PXS-A compartment. This potential challenge applies only to a small subset of severe accident scenarios by frequency. The cut set frequency for this scenario, from the AP1000 probabilistic risk assessment (APP-GW-GL-022, Revision 8) is 6.4E-09/reactor-year.

The purpose of calculation APP-VLS-M3C-008 was to perform a simple heat transfer calculation independent of the CFD analysis, to calculate potential pressure boundary transients during a diffusion flame hydrogen burn in the CMT-A compartment for the bounding hydrogen release scenario described above. The source term for the hydrogen and steam from the PXS-A vents are from a Modular Accident Analysis Program (MAAP) analysis, referenced in APP-VLS-M3C-007.

The diffusion flame hydrogen temperature is calculated from the heat balance on the plume, which is modeled as a cylinder. The area for heat transfer to the containment wall is based on the hydraulic radius of the source, the distance from the source to the wall, and the height of the CMT-A compartment. The calculation assumed that the hydrogen igniters are operable and preventing global hydrogen combustion. The temperature distributions are based on the peak temperatures assuming that 100 percent of the hydrogen release is from the equipment access floor hatch. Sensitivity analyses in the CFD calculation showed that the hydrogen release from the floor hatch only produced the most challenging temperature results.

The APP-VLS-M3C-008, Appendix A, analysis creates two temperature distributions on the containment pressure boundary based on insights from the CFD analysis and identifies the location of maximum temperature, referred to as the hot spot. The first distribution, Temperature Distribution No. 1, assumes the plume creates a hot spot that spans the lower containment equipment hatch cover, the hatch barrel, the insert plate, and the containment shell. The second distribution, Temperature Distribution No. 2, locates the hot spot on the containment shell at the vent exit (opening in ceiling above the lower equipment hatch).

The hot spot is the local area where the hot plume impacts the containment pressure boundary. Heat transfer to the hot spot consists of radiation and convection from the hydrogen diffusion flame. Heat transfer to the containment shell away from the hot spot consists of radiation from the hydrogen diffusion flame. For the structural analysis, the allowable surface temperatures within the

hot spot are assumed to be the bounding temperature limits of the containment shell and the hatch door cover. For the hatch barrel hot spot temperature, where the hatch seals are located, the allowable average wall temperature is assumed to be the temperature limit of the ethylene propylene diene monomer (EPDM) rubber, and the corresponding surface temperature is reported.

Zone 1 is the area of the containment pressure boundary above the hot spot in contact with the plume flow up the containment wall. The heat transfer consists of radiation and flat plate in parallel flow convection. Zone 2 is the area of the containment pressure boundary below the hot spot where the containment shell is not in contact with the plume flow but is receiving radiation from the plume.

Temperatures outside of Zones 1 and 2 are assumed unaffected and remain at 200 °F (93 °C). The calculations are performed to capture the maximum temperature on the inside surface of the heat sink in each region. The average temperatures in each region are also reported because the structural analysis uses the average through-wall temperatures for assessing integrity.

The peak surface and average temperatures from the limiting scenario identified by the sensitivity analysis for each of the zones are shown in the table below. The peak average through wall temperatures are assigned to the structural model. For Temperature Distribution No. 1, the temperatures were assigned as both a gradient from the hot spot outward to the base shell temperature and also as a constant value over the zone. Temperature Distribution No. 2 used the worst case from Temperature Distribution No. 1.

The component surface temperatures within each zone are calculated from these distributions.

Table 21.4-1 provides the results of the applicant's heat transfer calculations for Zone 1 and Zone 2 and compares them to the applicant's maximum allowable temperature for the hot spot. The results show that the applicant's calculated peak surface temperatures and peak average wall temperatures are below the allowable limits. The acceptability of the applicant's maximum allowable temperatures is discussed in Subsection B.2, below.

Table 21.4-1. Summary of Peak Temperature Results

Component	Peak Surface Temperature (°F (°C))		
	Hot Spot Allowables	Zone 1=Radiation and Convection	Zone 2=Radiation only
CTMT shell	650* (343)	470 (243)	436 (224)
Insert Plate/Barrel	488** (253)	366 (186)	344 (173)
Hatch Cover	800 (427)	591 (310)	543 (284)

	<i>Peak Average Wall Temperature (*F (*C))</i>		
<i>Component</i>	<i>Hot Spot Allowables</i>	<i>Zone 1=Radiation and Convection</i>	<i>Zone 2=Radiation Only</i>
<i>CTMT Shell</i>	607 (319)	442 (228)	411 (210)
<i>Insert Plate/Barrel</i>	390** (199)	308 (153)	293 (145)
<i>Hatch Cover</i>	780 (416)	577 (303)	530 (277)

* Allowable maximum temperature limit from ASME Code Service Level C for SA 738 Grade B.

** Allowable maximum temperature limit for insert plate/barrel corresponds to acceptance criterion for ethylene propylene diene monomer (EPDM) rubber.

The staff concludes that the methodology and assumptions in the analysis for determining the temperature source terms from the hydrogen burns are appropriately conservative, and the results are acceptable to be used as input to the structural analysis. The staff is tracking the proposed FSAR and ITAAC revisions proposed in the applicant's January 6, 2016, submittal, to be included in a future revision of the COL application, as **LNP Confirmatory Item 21.4-1**.

Resolution of LNP Confirmatory Item 21.4-1

LNP Confirmatory Item 21.4-1 is a commitment by the applicant to revise the LNP COL application FSAR and ITAAC as indicated in the letter dated January 6, 2016, in areas related to combustible gas control. The staff confirmed that the LNP COL FSAR and ITAAC have been appropriately revised. As a result, LNP Confirmatory Item 21.4-1 is now closed.

B.2 Containment Structural Evaluation of Hydrogen Venting

The NRC staff considered FSAR, Revision 8, Section 3.8, "Design of Category I Structures" to perform the technical evaluation. The staff also considered portions of NUREG-1793, Supplement 2, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design" (ADAMS Accession No. ML112061231).

The applicant's January 6, 2016, submission identifies the actual design distances between the PXS vents and the containment shell, including consideration of construction tolerances that pertain to the ITAAC in AP1000 DCD Tier 1 Table 2.3.9-3, Item 3. This submittal also contains proposed changes to AP1000 DCD Tier 2, Section 6.2.4.5.1, "Preoperational Inspection and Testing for the Hydrogen Ignition Subsystem," and Tier 2 Section 19.41, "Diffusion Flame Analysis." This section of the SER evaluates containment survivability and confirms that containment integrity is not challenged due to diffusion flame hydrogen burn in the containment compartments.

In the letter dated January 6, 2016, the applicant discussed changes in the analytical approach for the heat transfer calculation and the analysis to confirm that the containment integrity was not challenged due to a diffusion flame hydrogen burn in the containment compartments. In the applicant's supporting analysis audited by the staff, the maximum allowable temperature of the local

area at the lower equipment hatch cover (approximately 780 °F (416 °C)) exceeded the ASME NE-3000 maximum service temperature limit of 650 °F (343 °C). The applicant's supporting information audited by the staff provided further explanation of why the higher limit was acceptable. The temperature exceedance occurs at low containment pressure on order of 1.5 to 2.0 bar absolute. In order to assess the containment survivability of the hydrogen burning in the PXS-A compartment, the staff conducted an audit of the structural calculation (Westinghouse Document No. APP-VLS-GEF-017, Revision 0). As discussed above, the applicant's calculation developed two temperature distributions, each of which identified the location of a hot spot and two zones relative to the location of features on the containment shell. The calculation also performed sensitivity cases of the structural analysis. The applicant's results show Zone 1 and 2 are not affected by the hydrogen burn and remain below the service temperature limits. The hot spot area is a local area where burning plume flow impacts the containment pressure boundary. The hot spot area is about 2 meters in diameter and located on the equipment hatch at the top and covers the hatch barrel. For this hot spot, within the hatch barrel where the hatch seal is located, the peak allowable average wall temperature of 390 °F (199 °C) is based on the temperature limit of the EPDM rubber seal located within the hatch. The EPDM rubber is behind the 4-inch (10-cm) -thick lip of the hatch cover and, therefore, it is exposed to lesser temperature than the surrounding area of the hatch door. As shown in Table 21.4-1, above, the maximum average wall temperatures in Zone 1 and Zone 2 for the insert plate/barrel component are well below the applicant's 390 °F (199 °C) allowable limit.

Table 21.4-2, below, shows the applicant's calculation results of the stress analysis following ASME NE-3000, Service Level C code requirements for the containment vessel and hatch, which are fabricated from SA 738 Grade B steel.

Table 21.4-2. ASME Service Level C Limits

<i>Location and Corresponding Maximum Allowable Temperature</i>	<i>ASME Section 2, Part D Yield strength (Sy) for SA 738 Grade B</i>	<i>ASME Service Level C Allowable for SA 738 Grade B</i>
780 °F (416 °C)– Hot spot on equipment hatch	42.4 ksi (292 MPa)	63.6 ksi (438 MPa)
607 °F (319 °C)– Hot spot on containment shell	46.3 ksi (319 MPa)	69.45 ksi (478.8 MPa)

The applicant used an ANSYS finite element analysis (using software from ANSYS, Inc.) to calculate the maximum resultant stress intensity that would be experienced at the hot spot locations on the equipment hatch and containment shell. From the ANSYS stress analysis, the calculated maximum resultant stress intensity of 15.25 thousand pounds per square inch (ksi) (105.1 Megapascal (MPa)) is less than ASME Service Level C allowable of 63.6 ksi (438 MPa).

Therefore, based on the presented results, the staff concluded that the applicant meets the Service Level C requirements of ASME Code, Section III, Division 1, Subsection NE-3230.

Further, during the staff audit, the staff discussed the containment metal creep values at peak average wall temperature with the applicant. The applicant presented to the staff results of the creep calculation that was based on EGG-EA-7431, "Creep Rupture Failure of Three Components of the Reactor Primary Coolant System during the TMLB Accident," published November 1986. Based on the creep calculation results, the time required to rupture at 800 °F (427 °C) is 6.3 E+07 hours and temperature required to rupture at stress level of 15.25 ksi (105.1 MPa) is 1291 °F (699 °C) for a 1-hour duration. Since the time at the elevated temperature exposed for the containment shell and hatch cover is short (less than 10 minutes) the staff concluded that the creep is not significant factor for the containment to rupture for the hydrogen burn event.

According to Regulatory Guide 1.216, "Containment Structural Integrity Evaluation for Internal Pressure Loadings Above Design Bases Pressure," regulatory position 2(b), an instability (buckling) calculation is not required for the steel containments. Therefore, buckling is not an issue for the hydrogen burn event.

*Based on the staff's evaluation of containment survivability, discussed above, the staff finds that containment integrity is not challenged due to diffusion flame hydrogen burn in the containment CMT-A compartment from the PXS-A compartment because the containment meets the Service Level C requirements of ASME Code, Section III, Division 1 Subsection NE-3230 and Regulatory Guide 1.216. Therefore, the staff finds that applicant's FSAR and ITAAC revisions proposed in the January 6, 2016 submittal are acceptable. The staff is tracking these proposed FSAR and ITAAC revisions, to be included in a future revision of the COL application, as **LNP Confirmatory Item 21.4-1**.*

Resolution of LNP Confirmatory Item 21.4-1

LNP Confirmatory Item 21.4-1 is a commitment by the applicant to revise the LNP COL application FSAR and ITAAC as indicated in the letter dated January 6, 2016, in areas related to combustible gas control. The staff confirmed that the LNP COL FSAR and ITAAC have been appropriately revised. As a result, LNP Confirmatory Item 21.4-1 is now closed.

B.3 Risk Results and Insights

This design departure does not materially alter the description of AP1000 design features that reduce the risk associated with generation of combustible gases. It does not modify the plant-specific probabilistic risk assessment model used for licensing. Consequently, there is no change to the risk profile described in the COL application or the risk insights concerning hydrogen control in AP1000 DCD Revision 19, Table 19.59-18, Item 31. Consistent with DC/COL-ISG-003, "PRA Information to Support Design Certification and Combined License Applications," the plant-specific PRA remains acceptable to the staff.

Based on the above evaluation, and pending the staff's confirmation that the proposed revisions are incorporated in the Turkey Point Units 6 and 7 COL application, the staff finds the proposed revisions acceptable. The staff is tracking the proposed FSAR and ITAAC revisions proposed in

the applicant's April 29, 2016, letter (ADAMS Accession No. ML16124A922), to be included in a future revision of the COL application, as **Confirmatory Item 21.4-1**.

Resolution of Turkey Point Confirmatory Item 21.4-1

Confirmatory Item 21.4-1 is a commitment by the applicant to revise the Turkey Point Units 6 and 7 COL application to provide additional information as indicated in the letter dated April 29, 2016. The staff confirmed that the Turkey Point Units 6 and 7 COL application, Revision 8 has been appropriately revised. As a result, Confirmatory Item 21.4-1 is now closed.

21.4.5 Post Combined License Activities

For the reasons discussed in the technical evaluation section above, the staff finds acceptable revised Acceptance Criteria iii, as part of DCD ITAAC Item 3 in DCD Table 2.3.9-3, reproduced below in Table 21.4-3.

Table 21.4-3. DCD ITAAC Item 3 from DCD Table 2.3.9-3, as revised by PTN DEP 6.2-1.

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. The VLS provides the nonsafety-related function to control the containment hydrogen concentration for beyond design basis accidents.	<p>i) Inspection for the number of igniters will be performed.</p> <p>ii) Operability testing will be performed on the igniters.</p> <p>iii) An inspection of the as-built containment internal structures will be performed.</p> <p>iv) An inspection will be performed of the as-built IRWST vents that are located in the roof of the IRWST along the side of the IRWST next to the containment shell.</p>	<p>i) At least 64 hydrogen igniters are provided inside containment at the locations specified in Table 2.3.9-2.</p> <p>ii) The surface temperature of the igniter exceeds 1700°F.</p> <p>iii) The equipment access opening and CMT-A opening constitute at least 98% of vent paths within Room 11206 that vent to Room 11300. The minimum distance between the equipment access opening and containment shell is at least 24.3 feet. The minimum distance between the CMT-A opening and the containment shell is at least 9.4 feet. The CMT-B opening constitutes at least 98% of vent paths within Room 11207 that vent to Room 11300 and is a minimum distance of 24.6 feet away from the containment shell. Other openings through the ceilings of these rooms must be at least 3 feet from the containment shell.</p> <p>iv) The discharge from each of these IRWST vents is oriented generally away from the containment shell.</p>

21.4.6 Conclusion

The NRC staff reviewed the application and checked the referenced DCD, including the applicant's proposed changes in PTN DEP 6.2-1. The NRC staff's review confirmed that the applicant addressed the required information relating to the ITAAC and FSAR changes to be in conformance with the current detailed design while continuing to preserve the containment integrity. The staff concluded that the AP1000 containment will continue to maintain its role as a reliable leak-tight barrier in accordance with the containment performance regulatory guidance of SECY 93-087.

Based on the staff's technical evaluation documented above, the staff finds that the proposed change to allow short duration of the hydrogen burn temperature and pressure effect on the containment shell and equipment hatch with verification of the ITAAC distances from the containment shell is acceptable. The staff based its conclusion on the following:

- The methodology and assumptions used in the applicant's analysis for determining the temperature source terms from the hydrogen burns are appropriately conservative, and the result are acceptable to be used as input to the structural analysis.
- The containment meets the Service Level C requirements of ASME Code, Section III, Division 1 Subsection NE-3230 and Regulatory Guide 1.216, and the staff confirmed that the containment integrity is not challenged due to diffusion flame hydrogen burn in the containment compartment.

21.5 Source Range Neutron Flux Doubling Logic Operating Bypass

21.5.1 Introduction

The regulations in 10 CFR Part 50, Section 50.55a, "Codes and standards," cites certain standards published by the IEEE. According to 10 CFR 50.55a(h)(3), "Safety Systems," applicants for a COL must comply with IEEE Std. 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," and the associated correction sheet dated January 30, 1995.

Operating bypasses are addressed in Clause 6.6 of the standard. Under certain conditions, it may be acceptable to bypass a safety function. All of the conditions that permit bypassing the function must exist before the bypass is activated. If an operating bypass has been activated and plant conditions change so that the bypass is no longer permissible, the safety system must automatically do one of three things: restore plant conditions so that bypass is permissible, remove the active bypass, or initiate the safety function.

In the AP1000 certified design, safety functions are initiated by the PMS. In Revision 19 of the AP1000 DCD, Chapter 7, all safety functions initiated by the PMS comply with IEEE Std. 603-1991, Clause 6.6, "Operating Bypasses," with one exception. The exception is the manually activated operating bypass of the safety function called the boron dilution block from the source range neutron flux doubling logic. The boron dilution blocking function is normally activated when neutron flux doubles too quickly while reactor power is in the source range. However, bypassing this block is permitted above a certain temperature when boron dilution can no longer lead to inadvertent criticality. The AP1000 design of the PMS flux doubling logic for the boron dilution block did not meet the operating bypass requirements of IEEE Std. 603-1991

because no permissive conditions, as required, were programmed into the PMS to permit the block of the flux doubling logic.

21.5.2 Summary of Application

FPL incorporated in Turkey Point Units 6 and 7 COL application, Revision 8, the same information that DEF incorporated into the LNP COL application related to the voluntary submittal of an exemption request and design change description for departure from the AP1000 DCD to address source range neutron flux doubling logic operating bypass. The information was originally submitted in endorsement and exemption request letter dated April 29, 2016 (ADAMS Accession No. ML16124A921).

Tier 2 Departure

The applicant included the following Tier 2 departure from the AP1000 DCD:

- PTN DEP 7.3-1

PTN DEP 7.3-1 proposes changes for the PMS source range neutron flux doubling logic to comply with the requirements of IEEE Std. 603-1991, Clause 6.6. The departure included changes to the FSAR and TS; and incorporated changes into Parts 2, 7, and 10 of the COL application (letter dated April 29, 2016 (ADAMS Accession No. ML16124A921)).

This exemption request involves a departure from the generic TS Table 3.3.2-1, and Tier 2 involved departures. Therefore, these departures require NRC approval and are evaluated below.

21.5.3 Regulatory Basis

The regulations in 10 CFR 50.55a(h)(3) require compliance with IEEE Std. 603-1991, and the correction sheet dated January 30, 1995. Clause 5.1 of IEEE Std. 603-1991, "Single Failure Criterion," requires, in part, that safety systems shall perform all safety functions required for a DBE in the presence of (1) any single detectable failure within the safety systems concurrent with all identifiable but nondetectable failures, (2) all failures caused by the single failure, and (3) all failures and spurious system actuations that cause or are caused by the DBE requiring the safety functions. Clause 6.6 of IEEE Std. 603-1991, requires that, whenever the applicable permissive conditions are not met, a safety system shall automatically prevent the activation of an operating bypass or initiate the appropriate safety function(s). If plant conditions change so that an activated operating bypass is no longer permissible, the safety system shall automatically accomplish one of the following actions: (1) remove the appropriate active operating bypass(es), (2) restore plant conditions so that permissive conditions once again exist, or (3) initiate the appropriate safety function(s).

The regulations in 10 CFR 52.79(a)(2) require, in part, that the description of the structures, systems, and components shall be sufficient to permit understanding of the system designs and their relationship to the safety evaluations.

The guidance of SRP Appendix 7.1-C, "Guidance for Evaluation of Conformance to IEEE Std. 603," Section 4, "Safety System Designation," states that the information provided for the design-basis items, taken alone and in combination, should have one and only one interpretation.

21.5.4 Technical Evaluation

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (LNP Units 1 and 2) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the LNP COL FSAR, Revision 9 to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAs.
- The staff confirmed that all responses to RAs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting.

Tier 2 Departure

- PTN DEP 7.3-1

The following portion of this technical evaluation section is reproduced from Section 21.5.4 of the LNP COL application FSER.

- *LNP DEP 7.3-1*

LNP DEP 7.3-1 proposes to make changes for the PMS source range neutron flux doubling logic to comply with the requirements of IEEE Std. 603-1991, Clause 6.6 (Operating Bypasses). The manual block of the source range neutron flux doubling logic portion of the boron dilution block logic in the AP1000 DCD, Revision 19, does not comply with the requirements contained in Clause 6.6 of IEEE Std. 603-1991, which require the PMS to accomplish one of the following actions if plant conditions change so that an activated operating bypass is no longer permissible: (1) automatically remove the appropriate active operational bypass(es), (2) automatically restore plant conditions so that permissive conditions once again exist, or (3) automatically initiate the appropriate safety functions.

The staff reviewed a request for an exemption submitted by the applicant. The request proposed changes to generic TS Table 3.3.2-1. Additionally, the staff reviewed the associated changes to Tier 2 information, including DCD Chapters 7, 9, 14, 16, and 19. The regulatory evaluation of the exemption

request appears in Subsection A, below, and the technical evaluation of the exemption request and departure appears in Subsection B, below.

A. Regulatory Evaluation of Exemption Request

A.1 Summary of Exemption

The applicant requested an exemption from the provisions of 10 CFR Part 52, Appendix D, Section III.B, "Design Certification Rule for the AP1000 Design, Scope and Contents," that require the applicant referencing a certified design to incorporate by reference generic TS. Specifically, the applicant proposed to revise TS Table 3.3.2-1 by adding a P-8 permissive to the TS Table 3.3.2-1 for the ESFAS to provide reasonable assurance that the facility will be constructed and operated in conformity with the applicable design criteria, codes and standards.¹¹

A.2 Regulations

10 CFR Part 52, Appendix D, Section VIII.C.4 states that an applicant may request an exemption from the generic TS or other operational requirements. The Commission may grant such a request only if it determines that the exemption will comply with the requirements of 10 CFR 52.7, "Specific Exemptions."

A.3 Evaluation of Exemption

As stated in Section VIII.C.4 of Appendix D to 10 CFR Part 52, the Commission may grant an exemption from generic TS of the DCD only if it determines that the exemption will comply with the requirements of 10 CFR 52.7. As stated above, Section 52.7 points to 10 CFR 50.12 for specific exemptions.

Applicable criteria for when the Commission may grant the requested specific exemption are provided in 10 CFR 50.12(a)(1) and (a)(2). Section 50.12(a)(1) provides that the requested exemption must be authorized by law, not present an undue risk to the public health and safety, and be consistent with the common defense and security. The provisions of 10 CFR 50.12(a)(2) list six special circumstances for which an exemption may be granted. It is necessary for one of these special circumstances to be present in order for NRC to consider granting an exemption request. The applicant stated that the requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subsection defines special circumstances as when "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule." The staff's analysis of each of these findings is presented below.

¹¹ Although the applicant describes the requested exemption as being from Section III.B of 10 CFR Part 52, Appendix D, the entirety of the exemption pertains to proposed departures from generic TS in the generic DCD. In the remainder of this evaluation, the staff will refer to the exemption as an exemption from generic TS to match the language of Section VIII.C.4 of 10 CFR Part 52, Appendix D, which specifically governs the granting of exemptions from generic TS.

A.3.1 Authorized by Law

This exemption would allow the applicant to implement approved changes to TS Table 3.3.2-1. This is a permanent exemption limited in scope to particular generic TS, and subsequent changes to this information or any other generic TS would be subject to full compliance with the change processes specified in Section VIII.C.4 of Appendix D to 10 CFR Part 52. Section VIII.C.4 allows the NRC to grant exemptions from generic TS if the exemption meets the requirements of 10 CFR 52.7 and 50.12. The staff has determined that granting of the applicant's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the NRC's regulations. Therefore, as required by 10 CFR 50.12(a)(1), the exemption is authorized by law.

A.3.2 No Undue Risk to Public Health and Safety

Design changes are required for the PMS source range neutron flux doubling logic to comply with the requirements of IEEE Std. 603-1991, Clause 6.6 on operating bypasses; these changes to the source range flux doubling logic therefore support the system's intended design functions. The change will enable the plant-specific TS to meet the requirements of IEEE Std. 603-1991 and therefore the TS will continue to protect public health and safety and will maintain a level of detail consistent with that which is currently provided elsewhere in the plant-specific TS of the plant-specific DCD. The proposed changes to generic TS are evaluated and found to be acceptable in Section 21.5.4 of this safety evaluation. Therefore, the staff finds the exemption presents no undue risk to public health and safety as required by 10 CFR 50.12(a)(1).

A.3.3 Consistent with Common Defense and Security

The proposed exemption would allow the applicant to implement modifications to generic TS requested in the applicant's submittal. This is a permanent exemption limited in scope to a specific TS. Subsequent changes to this information or any other generic TS would be subject to full compliance with the change processes specified in Section VIII.C.4 of Appendix D to 10 CFR Part 52. This change is not related to security issues. Therefore, as required by 10 CFR 50.12(a)(1), the staff finds that the exemption is consistent with the common defense and security.

A.3.4 Special Circumstances

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever application of the regulation in the particular circumstances would not serve the underlying purposes of the rule or is not necessary to achieve the underlying purpose of the rule. The underlying purpose of TS Table 3.3.2-1 is to ensure compliance with the requirements of IEEE Std. 603-1991, Clause 6.6. Because TS Table 3.3.2-1 does not include the missing elements as described in the PMS source range neutron flux doubling logic, the proposed addition is needed to ensure that the plant-specific TS reflect the actual PMS design which meets the applicable requirements in IEEE Std. 603-1991. The additional TS

requirements are needed so that the PMS source range flux doubling logic maintains the design margins of reactor startup protection.

Application of the requirements in TS Table 3.3.2-1 is not necessary to achieve the underlying purpose of those portions of the rule. The proposed changes to the PMS source range neutron flux doubling logic support the system's intended design functions, as does the proposed changes to the TS requirements. The system as modified in the requested exemption will continue to perform its intended functions and will, therefore, meet the underlying purposes of the rule. Accordingly, because application of the requirements in generic TS Table 3.3.2-1 is not necessary to achieve the underlying purpose of the rule, special circumstances are present. Therefore, the staff finds that special circumstances exist, as required by 10 CFR 50.12(a)(2)(ii), for the granting of an exemption from generic TS described above.

A.4 Conclusion

The staff has determined that, as required by Section VIII.C.4 of Appendix D to 10 CFR Part 52, the exemption: (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, and (4) has special circumstances. Therefore, the staff grants the applicant an exemption from the requirements of TS Table 3.3.2-1.

B. Technical Evaluation of Exemption Request and Departure

B.1 Operating Bypasses

Operating bypasses are usually included in the reactor safety I&C system design to permit some safety functions to be bypassed, so that normal plant operations can occur without actuating safety systems unnecessarily. The implementation of operating bypasses for safety functions are required to meet the requirements in Clause 6.6 of IEEE Std. 603-1991, which is required by regulation in accordance with 10 CFR 50.55a(h)(3).

The applicant has incorporated the AP1000 DCD for the LNP COL application. However, the applicant proposed this design change because it found that the design in the safety-related PMS for bypassing the source range neutron flux doubling logic input to the boron dilution block, which is a safety function as shown in Figure 7.2-1 (Sheet 3 of 21) in the AP1000 DCD, did not meet the criteria in Clause 6.6 of IEEE Std. 603-1991. Hence, the applicant submitted the exemption request from generic TS and design change description, dated September 1, 2015, for a Tier 2 departure from the AP1000 DCD in which the applicant proposed the following design changes to ensure that the regulatory criteria on operating bypasses for safety functions are met in the LNP COL application:

- (1) Add a new permissive, P-8, to permit blocking the flux doubling logic during reactor startup (P-8 provides the logical permissive input to the PMS. P-8 is set to 551 degrees Fahrenheit (°F) (288 degrees Celsius (°C)) RCS temperature, the minimum temperature for criticality).*

- (2) *Add logic that will cause the PMS to force chemical and volume CVS Valves 136A and 136B closed if the flux doubling logic is blocked when reactor temperature is less than P-8. This ensures a permissible condition exists before flux doubling is bypassed below P-8, which is one option from IEEE Std. 603-1991, the other being to perform the appropriate safety functions.*
- (3) *When RCS temperature is below P-8 with the flux doubling signal block control logic actuated to block, reset of the flux doubling logic is required to open CVS Valves 136A and 136B.*
- (4) *Add an additional reset of source range flux doubling logic when RCS temperature falls below P-8. Existing PMS design resets flux doubling logic when neutron flux decreases below P-6.*
- (5) *Include new permissive and actuation in TS, and describe the changes in Tier 2 information.*

In its submitted exemption request and design change description, the applicant also included revised logic Figure 7.2-1, Sheet 3 of 21, to show the incorporation of the above proposed design changes, which are evaluated below in this section of the safety evaluation.

In the AP1000-certified design, without this departure, when the reactor is shut down from power operations, the PMS design for the block of the flux doubling logic safety function met the criteria in Clause 6.6 of IEEE Std. 603-1991 regarding to the operating bypass because the flux doubling logic safety function will be automatically reset to remove its block when the neutron flux falls below the existing Permissive P-6 setpoint. However, when the reactor starts up, the certified design of the PMS did not meet the regulatory requirement to impose permissive conditions for the manual block of the flux doubling logic safety function at any time because there were no permissive conditions implemented in the PMS design for the manual block of the flux doubling logic safety function for the boron dilution block. In addition, for the flux doubling logic safety function the PMS design in the certified AP1000 DCD did not include control logic to reinstate permissive conditions or initiate appropriate safety function when the permissive conditions do not exist.

To address the above design deviations from the regulatory requirement on operating bypasses, the applicant proposed to create a new permissive, P-8, by using the RCS temperature to permit blocking the flux doubling logic during reactor startup. The setpoint for the new Permissive P-8 is selected to be at 551 °F (288.3 °C) for the RCS temperature, which is the minimum temperature for criticality for the AP1000 standard design. The staff found that this proposed design change will provide the necessary permissive condition to allow manual bypass of the flux doubling logic safety function during the plant startup. The applicant also proposed to add an additional reset of source range flux doubling logic when the RCS temperature falls below the setpoint for the new Permissive P-8. The staff found that this proposed design change will address the lack of the control logic in the current PMS design to reinstate permissive conditions to manually block the flux doubling logic safety function. When the RCS temperature falls below the setpoint for the new P-8 permissive, the applicant proposed to add

logic in the PMS to force CVS Valves 136A and 136B closed. The CVS in the AP1000 DCD is designed to avoid or terminate boron dilution events by isolating sources of unborated water to the RCS during all modes of operation when signaled to do so by the PMS. Valves 136A and 136B are installed on the demineralized water supply line for isolating the unborated demineralized water to the CVS system. The staff found that this proposed change could prevent and/or terminate a boron dilution event from happening when the RCS temperature is below the new P-8 permissive setpoint if the flux doubling logic safety function is blocked.

In the revised logic Figure 7.2-1, Sheet 3 of 21, included in the submittal dated September 1, 2015, the staff noticed that there is a RESET/BLOCK momentary command for each applicable division for the "FLUX DOUBLING BLOCK CONTROL." This momentary command is used for the newly created function to close demineralized water system (DWS) isolation valves. However, the staff found that there is not a coincident voting logic used for this divisionized command. Therefore, the staff issued RAI 8404, Question 07.02-1, requesting the applicant to clarify how the single failure criterion, as required in Clause 5.1 of IEEE Std. 603-1991, is met for this newly added actuation signal sent to "CLOSE DWS ISOLATION VALVES." In its response, dated December 23, 2015, the applicant described how the DWS isolation valves are controlled by the PMS Division A for isolation Valve V136A and Division C for isolation Valve 136B, respectively. When the flux doubling block control is actuated for each division, the respective isolation valve is closed. Because the isolation valves are in series on the demineralized water supply connecting the DWS to the CVS system, the isolation function complies with the single failure criterion. In addition, this new function block to "CLOSE DWS ISOLATION VALVES" is added to prevent a boron dilution from happening if the flux doubling logic is blocked when the RCS temperature falls below the P-8 setpoint. Because this new function is not required to mitigate any DBE, it is not added as an engineered safety feature actuation function. The staff found that the response from the applicant to the above question in the RAI is appropriate and acceptable because it clarified how the design change meets the single failure criterion.

The applicant initially proposed to add logic to reset the flux doubling logic if CVS isolation Valves 136A and 136B are opened when RCS temperature is below the setpoint for the new P-8 permissive. However, the staff found that this original proposed change was not consistent with the revised logic Figure 7.2-1, Sheet 3 of 21. Hence, the staff issued RAI 8404, Question 07.02-1 requesting the applicant to explain how the proposed logic change would be implemented to match with the revised logic diagram (ADAMS Accession No. ML15329A055). In its response dated December 23, 2015, the applicant provided additional information stating that the information initially submitted is incorrect for this change, which should be changed as follows: When the RCS temperature is below the setpoint for the new P-8 permissive with the flux doubling signal block control logic actuated to block, the reset of the flux doubling block control logic is required to open CVS isolation Valves 136A and 136B (ADAMS Accession No. ML15329A055). The staff found that this modified description matches the revised logic Figure 7.2-1, Sheet 3 of 21.

Overall, the staff found that the changes to the PMS design comply with criteria in Clauses 5.1 and 6.6 of IEEE Std. 603-1991. Therefore, the staff found that the design changes proposed by the applicant are acceptable.

B.2 Boron Dilution Analysis

The staff reviewed the design change descriptions presented in the departure and exemption request (letter NPD-NRC-2015-038, dated November 12, 2015) with respect to the boron dilution analysis presented in AP1000 DCD Revision 19 Section 15.4.6. The design changes include adding a P-8 permissive which limits the ability to manually block the flux doubling calculation during plant startup and logic to force applicable CVS DWS isolation valves closed if the flux doubling logic is blocked.

The inclusion of the new permissive, P-8, does not change the approach and underlying assumptions used in the analysis for boron dilution as presented in Section 15.4.6. The logic presented in the exemption includes the automatic closure of the CVS valves if a manual block of the flux doubling logic is implemented below the P-8 permissive. This would block the potential source of unborated water and would be consistent with the termination method for a boron dilution event for modes 1 through 4 as discussed in DCD Section 15.4.6.2. When above the P-8 permissive, the manual block of the flux doubling logic may be permitted to allow for plant startup. The logic associated with the new P-8 permissive is also consistent with the description of dilution during startup (mode 2) as described in DCD Section 15.4.6.2.5.

Based on the staff's review of the new permissive and associated logic, the staff concludes that the boron dilution analysis presented in DCD Section 15.4.6 remains applicable given the changed descriptions presented in exemption request NPD-NRC-2015-038.

B.3 Technical Specifications

The design changes proposed by the applicant correspond to proposed changes in Section 3.3 of the TS and TS Bases (FSAR Chapter 16) in the COL application.

These changes, which appear in the September 1, 2015, submittal and have been incorporated into Part 4 of, Revision 8 of the COL application, submitted on December 7, 2015, are necessary to ensure that the TS and TS Bases accurately reflect the updated design and are described below.

Additionally, in a letter dated December 23, 2015, the applicant submitted its response to RAI Letter No. 135, Question 16-5, to address the staff's concerns related to proposed TS changes and insufficient level of details provided in the TS Bases. These changes, to be included in a future revision of the COL application, are among those described below and are being tracked by the staff as **LNP Confirmatory Item 21.5-1**.

Resolution of LNP Confirmatory Item 21.5-1

LNP Confirmatory Item 21.5-1 is a commitment by the applicant to revise the LNP COL application TS Bases as indicated in the letter dated December 23, 2015, in areas related to the flux doubling logic operating bypass. The staff confirmed that the LNP COL TS Bases have been appropriately revised. As a result, LNP Confirmatory Item 21.5-1 is now closed.

- LCO 3.3.2 (ESFAS Instrumentation)

In Table 3.3.2-1 (Page 9 of 13), the Mode 3 Applicability of Function 15.a, "Source Range Neutron Flux Doubling" is revised to indicate that this Function is "not applicable for valve isolation Functions whose associated flow path is isolated" (i.e., by applying Footnote (e) to the listed Mode 3).

In Table 3.3.2-1 (Page 10 of 13), a new Function 18.d, "Reactor Coolant Average Temperature, P-8" is added, with its associated requirements in columns for Applicable Modes or Other Specified Conditions, Required Channels, Conditions, and Surveillance Requirements, as follows (with added text underlined):

<i>Applicable Modes or Other Specified Conditions</i>	<i>Required Channels</i>	<i>Conditions</i>	<i>Surveillance Requirements</i>
<u>2, 3^(e), 4^(e)</u>	<u>4</u>	<u>J, T</u>	<u>SR 3.3.2.1</u> <u>SR 3.3.2.4</u> <u>SR 3.3.2.5</u>
<u>5^(e)</u>	<u>4</u>	<u>J, P</u>	<u>SR 3.3.2.1</u> <u>SR 3.3.2.4</u> <u>SR 3.3.2.5</u>

- Applicable Safety Analyses, LCOs, and Applicability (ASA) Section of TS Bases B3.3.2 (ESFAS Instrumentation)

On Page B3.3.2-37, the discussion of Function 15 is revised as follows (with deleted text lined out and added text underlined) to accurately reflect the logics shown in DCD Figure 7.2-1 (Sheet 3 of 21):

"The block of boron dilution is accomplished by closing the CVS makeup line isolation ~~suction~~ valves or closing the demineralized water system isolation ~~storage tanks valves to CVS, and aligning the boric acid tank to the CVS makeup pumps.~~ This Function is actuated by Source Range Neutron Flux Doubling and Reactor Trip."

On Page B3.3.2-37, the discussion of Function 15.a is revised as follows (with added text underlined) to reflect the revised logics:

"A signal to block boron dilution in MODES 2 or 3, when not critical or during an intentional approach to criticality, and MODES 4 or 5 is derived from source range neutron flow increasing at an excessive rate (source range flux doubling). This Function is not applicable in MODES 3, 4 and 5 if the demineralized water makeup flow path is isolated. The source range neutron detectors are used for this Function. The LCO requires four divisions to be OPERABLE. There are four divisions and two-out-of-four logic is used. On a coincidence of excessively

increasing source range neutron flux in two of the four divisions, demineralized water is isolated (CVS demineralized water system isolation valves closed) from the makeup pumps and reactor coolant makeup is isolated (CVS makeup line isolation valves closed) from the reactor coolant system to preclude a boron dilution event. In MODE 6, a dilution event is precluded by the requirement in LCO 3.9.2 to close, lock and secure at least one valve in each unborated water source flow path.”

On Page B3.3.2-37, the discussion of Function 15.b is revised, in part, as follows (with deleted text lined out and added text underlined) to clarify the specific components actuated by the permissive P-4:

“A P-4 signal initiates isolation of RCS makeup from the CVS Demineralized Water Makeup is also isolated by closing the demineralized water system isolation valves, and aligned to the CVS makeup pumps) aligning the CVS makeup pump suction to the boric acid tank. Unborated water source makeup isolation is initiated by all the Functions that initiate a Reactor Trip.”

On Page B3.3.2-41, the discussion of Function 18.c, “Intermediate Range Neutron Flux, P-6,” is revised as follows (with deleted text lined out and added text underlined) to reflect the revised logics:

“The Intermediate Range Neutron Flux, P-6 interlock is actuated when the respective NIS intermediate range channel increases to approximately one decade above the channel lower range limit. Above the setpoint, the P-6 interlock allows manual block of the source range neutron flux reactor trip. Below the setpoint, the P-6 interlock automatically energizes the source range detectors and unblocks the source range neutron flux reactor trip. As intermediate range flux decreases from above the setpoint to below the setpoint, the P-6 interlock automatically resets the flux doubling block function ensuring unblocks the source range neutron flux doubling function is enabled, permitting the block of boron dilution. Normally, the source range neutron flux doubling f-this Function is blocked by the main control room operator during reactor startup. This Function is required to be OPERABLE in MODE 2.”

On Page B3.3.2-42, the discussion of the new Function 18.d is added as follows to reflect the revised logics:

“The P-8 interlock is provided to permit a manual block of or to reset a manual block of the automatic Source Range Neutron Flux Doubling actuation of the Boron Dilution Block (Function 15.a).

The automatic Source Range Neutron Flux Doubling actuation of the Boron Dilution Block Function may be manually blocked (disabled) to permit plant startup and normal power operation when above the P-8 reactor coolant average temperature setpoint.

The manual block to disable the automatic Source Range Neutron Flux Doubling actuation of the Boron Dilution Block Function is automatically reset upon decreasing reactor coolant average temperature to below the P-8 setpoint.

Once reactor coolant average temperature is below the P-8 setpoint, the Source Range Neutron Flux Doubling actuation of the Boron Dilution Block Function may also be manually blocked to prevent inadvertent actuation during refueling operations and post-refueling control rod testing.

When the Source Range Neutron Flux Doubling actuation of the Boron Dilution Block is manually blocked below P-8 during shutdown conditions, the CVS demineralized water system isolation valves will automatically close to prevent inadvertent boron dilution.

The P-8 interlock is required to be OPERABLE in MODES 2, 3, 4 and 5. This Function is not applicable in MODES 3, 4 and 5, if the demineralized water makeup flow path is isolated. In MODE 6 a dilution event is precluded by the requirement in LCO 3.9.2 to close, lock and secure at least one valve in each unborated water source flow path.”

- Applicable Safety Analyses, LCOs, and Applicability (ASA) Section of TS Bases B3.3.1 (Reactor Trip System (RTS) Instrumentation)

In addition, unrelated to the revised logics in the ESFAS, on Page B3.3.1-23, in the discussion of the permissive P-6, Item a(3) is revised as follows (with deleted text lined out and added text underlined) to reflect relevant information regarding the permissive P-6:

“(3) on decreasing ~~increasing~~ power, the P-6 interlock automatically resets the flux doubling block control ensuring ~~provides a backup block signal to the source range neutron flux doubling circuit~~ is enabled. Normally, the source range neutron flux doubling circuit ~~this Function~~ is manually blocked by the main control room operator during the reactor startup.”

- Actions Section of TS Bases B3.3.2 (ESFAS Instrumentation)

On Page B3.3.2-57, in the discussion of Actions J.1 and J.2, the first paragraph is revised to read, in part, “[C]ondition J applies to P-6, P-8, P-11, P-12, and P-19 interlocks ...” to reflect the addition of the permissive P-8.

The staff finds the above proposed changes to TS LCO 3.3.2 and its associated bases acceptable because they reflect the revised logic for the source range neutron flux doubling function of the AP1000 ESFAS as described in DCD Section 7.3.

Based on the above evaluation, the staff finds the proposed TS and Bases revisions meet the requirements of 10 CFR 50.36.

B.4 Risk Results and Insights

This design departure does not affect the description of AP1000 design features that reduce the risk of boron dilution events. It does not modify the plant-specific probabilistic risk assessment model used for licensing. Consequently, there is no change to the risk profile described in the COL application or the risk insights

concerning boron dilution in AP1000 DCD Revision 19, Table 19.59-18 (Item 9). Instead, the change improves confidence in the validity of the reported risk results and insights. Consistent with DC/COL-ISG 003, "PRA Information to Support Design Certification and Combined License Applications," the plant-specific probabilistic risk assessment remains acceptable to the staff.

Based on the above evaluation, and pending the staff's confirmation that the proposed revisions are incorporated in the Turkey Point Units 6 and 7 COL application, the staff finds the proposed revisions acceptable. The staff is tracking the proposed FSAR, TS, and TS Bases revisions proposed in the applicant's April 29, 2016, letter (ADAMS Accession No. ML16124A921), to be included in a future revision of the COL application, as **Confirmatory Item 21.5-1**.

Resolution of Turkey Point Confirmatory Item 21.5-1

Confirmatory Item 21.5-1 is a commitment by the applicant to revise the Turkey Point Units 6 and 7 COL application to provide additional information as indicated in the letter dated April 29, 2016. The staff confirmed that the Turkey Point Units 6 and 7 COL application, Revision 8 has been appropriately revised. As a result, Confirmatory Item 21.5-1 is now closed.

21.5.5 Post Combined License Activities

There are no post-COL activities related to this section.

21.5.6 Conclusion

The staff reviewed the application for proposed departure number PTN DEP 7.3-1 and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to the departures and there is no outstanding information expected to be addressed in the Turkey Point Units 6 and 7 COL FSAR and TS related to this departure.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR TS is acceptable and meets the regulatory requirements and guidance discussed in Section 21.4.3 of this SER. The staff based its conclusion on the following:

Based on the evaluation discussed above, the staff concludes that the changes to the PMS design and the RAI responses for bypassing the source range neutron flux doubling logic input to the boron dilution block comply with 10 CFR 50.55a(h)(3) because they meet the criteria in Clauses 5.1 and 6.6 of IEEE Std. 603-1991. The staff therefore finds the design changes proposed by the applicant acceptable.

22.0 CONCLUSIONS

In accordance with Subpart C, "Combined Licenses," of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," the staff of the U.S. Nuclear Regulatory Commission reviewed the combined license (COL) application submitted by Florida Power and Light Company for Turkey Point Units 6 and 7. Based on the staff's evaluation documented in this final safety evaluation report, the staff finds the following with respect to the safety aspects¹ of the COL application:

- 1) The applicable standards and requirements of the Atomic Energy Act and Commission's regulations have been met,
- 2) Required notifications to other agencies or bodies have been duly made,
- 3) There is reasonable assurance that the facility will be constructed and will operate in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's regulations,
- 4) The applicant is technically and financially qualified to engage in the activities authorized, and,
- 5) Issuance of the license will not be inimical to the common defense and security or to the health and safety of the public.

¹ An environmental review was also performed of the COL application, and its evaluation and conclusions are documented in NUREG-2176, "Environmental Impact Statement for Combined Licenses (COLs) for Turkey Point Nuclear Plant Units 6 and 7, Final Report," dated October 2016.

Appendix A

Post COL Activities: License Conditions; Inspections, Tests, Analyses, and Acceptance Criteria; and Final Safety Analysis Report Commitments

A.1 License Conditions

The Nuclear Regulatory Commission's (NRC's) regulations at Title 10 of the *Code of Federal Regulations* (10 CFR) 52.97, "Issuance of combined licenses," require a combined license (COL) to specify any terms and conditions of the COL the Commission deems appropriate. A license condition is not needed when an existing NRC regulation requires a future regulatory review of a matter to ensure adequate safety during design, construction, inspection activities or operation for a new plant. The staff is proposing that the Commission include the following license conditions, which are set forth below, to control various safety matters.

Proposed License Condition in FSER	FSER Section	License Condition Description
1-1	1.5.1	Primary and secondary financial protection per 10 CFR 140.11(a)(4) and 10 CFR 50.54(w)
1-2	1.5.1	Financial assurance – deferred reporting of 10 CFR 140.21 for guarantee of payment
1-3	1.5.5	10 CFR Parts 30, 40, and 70 licenses governing the possession and use of applicable source, byproduct and special nuclear materials
1-4	1.5.5	Implementation schedule submission requirements for Special Nuclear Material Control and Accounting Program
1-5*	1.5.5	Implementation schedule submission requirements for Non-Licensed Plant Staff Training Program
1-6	1.5.5	Implementation of Special Nuclear Material Physical Protection Program
2-1	2.5.3.5	Geologic mapping
3-1	3.6.5	As-designed pipe rupture hazards analysis
3-2	3.7.2.5	Seismic interaction analysis update to reflect as-built information
3-3	3.7.2.5	Seismic analyses reconciliation to account for detailed design changes
3-4	3.8.5.5	Implementation schedule submission requirements for construction and inspection procedures for steel concrete composite construction activities for seismic Category I nuclear island modules

Proposed License Condition in FSER	FSER Section	License Condition Description
3-5	3.9.6.5	Preservice Testing Operational Program and the Motor-Operated Valve Testing Operational Program
3-6	3.9.6.5	Implementation schedule submission requirements for Inservice Testing program (including preservice and motor-operated valve testing)
3-7	3.9.6.5	Squib valve surveillance and maintenance
3-8	3.11.5	Implementation of Environmental Qualification Program
3-9	3.11.5	Implementation schedule submission requirements for Environmental Qualification Program
3-10	3.12.5	As-designed individual piping segments and reporting requirements
4-1	4.5	Instrument uncertainty for measuring departure from nucleate boiling ratio values
5-1**	5.2.4.5	Implementation schedule submission requirements of operational programs in FSAR Table 13.4-201 (Preservice Inspection and Inservice Inspection Programs)
5-2	5.3.2.5	Implementation of Reactor Vessel Material Surveillance Program
5-3	5.3.2.5	Implementation schedule submission requirements for Reactor Vessel Material Surveillance program
5-4	5.3.3.5	Updating the pressure-temperature limits using the approved pressure-temperature limits report methodologies for reactor vessel material properties
5-5	5.3.4.5	Plant-specific belt line material properties
5-6**	5.4.5	Implementation schedule submission requirements for Preservice Inspection and Inservice Inspection Programs
6-1	6.2.5	Implementation of containment leakage rate testing program
6-2	6.2.5	Implementation schedule submission requirements for containment leakage rate testing program
6-3**	6.6.5	Implementation schedule submission requirements for Preservice Inspection and Inservice Inspection Programs
9-1	9.1.2.5	Implementation of and implementation schedule submission requirements for spent fuel rack Metamic Coupon Monitoring Program
9-2	9.5.1.5	Implementation of Fire Protection Program
9-3	9.5.1.5	Implementation schedule submission requirements for Fire Protection Program
10-1	10.1.5	Implementation of and implementation schedule submission requirements for flow accelerated corrosion program
10-2	10.2.5	Implementation of and implementation schedule submission requirements for turbine maintenance and inspection program

Proposed License Condition in FSER	FSER Section	License Condition Description
11-1	11.2.5	Radionuclide inventory of unpackaged wastes
11-2	11.4.5	Implementation of operational program for process and effluent monitoring and sampling (including process control program)
11-3	11.4.5	Implementation schedule submission requirements for operational program for process and effluent monitoring and sampling (including process control program)
11-4	11.5.5	Implementation of operational program for process and effluent monitoring and sampling, including (1) Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls, (2) Offsite Dose Calculation Manual, and (3) Radiological Environmental Monitoring Program
11-5	11.5.5	Implementation schedule submission requirements for operational program for process and effluent monitoring and sampling, including (1) Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls, (2) Offsite Dose Calculation Manual, and (3) Radiological Environmental Monitoring Program
12-1	12.5.5	Implementation of Radiation Protection Program (including the as low as reasonably achievable (ALARA) principle)
12-2	12.5.5	Implementation schedule submission requirements for Radiation Protection Program (including the ALARA principle)
13-1	13.2.5	Implementation of Reactor Operator Training Program
13-2*	13.2.5	Implementation schedule submission requirements for Non-Licensed Plant Staff Training Program, Reactor Operator Training Program, and Reactor Operation Requalification Program
13-3	13.3.5	NEI 12-01, Staffing assessment
13-4	13.3.5	NEI 12-01, Communications capability assessment
13-5	13.3.5	NEI 10-05, detailed staffing analysis
13-6	13.3.5	Fully developed set of site-specific emergency action levels
13-7	13.6.5 13.7.5 13.8.5	Implementation schedule submission requirements for physical security programs, Fitness for Duty operational program, and Cyber Security program
14-1	14.2.3.5	Implementation schedule submission requirements for implementation of preoperational and startup procedures
14-2	14.2.3.5	Initial startup test program changes
14-3	14.2.5.5	First-plant-only and first-three-plant-only testing
14-4	14.2.8.5	Implementation milestones for initial test program
14-5	14.2.8.5	Implementation schedule submission requirements for initial test program

Proposed License Condition in FSER	FSER Section	License Condition Description
14-6	14.2.8.5	Pre-operational, pre-critical, initial criticality, low-power, and power ascension testing
15-1	15.0.5	Schedule submission requirements for calculations for power calorimetric uncertainty instrumentation and administrative controls
17-1	17.6.5	Implementation schedule submission requirements for Maintenance Rule program
19-1	19.59.5	AP1000 seismic margin analysis
19-2	19.59.5	AP1000 probabilistic risk assessment
19-3	19.59.5	AP1000 internal fire and internal flood analysis
19-4	19.59.5	Implementation schedule submission requirements for site-specific severe accident management guidelines
19-5	19.59.5	Thermal lag assessment
19-6	Appendix 19F	Malevolent aircraft impact FSAR revisions
19.A-1	19.A.5	Implementation schedule submission requirements for operational and programmatic elements of mitigative strategies for responding to a loss of large areas event
20-1	20.1.5	Mitigation strategies for beyond-design-basis external events
20-2	20.2.5	Reliable spent fuel pool instrumentation

* License Conditions 1-5 and 13-2 represent the same reporting requirements for the Non-Licensed Plant Staff Training Program.

** License Conditions 5-1, 5-6, and 6-3 represent the same reporting requirements for the Preservice Inspection Program and Inservice Inspection Program.

Appendix A

License Conditions, Inspections, Tests, Analyses, and Acceptance Criteria, and Final Safety Analysis Commitments

A.2 Inspections, Tests, Analyses, and Acceptance Criteria

The staff has identified the certain Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) that it will recommend the United States Nuclear Regulatory Commission impose with respect to a COL issued to the applicant. The following is a list of those ITAAC. In addition to the ITAAC contained in this list, the ITAAC found in the AP1000 DCD Revision 19 Tier 1 material will also be incorporated into the COL should a COL be issued to the applicant.

Listing of Turkey Point Site-Specific ITAAC

ITAAC Number from Draft License	ITAAC Description	SER Section
C.2.2.05.07e	Main Control Room Emergency Habitability System*	21.2
C.2.3.09.03.iii	Containment Hydrogen Control System*	21.4
C.2.5.04.04	Feedwater Flow Measurement	15.0
C.2.6.09	Physical Security	13.6.A
C.2.6.12	Offsite Power System	8.2.A
C.3.8.01.01	Emergency Planning	13.3
C.3.8.02.01	Pipe Rupture Hazards Analysis	3.6
C.3.8.03.01	Piping Design	3.12
C.3.8.04.01	Waterproof Membrane	3.8.5
C.3.8.05.01	Concrete Fill under Seismic Category I Structures	2.5.4
C.3.8.06.01	Seismic Category I Structure Foundation Grouting	2.5.4

* ITAAC for the Main Control Room Emergency Habitability System and the Containment Hydrogen Control System, appear in the AP1000 DCD Revision 19 and were revised in the Turkey Point COL application.

Appendix A

License Conditions, Inspections, Tests, Analyses, and Acceptance Criteria, and Final Safety Analysis Report Commitments

A.3 Final Safety Analysis Report (FSAR) Commitments

The following FSAR commitments are identified as the responsibility of the licensee:

SER Section	Description
1.4	A site-specific construction plan and startup schedule will be provided after issuance of the COL.
5.2.5	Prior to initial fuel load, the operating procedures that include identifying, monitoring, trending, and managing the prolonged low-level reactor coolant system leakage will be developed.
6.4	FSAR Commitment 6.4-1. The licensee's control room operator training program will address the following: <ul style="list-style-type: none">• Regulatory Position C.5, "Emergency Planning," of RG 1.78• Regulatory Position 2.5, "Hazardous Chemicals," of RG 1.196• Regulatory Position 2.2.1, "Comparison of System Design, Configuration, and Operation with Licensing Basis," of RG 1.196• Regulatory Position 2.7.1, "Periodic Evaluations and Maintenance," of RG 1.196
9.1.4	The light load handling program, including system inspections, will be implemented prior to receipt of fuel onsite.
9.1.5	The overhead heavy-load handling program, including system inspections, will be implemented prior to receipt of fuel onsite.

Appendix B Chronology

This appendix contains a chronological listing of correspondence to and from the U.S. Nuclear Regulatory Commission regarding the Turkey Point Nuclear Plant Units 6 and 7 combined license application under docket numbers 052-00040 and 052-00041 through September 28, 2016, with the exception of legal filings related to the hearings. Source: Agencywide Documents Access and Management System Accession No. ML16273A550.

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
6/30/2009	ML091830589	Florida Power & Light Company, Application for Combined License for Turkey Point Units 6 and 7.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040
			License-Application for Combined License (COLA)			05200041
						PROJ0763
7/2/2009	ML091830622	Request for FEMA Review of a Combined License Application from Florida Power and Light for Two New Reactor Units at the Turkey Point Site.	Letter	NRC/NSIR/DPR /DDEP	US Federal Emergency Mgmt Agency (FEMA)	05200040 05200041 PROJ0763
6/26/2009	ML091830842	2009/06/26-Comment (2) of John Dwyer on Behalf of Stone Crab Alliance on Proposed Rule PR-50 and PR-52, Enhancements to Emergency Preparedness Regulations.	Rulemaking-Comment	Stone Crab Alliance	NRC/SECY/RAS	05200029 05200030 05200040 05200041 06300001 07007001 07007002

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
6/30/2009	ML091870846	FPL - Turkey Point, Units 6 & 7 COLA (General and Admin Information), Rev. 0 - Part 1 - General and Financial Information	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870848	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Master Table of Contents	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870849	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 1 - Introduction and General Description of the Plant	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870850	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.0 - Site Characteristics	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
6/30/2009	ML091870851	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.1 - Geography and Demography	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870852	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.2 - Nearby Industrial, Transportation, and Military Facilities	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870853	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.3 - Meteorology	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870854	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.1 - Hydrologic Description	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
6/30/2009	ML091870855	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.2 - Floods	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870856	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.3 - Probable Maximum Flood on Streams and Rivers	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870857	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.4 - Potential Dam Failures	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870858	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.5 - Probable Maximum Surge and Seiche Flooding	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
6/30/2009	ML091870859	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.6 - Probable Maximum Tsunami Hazards	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870860	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.7 - Ice Effects	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870861	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.8 - Cooling Water Canals and Reservoirs	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870862	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.9 - Channel Diversions	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870863	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.10 - Flooding Protection Requirements	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870864	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.11 - Low Water Considerations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870865	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870866	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2AA - Transducer Data	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870867	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2BB - Aquifer Pumping Test Results	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870868	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2CC - Groundwater Model Development and Analysis	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870869	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 201-225	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870870	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 226-247	Final Safety Analysis Report (FSAR) License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091870871	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.13 - Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870872	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.14 - Technical Specification and Emergency Operation Requirements	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870873	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.15 - Combined License Information	Final Safety Analysis Report (FSAR) License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091870874	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.0 - Geology, Seismology, and Geotechnical Engineering	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870875	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870876	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 201-218	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870877	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 219-238	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870878	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.2 - Vibratory Ground Motion	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870879	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.3 - Surface Faulting	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870880	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.4 - Stability of Subsurface Materials and Foundations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870881	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.5 - Stability of Slopes	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870882	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.6 - Combined License Information	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870883	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 3 - Design of Structures, Components, Equipment and Systems	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870884	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 4 - Reactor	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870885	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 5 - Reactor Coolant System and Connected Systems	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870886	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 6 - Engineered Safety Features	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870887	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 7 - Instrumentation and Controls	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870888	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 8 - Electric Power	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870889	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 9 - Auxiliary Systems	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870890	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 10 - Steam and Power Conversion	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870891	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 11 - Radioactive Waste Management	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870892	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 12 - Radiation Protection	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870893	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 13 - Conduct of Operations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870894	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 14 - Initial Test Program	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870895	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 15 - Accident Analyses	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870896	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 16 - Technical Specifications	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870897	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 17 - Quality Assurance	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870898	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 18 - Human Factors Engineering	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870899	FPL - Turkey Point, Units 6 & 7 COLA (FSAR), Rev. 0 - Part 2 - FSAR - Chapter 19 - Probabilistic Risk Assessment	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870901	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Master Table of Contents	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870902	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 1 - Introduction	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870903	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 1 - Introduction - Appendix 1A Part 1	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870904	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 1 - Introduction - Appendix 1A Part 2	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870905	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.1 - Station Location	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870906	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.2 - Land	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870907	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Water	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870908	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Figures 1-31	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870909	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Figures 32-68	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870910	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.4 - Ecology	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870911	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870912	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.6 - Geology	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870913	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.7 - Meteorology, Air Quality, and Noise	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870914	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.8 - Related Federal Project Activities	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870916	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 3 - Plant Description	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870918	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 4 - Environmental Impacts of Construction	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870919	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 5 - Environmental Impacts of Operation	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870921	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 6 - Environmental Measurements and Monitoring Programs	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870922	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 7 - Environmental Impacts of Postulated Accidents Involving Radioactive Materials	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870923	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 8 - Need for Power	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870924	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER - Chapter 9 - Alternatives to the Proposed Action	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870925	FPL - Turkey Point, Units 6 & 7 COLA (Environmental Report), Rev. 0 - Part 3 - ER Chapter 10 - Environmental Consequences of the Proposed Action	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870927	FPL - Turkey Point, Units 6 & 7 COLA (Technical Specifications), Rev. 0 - Part 4 Technical Specifications	License-Application for Combined License (COLA) Technical Specifications	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870929	FPL - Turkey Point, Units 6 & 7 COLA (Emergency Plan), Rev. 0 - Part 5 Emergency Plan	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870930	FPL - Turkey Point, Units 6 & 7 COLA (Emergency Plan), Rev. 0 - Part 5 Emergency Plan Supplement 1 - ETE	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091870932	FPL - Turkey Point, Units 6 & 7 COLA (Emergency Plan), Rev. 0 - Part 5 Emergency Plan Supplements 2 - 7	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870934	FPL - Turkey Point, Units 6 & 7 COLA (Site Redress Plan), Rev. 0 - Part 6 Limited Work Authorization and Site Redress Plan	License-Application for Combined License (COLA) Site Redress Plan	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870936	FPL - Turkey Point, Units 6 & 7 COLA (Generic DCD Departures Report), Rev. 0 - Part 7 Departures and Exemption Requests	Generic DCD Departures Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091870940	FPL - Turkey Point, Units 6 & 7 COLA (ITAAC), Rev. 0 - Part 10 License Conditions (Including ITAAC)	Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871047	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - QAPD	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871048	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 1A	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871049	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 1B	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871050	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 2A	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871052	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 2B	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871053	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 2C	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871054	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 2D	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871055	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 2E	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871056	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 2F	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871057	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 2G	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871058	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 3A	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871059	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 3B	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871060	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 3C	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871061	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 3D	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871062	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 3E	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871063	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 3F	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871065	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 3G	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871066	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4A	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871067	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4B	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871068	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4C	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871069	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4D	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871070	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4E	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871071	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4F	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871072	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4G	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871073	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4H	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871074	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4I	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871076	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4J	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871077	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 4K	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871078	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5A	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871079	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5AA	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871080	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5B	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871081	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5BB	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871082	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5C	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871083	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5CC	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871084	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5D	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871085	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5DD	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871086	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5E	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871087	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5EE	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871088	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5F	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871089	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part FF	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871090	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5G	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871091	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5GG	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871092	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5H	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871093	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5HH	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871094	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5I	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871095	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5J	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871096	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5K	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871097	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5L	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871098	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5M	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871099	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5N	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871100	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5O	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871101	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5P	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871102	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5Q	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871103	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5R	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871104	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5S	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871105	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5T	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871106	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5U	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871107	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5V	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871108	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5W	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871109	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5X	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871110	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5Y	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871111	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 5Z	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871112	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6A	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871113	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6AA	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871115	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6BB	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871116	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6C	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871117	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6CC	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871118	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6D	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871119	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6DD	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871120	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6E	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871122	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6EE	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871123	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6F	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871124	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6FF	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871125	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6G	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871126	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6GG	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871127	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6H	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871128	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6HH	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871129	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6I	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871130	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6J	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871131	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6K	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871132	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6L	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871133	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6M	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871134	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6N	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871135	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6O	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871136	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6P	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871138	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6Q	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871139	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6R	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871140	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6S	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871141	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6T	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871142	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6U	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871143	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6V	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871144	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6W	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871145	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6X	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871146	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6Y	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871147	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 6Z	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871148	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 450-453	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871149	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 454-457	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871150	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 458-461	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871151	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 462-465	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871152	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 466-469	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871153	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 470-473	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871154	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 474-477	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871155	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 478-481	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871157	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 482-485	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871159	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 486-489	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871160	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 490-493	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871161	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 494-497	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871162	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 498-499	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871163	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 400	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871165	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 402	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871166	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 403	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871167	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 404	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871168	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 405	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871169	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 406	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871170	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 407	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871171	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 408	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871172	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 409	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871173	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 410	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871174	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 411	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871176	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 412	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871177	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 413	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871178	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 414	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871179	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 415	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871180	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 416	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871181	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 417	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871182	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 418	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871183	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 419	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871184	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 420	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871185	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 421	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871186	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 422	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871187	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 423	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871188	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 424	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871189	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 425	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871190	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 426	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871191	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 427	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871192	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 428	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871193	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 429	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871194	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 430	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871195	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 431	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871196	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 432	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871197	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 433	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871198	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 434	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871199	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 435	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871200	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 436	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871201	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 437	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871202	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 438	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871203	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 439	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871204	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 440	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871205	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 441	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871206	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 442	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871207	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 443	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871208	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 444	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871209	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 445	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871210	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 446	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871211	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 447	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871212	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 448	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871213	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 449	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871214	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 1-15	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871215	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 16-20	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871216	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 21-25	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871217	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 26-49	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871218	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 50-99	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871219	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 100-149	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871220	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 150-199	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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6/30/2009	ML091871221	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 200-214	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871222	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 215-229	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871224	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 230-249	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871226	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 250-264	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871227	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 265-279	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871228	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 280-294	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871229	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 295-299	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871230	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 300-309	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871231	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 310-319	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871232	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 320-329	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871233	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 330-339	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871234	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 340-341	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871235	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 342-343	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871237	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 344-345	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871238	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 346-347	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871239	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 348-349	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871240	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 350-354	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871241	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 355-356	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871242	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 357-358	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871243	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Page 359	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871244	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 360-364	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871246	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 365-369	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871247	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 370-372	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871248	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 373-374	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871249	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Volume 2 Pages 375-379	Combined License (COLA)			
6/30/2009	ML091871250	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 380-384	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871251	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 385-389	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871252	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 390-392	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871253	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 393-394	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871254	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 395-397	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871255	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Pages 398-399	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871256	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 11A	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871257	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 11B	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871258	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 11C	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871259	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 11D	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871260	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 11E	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871261	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 11F	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871263	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 11H	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871264	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 11I	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871265	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 11J	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871266	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 12	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871267	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 13 Pages 600-649	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871268	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 14 Pages 650-699	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871269	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 15 Pages 700-749	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871270	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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		Volume 2 Part 16 Pages 750-799	Combined License (COLA)			
6/30/2009	ML091871271	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 2 Part 17 Pages 800-809	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871272	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 001-299	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871273	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 300-549	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871274	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 550-724	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871276	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 725-729	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871278	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 730-734	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871279	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 735-739	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871280	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 740-744	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871281	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 745-749	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871282	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 750-753	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871284	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 754-757	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871285	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 758-761	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871286	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 762-765	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871287	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 766-769	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871288	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 770-773	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871289	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 774-777	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871290	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 778-781	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871291	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 782-785	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871292	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 786-789	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871293	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 790-793	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871294	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 794-797	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871295	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 798-799	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871296	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 800-804	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871297	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 805-809	Environmental Report License-Application for	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

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			Combined License (COLA)			
6/30/2009	ML091871298	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 3 Pages 810-813	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871299	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 4 Pages 1-287	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML091871300	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 4 Pages 288-537	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
7/23/2009	ML091890130	Acknowledgment of Receipt of the Combined License Application for Turkey Point, Units 6 and 7, and associated Federal Register Notice.	Letter	NRC/NRO/DNR L/NWE1	Florida Power & Light Co	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/30/2009	ML091940230	G20090376/LTR-09-0309/EDATS: SECY-2009-0331 - Ltr. Thomas Saporito re: Florida Power and Light Company - Proposed Turkey Point Units 6 and 7 COL Project - Response letter from NRC.	Letter	NRC/NRO/DNR L/NWE1	Saporito Energy Consultants	05200040 05200041 PROJ0763
7/16/2009	ML091950202	07/28/2009 Meeting Notice with Florida Power & Light Company, to Discuss Turkey Point Units 6 & 7 Subsequent Combined License Application (S-COLA).	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DNR L/NWE1	NRC/NRO/DNR L/NWE1	05200040 05200041 PROJ0763
7/16/2009	ML091970140	Press Release-09-126: Turkey Point Application for New Reactors in Florida Available on NRC Website.	Press Release	NRC/OPA		05200040 05200041 PROJ0763
7/23/2009	ML092020210	Request for FEMA Review of a Combined License Application- Florida Power and Light, Turkey Point Site- Supplement to Original Submittal.	Emergency Preparedness- NRC Correspondence to FEMA Letter	NRC/NSIR/DPR /DDEP	US Federal Emergency Mgmt Agency (FEMA)	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/21/2009	ML092170632	Enclosure 2 - Federal Emergency Management Agency E-mail dated July 21, 2009, on Preliminary Results of the FEMA Acceptance Review Findings.	E-Mail	US Dept of Homeland Security	NRC/NSIR	05200040 05200041 PROJ0763
7/30/2009	ML092170634	Enclosure 3 - Federal Emergency Management Agency letter dated July 30, 2009, on Offsite Emergency Planning Acceptance Review Results.	Emergency Preparedness-FEMA Correspondence to NRC Letter	US Dept of Homeland Security US Federal Emergency Mgmt Agency (FEMA)	NRC/NSIR/DP R NRC/NSIR/DP R/DDEP	05200040 05200041 PROJ0763
8/25/2009	ML092240457	07/28/2009 Summary of Public Meeting Related to the Acceptance Review of the Combined License Application Review for Turkey Point, Units 6 and 7.	Meeting Summary Memoranda	NRC/NRO/DNR L/NWE1	NRC/NRO/DNR L/NWE1	05200040 05200041 PROJ0763
7/28/2009	ML092240528	Turkey Point Units 6 & 7 S-COLA Orientation Session, July 28, 2009.	Slides and Viewgraphs	Florida Power & Light Co	NRC/NRO	05200040 05200041 PROJ0763
8/25/2009	ML092240566	List of Attendees/Participants for the Public Meeting Related to the Combined License Application Review for the Turkey	- No Document Type Applies	NRC/NRO/DNR L/NWE1		05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Point Units 6 and 7 on July 28, 2009				
8/7/2009	ML092250585	Turkey Point, Units 6 & 7 Combined License Application, Supplemental Meteorological Data.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/29/2009	ML092300597	June 29, 2009, Letter from Mr. Lloyd Miller to NRC Regarding Potential Impacts of Proposed Turkey Point, Units 6 and 7.	Letter	- No Known Affiliation	NRC/NRO	05200040 05200041 PROJ0763
9/1/2009	ML092321149	Letter Regarding proposed Turkey Point for Units 6 and 7.	Letter	NRC/NRO/DSE R/RAP2	- No Known Affiliation	05200040 05200041 PROJ0763
9/4/2009	ML092380248	Combined License Application Acceptance Review For Turkey Point Units 6 & 7 Nuclear Power Plants.	Letter	NRC/NRO/DNR L/NWE1	Florida Power & Light Co	05200040 05200041 PROJ0763
9/4/2009	ML092380309	Enclosure 1, Request for Additional Information, Turkey Point Units 6 & 7.	Request for Additional Information (RAI)	NRC/NRO/DNR L/NWE1		05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
9/4/2009	ML092380323	Acceptance for Docketing of an Application for Combined License for Turkey Point Units 6 & 7 Nuclear Power Plants.	Federal Register Notice	NRC/NRO/DNR L/NWE1		05200040 05200041 PROJ0763
9/8/2009	ML092510186	Press Release-09-149: NRC Accepts Application for New Reactors at Turkey Point Site in Florida.	Press Release	NRC/OPA		05200040 05200041 PROJ0763
9/10/2009	ML092520076	Notification to DHS on Turkey Point COLA Docketing.	Letter	NRC/NSIR/DSP /DDRSR/RSPL B	US Dept of Homeland Security, Office of Infrastructure Protection	05200040 05200041 PROJ0763
9/10/2009	ML092540525	Task Order No. 072 Under Delivery Order No. NRC-42-07-036.	ACQ-Contract Task Order	NRC/ADM/DC	Information Systems Labs, Inc	05200040 05200041 PROJ0763
8/3/2009	ML092590051	FRN - Official Acceptance Review for Combined License Application and Docketing for Turkey Point, Units 6 and 7.	Federal Register Notice	NRC/NRO/DNR L/NWE1		05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/25/2009	ML092610207	Letter to D. Hobbie - U.S. Nuclear Regulatory Commission's Environmental Impact Statement for Florida Power and Light Company Combined License Application Turkey Point, Units & 7, Miami-Dade County, Florida.	Letter	NRC/NRO/DSE R/RAP2	US Dept of the Army, Corps of Engineers, Jacksonville District	05200040 05200041 PROJ0763
1/4/2010	ML092610278	Maintenance of Reference Materials at the South Dade Regional Library Related to the Environmental Review of the Florida Power & Light Company Combined License Application for Turkey Point, Unit 6 & 7.	Letter	NRC/NRO/DSE R/RAP2	Miami-Dade County, FL	05200040 05200041
1/4/2010	ML092610521	Letter to P. Hogue - Maintenance of Reference Materials at the Homestead Branch Library Related to the Environmental Review of the Florida Power & Light Company Combined License Application for Turkey Point, Units 6 & 7.	Letter	NRC/NRO/DSE R/RAP2	Homestead, FL	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
9/17/2009	ML092610728	Task Order No. 074 Under Delivery Order No. NRC-42-07-036.	ACQ-Contract Task Order	NRC/ADM/DC	Information Systems Labs, Inc ISL, Inc	05200040 05200041 PROJ0763
9/16/2009	ML092750383	Request of the Monroe County Administrator and County Attorney be Officially Noticed When there is Workshops or any Other Hearings by NRC in the COL Application Process Related to FP&L's Operations at Turkey Point.	Letter	Monroe County, FL	NRC/NRO	05200040 05200041 PROJ0763
10/6/2009	ML092800346	Task Order No. 075 Under Delivery Order No. NRC-42-07-036.	ACQ-Contract Task Order	NRC/ADM/DC	Information Systems Labs, Inc	05200040 05200041 PROJ0763
10/1/2009	ML092810318	Turkey Point Units 6 and 7, Response to NRC COL Application Acceptance Review Letter.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
10/5/2009	ML092810319	Turkey Point Units 6 and 7, First Endorsement of Bellefonte R-COLA Standard Content Requests for Additional Information.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/7/2009	ML092860057	FRN - Official Docketing of Turkey Point Units 6 & 7 Combined License Application.	Federal Register Notice	NRC/NRO/DNR L		05200040 05200041 PROJ0763
10/7/2009	ML092860083	LTR-09-0506 - Email from Thomas Saporito re: NRC Mulls Whether to Allow FPL to Contaminate Florida's Drinking Water.	E-Mail Meeting Briefing Package/Handouts Slides and Viewgraphs	Renewable Electric Systems	NRC/SECY	05200040 05200041 PROJ0763
10/12/2009	ML092870439	Turkey Point, Units 6 and 7, Second Endorsement of Bellefonte R-COLA Standard Content Requests for Additional Information.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
1/11/2010	ML092880776	09/03/2009 Summary of Category II Public Meeting with AP1000 Design-Centered Working Group to Discuss The Implementation of DC/COL-ISG-8, "Necessary Content of Plant-Specific Technical Specifications.	Meeting Agenda Meeting Summary Memoranda	NRC/NRO/DNR L/NWE1	NRC/NRO/DNR L/NWE1	05200014
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10/17/2009	ML092931248	G20090604/EDATS: OEDO-2009-0636 - Thomas Saporito Ltr. re: 2.206 - Florida Power & Light Company 6 &	2.206 Petition E-Mail Letter	- No Known Affiliation	NRC/EDO	05200041
						05200040
						PROJ0763

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		7/Combined Operation License Application	Memoranda			
11/25/2009	ML092960671	Letter to Susan Grimsley Acknowledging the U.S. Nuclear Regulatory Commission (NRC) Staff's Receipt Letter Dated September 16, 2009.	Letter	NRC/NRO/DSE R/RAP2	Monroe County, FL	05200040 05200041 PROJ0763
10/21/2009	ML093020672	Turkey Point, Units 3 & 4, Request to Renew Industrial Wastewater Facility Permit.	Letter License-Application for Facility Operating License (Amend/Renewal) DKT 50	Florida Power & Light Co	NRC/Document Control Desk NRC/NRR	05000250 05000251 05200040 05200041 PROJ0763
11/12/2009	ML093090260	10/21/09 Summary of Category 2 Public Meeting with the Nuclear Energy Institute to Discuss Health Physics Issues for New Reactors.	Meeting Summary	NRC/NRO/DCI P/CHPB	NRC/NRO/DCI P/CHPB	05200006 05200014 05200015 05200020 05200021 05200025

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						05200026 05200040 05200041 PROJ0763
11/17/2009	ML093100269	G20090604/EDATS: OEDO-2009-0636 - Thomas Saporito Ltr. re: 2.206 - Florida Power & Light Company 6 & 7/Combined Operation License Application	Letter	NRC/NRO/DNR L/NWE1	- No Known Affiliation	05200040 05200041 PROJ0763
11/10/2009	ML093170513	Turkey Point, Units 6 & 7, Notification to Withdraw Request for a Limited Work Authorization.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
11/10/2009	ML093200319	Proposed Turkey Point, Units 6 and 7, Response to NRC Information Requests in COL Application Acceptance Review Letter.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
9/3/2009	ML093270025	09/03/09, Slides, Meeting Summary, DCWG Re: Implementation of DC/COL-ISG-08 "Necessary Content of Plant-Specific Technical Specifications."	Meeting Summary Slides and Viewgraphs	NRC/NRO/DNR L/NWE1		05200006
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Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/24/2009	ML093310169	Proposed Turkey Point Units 6 and 7, Revised Hydrology Response to NRC Information Request in COL Application Acceptance Review Letter.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
12/14/2009	ML093510077	Turkey Point, Units 6 & 7 Combined License Application, Semi-Annual Departure Report Update.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/10/2009	ML093520690	Letter from Mr. Donald Kinard, Chief Regulatory Division, U.S. Army Corps of Engineers, Agreeing to Become a Cooperating Agency for the Environmental Impact Statement for FPL Combined License Application for Turkey Point, Units 6 & 7.	Letter	US Dept of the Army, Corps of Engineers, Jacksonville District	NRC/NRO/DSE R	05200040 05200041
1/26/2010	ML100280942	Florida Power & Light Company Proposed Turkey Point Units 6 and 7 - Third Endorsement of Bellefonte R-COLA Standard Content Requests for Additional Information.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
2/10/2010	ML100481619	Email from R. Orthen (FPL) regarding a meeting between FPL and USFWS on 2/9/10.	E-Mail	Florida Power & Light Co	NRC/NRO/DSE R/RAP2	05200040 05200041
2/10/2010	ML100481673	Email attachment from R. Orthen of FPL, attendee list for 2/9/10 meeting between FPL and USFWS.	E-Mail	Florida Power & Light Co	NRC/NRO/DSE R/RAP2	05200040 05200041
2/10/2010	ML100490008	Email from R. Orthen, FPL, providing materials discussed in a 2/9/10 meeting between FPL and USFWS.	E-Mail	Florida Power & Light Co	NRC/NRO/DSE R/RAP2	05200040 05200041
2/10/2010	ML100490011	Miami-Dade County Consumptive Use Permit, partial list of conditions. Photo of FPL Logo.	Photograph	Florida Power & Light Co	NRC/NRO/DSE R/RAP2	05200040 05200041
2/10/2010	ML100490014	Email attachment - Miami-Dade County Consumptive Use Permit, Partial list of conditions.	E-Mail	Florida Power & Light Co	NRC/NRO/DSE R/RAP2	05200040 05200041
2/10/2010	ML100490021	Email attachment - Miami-Dade County Consumptive Use Permit, Exhibit 30.	E-Mail	Florida Power & Light Co	NRC/NRO/DSE R/RAP2	05200040 05200041
8/12/2009	ML100490024	Email attachment, Executive Summary from Miami-Dade Water and Sewer Department Water Reuse Feasibility Update.	E-Mail	Florida Power & Light Co	NRC/NRO/DSE R/RAP2	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
8/12/2009	ML100490029	Email attachment, South Florida Water Management District slides regarding Ocean Outfalls and Reuse Requirements.	E-Mail	South Florida Water Management District	NRC/NRO/DSE R/RAP2	05200040 05200041
2/22/2010	ML100560114	Turkey Point, Units 6 & 7, Vogtle, Units 3 & 4, Submittal of AP1000 R-COLA (VEGP) Supplemental Evaluation of Safety Evaluation Report Open Items for Standard Applicability.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200025 05200026 05200040 05200041

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						05200027
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Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
3/11/2010	ML100710538	Task Order No. 092 Under Delivery Order No. NRC-42-07-036.	ACQ-Contract Task Order	NRC/ADM/DC	Information Systems Labs, Inc	05200040 05200041

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Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
6/30/2009	ML100920352	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 7A	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML100920353	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 7B	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML100920355	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 7C	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML100920357	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 7D	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML100920359	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 7E	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
6/30/2009	ML100920361	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 7F	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML100920363	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 7G	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
6/30/2009	ML100920365	FPL - Turkey Point, Units 6 & 7 COLA (Enclosures), Rev. 0 - Part 11 - Subsurface Investigation Report Volume 1 Part 7H	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763
4/9/2010	ML100950157	Site Audit Report Related To Safety Hydrologic Review Of The Turkey Point Units 6 And 7 Combined License Application.	Audit Report Memoranda	NRC/NRO/DSE R/RHEB	NRC/NRO/DSE R/RHEB	05200040 05200041

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Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/23/2009	ML100980173	Federal Emergency Management Agency's (FEMA) Interim Finding Report for Reasonable Assurance of the Offsite Emergency Response Plans for Turkey Point Units 6 & 7 and Combined License Application.	Letter	US Dept of Homeland Security US Federal Emergency Mgmt Agency (FEMA)	NRC/NSIR/DP R/DDEP/LIB	05200040 05200041
10/5/2009	ML100980192	Enclosure, Interim Finding Report for Reasonable Assurance on the Adequacy of Offsite Radiological Emergency Response Planning For the Turkey Point, Units 6 and 7, Miami-Dade County, Florida.	Report, Miscellaneous	US Dept of Homeland Security US Federal Emergency Mgmt Agency (FEMA)	NRC/NSIR	05200040 05200041
4/12/2010	ML101130367	Turkey Point, Units 6 and 7, Response to Request for Additional Information on Hydrology Information Audit Combined License Application to be Located in Miami-Dade County, FL	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/12/2010	ML101160063	Turkey Point, Units 6 and 7, Proposed 10 CFR 50.46 Annual Report for the AP1000 Standard Plant Design.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
5/28/2010	ML101310404	Turkey Point Units 6 & 7 Nuclear Power Plants Combined License Application Review Schedule.	Letter Schedule and Calendars	NRC/NRO/DNR L	Florida Power & Light Co	05200040 05200041
6/9/2010	ML101530683	Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Related to a Combined License Application for Turkey Point, Units 6 and 7.	Letter	NRC/NRO/DSE R	Florida Power & Light Co	05200040 05200041
6/9/2010	ML101590602	FRN - Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process for Turkey Point, Units 6 and 7.	Federal Register Notice	NRC/NRO/DSE R		05200040 05200041
3/9/2010	ML102080613	PineCrest Resolution 2010-11.	- No Document Type Applies	Village of Pinecrest, FL	NRC/NRO/DSE R/RAP2	05200040 05200041
3/9/2010	ML102080617	PineCrest Resolution - 2010-12.	- No Document Type Applies	Village of Pinecrest, FL	NRC/NRO/DSE R/RAP2	05200040 05200041
3/9/2010	ML102080632	Pinecrest Resolution 2010-13.	- No Document Type Applies	Village of Pinecrest, FL	NRC/NRO/DSE R/RAP2	05200040 05200041
4/30/2010	ML102110567	Resolution No. 2010-32.	- No Document Type Applies	Village of Palmetto Bay, FL	NRC/NRO/DSE R/RAP2	05200040 05200041

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12/5/2009	ML102230459	0910 CDMP Application Report.	Report, Miscellaneous	Miami-Dade County, FL	NRC/NRO/DSE R/RAP2	05200040 05200041
3/5/2010	ML102230483	0910 CDMP App 10 Withdrawn.	Letter Report, Miscellaneous	Miami-Dade County, FL	NRC/NRO/DSE R/RAP2	05200040 05200041
6/30/2009	ML102580760	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information), Rev. 1 - Packing Slip	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
6/30/2009	ML102580889	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information), Rev. 1 - Packing Slip	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
6/30/2009	ML102581012	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information), Rev. 1 - Packing Slip	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/14/2010	ML103420621	2010/04/14 Turkey Point COL Hearing - FW: Letter from Vanessa E. Quinn, FEMA, Ref: Turkey Point IFR RA	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
2/10/2010	ML103490989	2010/02/10 Turkey Point COL Hearing - FW: USFWS Meeting Notes 2-9-10	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/NWE1	05200040 05200041
2/10/2010	ML103490990	2010/02/10 Turkey Point COL Hearing - FW: FPL Meeting 2-9-10	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/NWE1	05200040 05200041

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5/14/2010	ML103491017	2010/05/14 Turkey Point COL Hearing - Turkey Point Environmental Site Audit Information Needs	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
6/4/2010	ML103500041	2010/06/04 Turkey Point COL Hearing - RE: PTN 6 & 7 ER Audit - Boat Tour Itinerary	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
6/4/2010	ML103500042	2010/06/04 Turkey Point COL Hearing - PTN 6 & 7 ER Audit - Boat Tour Itinerary	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/NWE1	05200040 05200041
6/3/2010	ML103500043	2010/06/03 Turkey Point COL Hearing - Turkey Point Site Audit Information	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
5/24/2010	ML103500044	2010/05/24 Turkey Point COL Hearing - PTN 6 & 7 Info Need 'Met 5'	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/NWE1	05200040 05200041
5/27/2010	ML103500045	2010/05/27 Turkey Point COL Hearing - Agencies participant	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
5/27/2010	ML103500046	2010/05/27 Turkey Point COL Hearing - Turkey Point Tours.doc	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
5/28/2010	ML103500048	2010/05/28 Turkey Point COL Hearing - RE: PTN 6 & 7 ER Audit - FPL Presentations	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
5/28/2010	ML103500049	2010/05/28 Turkey Point COL Hearing - PTN 6 & 7	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/NWE1	05200040 05200041

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		ER Audit - FPL Presentations				
5/14/2010	ML103500052	2010/05/14 Turkey Point COL Hearing - Turkey Point Environmental Site Audit Information Needs	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
5/14/2010	ML103500053	2010/05/14 Turkey Point COL Hearing - RE: FPL Turkey Point Units 6 & 7 Aerosol Air Pollutants from Cooling Towers	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
5/11/2010	ML103500054	2010/05/11 Turkey Point COL Hearing - FW: FPL Turkey Point Units 6 & 7 Aerosol Air Pollutants from Cooling Towers	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/NWE1	05200040 05200041
4/1/2010	ML103500056	2010/04/01 Turkey Point COL Hearing - Requested Turkey Point information	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/NWE1	05200040 05200041
5/27/2010	ML103570316	2010/05/27 Turkey Point COL Hearing - PTN 6 & 7 - Info Need G-4 Clarification	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/NWE1	05200040 05200041
5/27/2010	ML103630433	2010/05/27 Turkey Point COL Hearing - PTN 6 & 7 - Info Need G-4 Clarification	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/NWE1	05200040 05200041
12/1/2009	ML110030203	2009/12/01 Turkey Point COL Hearing - Question from County	E-Mail	NRC/NRO		05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
5/20/2010	ML110030206	2010/05/20 Turkey Point COL Hearing - Early Draft Site Audit Schedule	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
5/20/2010	ML110030208	2010/05/20 Turkey Point COL Hearing - FW: Early Draft Site Audit Schedule	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
5/21/2010	ML110030209	2010/05/21 Turkey Point COL Hearing - Site tour transportation	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
5/24/2010	ML110030210	2010/05/24 Turkey Point COL Hearing - RE: PTN 6 & 7 Info Need 'Met 5'	E-Mail	NRC/NRO	NRC/NRO/DNR L/NWE1	05200040 05200041
8/19/2009	ML110820053	Turkey Point Exploratory Drilling and Aquifer Performance Test Program, Technical Report for FPL by HDR Engineering, Inc.	Report, Technical	HDR Engineering, Inc Florida Power & Light Co	NRC/NRO	05200040 05200041
3/30/2010	ML11097A000	Information for FPL Radial Well Impacts Model.	Annual Operating Report Environmental Monitoring Report	Golder Associates, Inc	Florida Power & Light Co NRC/NRO	05200040 05200041
8/7/2009	ML12039A128	Turkey Point, Units 6 & 7, Supplemental Information - COL Application Part 2 Final Safety Analysis Report Sections 2.5.1 and 2.5.2.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041 PROJ0763

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
4/12/2010	ML12192A257	DOT (U.S. Department of Transportation). 2008. Traffic Safety Facts, Miami-Dade County, Florida, 2004-2008. National Highway Traffic Safety Administration, Washington, D.C.	FACT Sheet	US Dept of Transportation, National Highway Traffic Safety Admin	NRC/NRO	05200040 05200041
4/12/2010	ML12192A272	DOT (U.S. Department of Transportation). 2008. Traffic Safety Facts, Glades County, Florida, 2004-2008. National Highway Traffic Safety Administration, Washington, D.C. TN414.	Environmental Impact Statement	US Dept of Transportation, National Highway Traffic Safety Admin	NRC/NRO/DNR L/EPB1	05200040 05200041
4/12/2010	ML12192A280	DOT (U.S. Department of Transportation). 2008. Traffic Safety Facts, St. Lucie County, Florida, 2004-2008. National Highway Traffic Safety Administration, Washington, D.C. TN411.	FACT Sheet	US Dept of Transportation, National Highway Traffic Safety Admin	NRC/NRO	05200040 05200041
10/2/2009	ML12193A209	Ecological Associates, Inc., 2009. Letter from M.S. Mohlmann to M. Raffenberg dated October 2, 2009 Regarding "Nearshore Benthic	Letter Environmental Monitoring Report	Ecological Associates, Inc	Florida Power & Light Co NRC/NRO	05200040 05200041

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		Macroinvertebrates in Biscayne Bay and Card Sound." Jensen Beach, Florida. TN97.				
10/14/2009	ML12193A539	SFWMD (South Florida Water Management District). 2009. FPL Turkey Point Power Plant Groundwater, Surface Water, and Ecological Monitoring Plan. West Palm Beach, Florida. TN149.	Environmental Impact Statement	South Florida Water Management District Miami-Dade County, FL, Dept of Environmental Resources Management State of FL, Dept of Environmental Protection	NRC/NRO	05200040 05200041
9/18/2009	ML12195A195	FPL (Florida Power & Light Company). 2009. 2009 Annual Report Ground-Water Monitoring Program. Golder Associates Inc., Atlanta, Georgia. TN268.	Environmental Impact Statement Annual Report	Golder Associates, Inc	Florida Power & Light Co NRC/NRO	05200040 05200041

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6/30/2009	ML12195A241	NOAA (National Oceanic and Atmospheric Administration). 2009. Final Amendment 1 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan Essential Fish Habitat. National Marine Fisheries Service, Silver Spring, Maryland. TN229.	Environmental Impact Statement	US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO	05200040 05200041
5/31/2010	ML12198A127	Ohs, C.L., S.W. Grabe, and M.A. DiMaggio. 2010. Candidate Species for Florida Aquaculture: Pinfish, Lagodon rhomboides. FA168, University of Florida IFAS Extension, Gainesville, Florida TN219.	Environmental Report	Univ of Florida	NRC/NRO	05200040 05200041
5/4/2010	ML12212A054	Waterhouse, A. 2010, South Miami-Dade Rock Mining. South Florida Water Management District, West Palm Beach, Florida. TN677.	Environmental Impact Statement Slides and Viewgraphs	South Florida Water Management District	NRC/NRO	05200040 05200041

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4/12/2010	ML12219A158	Letter to Florida Department of Environmental Protection from Miami-Dade Water and Sewer, South District Regarding Annual Wastestream Analysis South District Wastewater Treatment Plant Permits 61787-022-UO and 61787-014-UC through 61787-017-UC.	Letter Report, Miscellaneous	Miami-Dade County, FL	State of FL, Dept of Environmental Protection NRC/NRO	05200040 05200041
8/31/2009	ML12240A279	EIA 2009 Report - Turkey Point Seagrass Report - Aug 2009 Final, TN153.	Environmental Monitoring Report	Ecological Associates, Inc	Florida Power & Light Co NRC/NRO	05200040 05200041
10/31/2009	ML12240A280	EIA 2009 Fish and Shellfish Near TP (Baseline), TN154.	Environmental Monitoring Report Technical Paper	Ecological Associates, Inc	NRC/NRO	05200040 05200041
12/31/2009	ML12240A287	NOAA 2009 Bottlenose Dolphin, TN175.	Database File Environmental Monitoring Report	- No Known Affiliation	NRC/NRO	05200040 05200041

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3/9/2010	ML12240A292	NOAA 2010 Critical Habitat NOAA Fisheries WebLink, TN179.	Database File	US Dept of Commerce, National Marine Fisheries Service US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO	05200040 05200041
2/28/2010	ML12269A197	Cela, M., J. Hulsey and J. G. Titus. 2010. "South Florida." Chapter 8 in the Likelihood of Shore Protection Along the Atlantic Coast of the US. V2: New England and the Southeast. TN1034.	Environmental Monitoring Report	US Environmental Protection Agency (EPA)	NRC/NRO/DNR L/EPB1	05200040 05200041
6/29/2009	ML12269A220	FPL (Florida Power and Light Company). 2009. Letter from B.P. Linkiewicz to T. Vielhauer Dated June 29, 2009, Regarding Air Permit Application and PDS. TN1023.	Environmental Report Letter	Florida Power & Light Co	NRC/NRO/DNR L/EPB1 State of FL, Dept of Environmental Protection	05200040 05200041
6/12/2009	ML12269A236	HDR (HDR Engineering, Inc.,) 2009 Turkey Point, Units 6 & 7 Roads and Bridges Conceptual	Memoranda Report, Technical	HDR Engineering, Inc	HDR Engineering, Inc	05200040 05200041

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		Design Report. Omaha, Nebraska. TN1040.			NRC/NRO/DNR L/EPB1	
4/5/2010	ML14230A018	TN1323 - USFWS Florida Cape Sable thoroughwort Spp Assessment.	Report, Miscellaneous	State of FL, Fish & Wildlife Research Institute	NRC/NRO/DNR L	05200040 05200041
4/5/2010	ML14231B323	TN1323 - FWS (U.S. Fish and Wildlife Service). 2010. Species Assessment and Listing Priority Assignment Form: Chromolaena frustrata Cape Sable Thoroughwort. Washington, D.C.	FACT Sheet Report, Miscellaneous	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
12/31/2009	ML14279A234	TN1669 - USDA (U.S. Department of Agriculture). 2009, 2007 Census of Agriculture: Florida State and County Data, AC-07-A-9, Washington, D.C.	Report, Technical	US Dept of Agriculture	NRC/NRO	05200040 05200041
8/31/2009	ML14279A259	TN1673 - Conant, T.A., ET AL, 2009, Loggerhead Sea Turtle (Caretta caretta) 2009 Status Review Under the U.S. Endangered Species Act, National	Environmental Monitoring Report	US Dept of Commerce, National Marine Fisheries Service	NRC/NRO	05200040 05200041

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		Marine Fisheries Service, Washington, D.C.				
12/31/2009	ML14287A727	TN1461 - USCB (U.S. Census Bureau). 2009. "2005-2009 American Community Survey 5-Year Estimates Occupancy Status Housing Units." Washington, D.C.	FACT Sheet	US Dept of Commerce, Bureau of Census	NRC/NRO	05200040 05200041
12/31/2009	ML14287A731	TN1462 - USCB (U.S. Census Bureau). 2009. "2005-2009 American Community Survey 5-Year Estimates Demographics 50-Mile Area." Washington, D.C.	FACT Sheet	US Dept of Commerce, Bureau of Census	NRC/NRO	05200040 05200041
6/7/2010	ML14287A775	TN1476 - DOE (U.S. Department of Energy). 2010. EERE Project Management Center, NEPA Determination, SDWWTP-Installation of Co-Gen Units 4 & 5 and Landfill Gas Pipeline Construction. Washington, D.C.	FACT Sheet	US Dept of Energy (DOE)	NRC/NRO	05200040 05200041

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5/18/2010	ML14309A099	FWS 2010 - TN226-20100518_Letter_Service to Corps_FL Programmatic Stork Revised 1.	FACT Sheet Letter	US Dept of Interior, Fish & Wildlife Service	NRC/NRO US Dept of the Army, Corps of Engineers, Jackson District	05200040 05200041
4/16/2010	ML14309A100	FWS 2010 - TN2574-FWS2010_Ivory-blliedRecoveryPlan.	FACT Sheet	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
2/5/2010	ML14328A478	USACE 2010 TN3559 - USACE 2010 SAJ 2000 02284 White Rock North Permit Only.	Letter	US Dept of the Army, Corps of Engineers	NRC/NRO Vecelio & Grogan, Inc	05200040 05200041
3/17/2010	ML14328A481	USACE 2010 - TN3561 - USACE 2010 SAJ 2000 2366 APAC Permit.	Letter	US Dept of the Army, Corps of Engineers	APAC Southeast, Inc NRC/NRO	05200040 05200041
3/3/2010	ML14328A484	USACE-2010-TN3563-USACE 2010_SAJ-2000 02367 FloridaRock_PermitOnly.	FACT Sheet	US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041
5/17/2010	ML14328A518	SFWMD 2010 - TN3556 - SFWMD 2010 FEC Quarry Water Use Permit 13 -00054-W.	- No Document Type Applies	State of FL, Water Management District	NRC/NRO	05200040 05200041
10/31/2009	ML14336A331	FPL 2009- TN974-1st completeness-link and document.	Report, Technical	Florida Power & Light Co	NRC/NRO	05200040 05200041
7/22/2009	ML14342A020	FISP 2009 - TN3064 - Treasure Coast 2014.	Environmental Impact Statement FACT Sheet	Univ of Georgia	NRC/NRO	05200040 05200041

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10/20/2009	ML14342A044	Center for Biological Diversity-2009-TN1518-Ctr Bio Diversity 2009 Coral Petition.	Environmental Impact Statement	Center for Biological Diversity	NRC/NRO	05200040 05200041
3/4/2010	ML14342A046	CPC-2010-TN3729-Four-petal pawpaw_National Collection of Imperiled Plants - Plant Profiles.	Environmental Impact Statement	Center for Plant Conservation	NRC/NRO	05200040 05200041
1/31/2010	ML14345B004	TN4128 HEC-RAS.	Environmental Impact Statement Manual	US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041
10/14/2009	ML15364A440	Turkey Point, Units 6 and 7 - South Florida Water Management District, Groundwater, Surface Water, and Ecological Monitoring Plan, Exhibit B. Part 1 of 2.	Environmental Monitoring Report	South Florida Water Management District	NRC/NRO	05200040 05200041
10/14/2009	ML15364A441	Turkey Point, Units 6 and 7 - South Florida Water Management District, Groundwater, Surface Water, and Ecological Monitoring Plan, Exhibit B. Part 2 of 2	Environmental Monitoring Report	South Florida Water Management District	NRC/NRO	05200040 05200041
3/16/2010	ML15364A443	Turkey Point, Units 6 and 7 - South Florida Water Management District, Quality Assurance Protection Plan. Part 1 of 2	Quality Assurance Program	South Florida Water Management District	NRC/NRO	05200040 05200041

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3/16/2010	ML15364A444	Turkey Point, Units 6 and 7 - South Florida Water Management District, Quality Assurance Protection Plan. Part 2 of 2.	Quality Assurance Program	South Florida Water Management District	NRC/NRO	05200040 05200041
6/16/2009	ML16167A504	Turkey Point Power Plant, Peak Construction Analysis Traffic Study 2009-TN1266.	Environmental Monitoring Report Letter	Traf Tech Engineering, Inc	Golder Associates, Inc NRC/NRO	05200040 05200041
12/9/2009	ML16167A509	Estimated Impacts to Florida Panther Habitats Turkey Point 6 & 7 Project, Prepared for Florida Power Light, by Breedlove, Dennis & Associates, Inc., 2009-TN4420.	Environmental Monitoring Report	Breedlove, Dennis & Associates, Inc	Florida Power & Light Co NRC/NRO	05200040 05200041

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6/14/2010	ML16266A242	U. S. Department of Agriculture Biological Control of Melaleuca Quinquervia in Southern Florida Annual Report for May 23, 2009 through May 22, 2010, 2010-TN4747.	Annual Operating Report	US Dept of Agriculture, Agricultural Research Service	NRC/NRO	05200040 05200041
6/16/2010	ML101670532	Press Release-10-106: NRC Seeks Environmental Scoping Comments Regarding Turkey Point New Reactor Application, Meeting July 15.	Press Release	NRC/OPA		05200040 05200041
6/17/2010	ML103500039	2010/06/17 Turkey Point COL Hearing - Alt sites audit plan/agenda	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/17/2010	ML103500040	2010/06/17 Turkey Point COL Hearing - Reports possibly requiring docketing	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/18/2010	ML101610556	Turkey Point, Units 6 & 7 Combined License Application Review, Request for Participation in the Scoping Process and List of State Listed Protected Species For the Environmental Review.	Letter	NRC/NRO/DS ER/RAP1	State of FL, Fish and Wildlife Conservation Commision	05200040 05200041
6/18/2010	ML101690288	Press Release-10-110: NRC Announces Opportunity To Participate In Hearing On New Reactor Application For Turkey Point Site.	Press Release	NRC/OPA		05200040 05200041

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6/18/2010	ML101720666	Press Release-10-110: NRC Announces Opportunity to Participate in Hearing on New Reactor Application for Turkey Point Site.	Press Release	NRC/OPA		05200040 05200041
6/18/2010	ML102370715	FRN - Official Notice Regarding Opportunity to Petition for Leave to Intervene, Turkey Point, Units 6 & 7.	Federal Register Notice	NRC/NRO/DN RL/NWE1		05200040 05200041
6/23/2010	ML101610537	Turkey Point, Units 6 & 7 Combined License Application, Request for Participation in the Scoping Process Review.	Letter	NRC/NRO/DS ER/RGS1	US Advisory Council On Historic Preservation	05200040 05200041
6/23/2010	ML101610560	FWS Scoping Letter - Turkey Point COL - 06/10/2010.	Letter	NRC/NRO/DS ER	US Dept of Interior, Fish & Wildlife Service	05200040 05200041
6/23/2010	ML101610565	Notification and Request for Consultation and Participation in the Environmental Scoping Process and a List of Protected Species Within the Area Under Evaluation for Turkey Point Units 6 & 7 Combined License Application Review.	Letter	NRC/NRO/DS ER/RAP2	US Dept of Commerce, National Marine Fisheries Service	05200040 05200041
6/24/2010	ML101610568	Turkey Point Scoping Letter to Other Agencies - 06/16/2010.	Letter	NRC/NRO/DS ER/RAP2	Monroe County, FL	05200040 05200041

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6/24/2010	ML101690496	Turkey Point, Units 6 and 7 - Letter to Muscogee Creek Nation - 6/2010.	Letter	NRC/NRO/DS ER/RAP2	Muscogee (Creek) Nation	05200040 05200041
6/24/2010	ML101690497	Notification and Request for Consultation and Participation in the Scoping Process for Environmental Review of Turkey Point, Units 6 and 7 Combined License Application.	Letter	NRC/NRO/DS ER/RAP2	Seminole Nation of Oklahoma	05200040 05200041
6/24/2010	ML101690499	Turkey Point, Units 6 and 7 - Seminole Tribe of Florida, Notification and Request for Consultation and Participation in Scoping Process for Environmental Review.	Letter	NRC/NRO/DS ER/RAP2	Seminole Tribe of Florida	05200040 05200041
6/24/2010	ML101690501	Letter re: Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point, Units 6 and 7 Combined License Application.	Letter	NRC/NRO/DS ER/RAP2	Miccosukee Indian Tribe	05200040 05200041
6/24/2010	ML101690503	Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point, Units 6 and 7 Combined License Application.	Letter	NRC/NRO/DS ER/RAP2	Poarch Band of Creek Nation	05200040 05200041

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6/24/2010	ML103500037	2010/06/24 Turkey Point COL Hearing - Groups likely needing tables at the scoping meeting	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/25/2010	ML103500035	2010/06/25 Turkey Point COL Hearing - Alternative Site	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/25/2010	ML103500036	2010/06/25 Turkey Point COL Hearing - Alternative Site	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/29/2010	ML101690480	Turkey Point, Units 6 and 7 - Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point, Units 6 and 7 Combined License Application.	Letter	NRC/NRO/DS ER/RAP2	State of FL	05200040 05200041
6/29/2010	ML101690484	07/15/2010-Notice of Public Meeting to have Public Participate by Submitting Comments on the Scope for and Environmental Impact Statement concerning Turkey Point Unit 6 and 7 Combined License.	Meeting Agenda Meeting Notice	NRC/NRO/DS ER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041
6/30/2010	ML103500033	2010/06/30 Turkey Point COL Hearing - RE: EIS for Turkey Point 6&7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/1/2010	ML101690462	Turkey Point Units 6 and 7 - AHC Scoping Letter - 06/2010.	Letter	NRC/NRO/DS ER/RAP2	Conservancy , Inc	05200040 05200041

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7/1/2010	ML101690468	Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of Turkey Point, Units 6 and 7 Combined License Application.	Letter	NRC/NRO/DSER/RAP2	State of FL, Office of Historic & Archaeological Resources	05200040 05200041
7/1/2010	ML101690472	Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the Turkey Point, Units 6 and 7 Combined License Application.	Letter	NRC/NRO/DSER/RAP2	City of Miami, FL	05200040 05200041
7/1/2010	ML101730494	Turkey Point, Units 6 and 7 Combined License Application, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review.	Letter	NRC/NRO/DSER/RAP2	City of Coral Gables, FL	05200040 05200041
7/1/2010	ML101730511	Turkey Point, Units 6 and 7 Combined License Application, Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review.	Letter	NRC/NRO/DSER/RAP2	City of Homestead, FL, Community Redevelopment Agency	05200040 05200041
7/1/2010	ML101730515	Turkey Point Units 6 and 7 - Ltr to Director of Planning and Zoning.	Letter	NRC/NRO/DSER/RAP2	City of South Miami, FL, Planning & Zoning	05200040 05200041

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7/1/2010	ML101800575	Invitation To A Government-To-Government Meeting For The Turkey Point, Units 6 And 7 Combined License Application Environmental Review.	Letter	NRC/NRO/DSER/RAP2	Monroe County, FL	05200040 05200041
7/1/2010	ML103500034	2010/07/01 Turkey Point COL Hearing - Change in team for alternative sites	E-Mail	NRC/NRO	NRC/NRO/DNRL/NWE1	05200040 05200041
7/6/2010	ML101870424	07/22/10-Notice of Public Teleconference for the Turkey Point, Units 6 and 7 Combined License Information Needs.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DSER/RAP2	NRC/NRO/DNRL/NGE2	05200040 05200041
7/6/2010	ML101870504	Press Release-II-10-054: NRC Schedules Meeting for Public to Comment on Proposed New Turkey Point Reactors.	Press Release	NRC/OPA/RGN-II/FO		05200040 05200041
7/7/2010	ML101880586	Slides for Environmental Scoping Meeting for the Turkey Point Site Units 6 and 7 Combined License Application - 7/15/2010 - English Version.	Slides and Viewgraphs	NRC/NRO		05200040 05200041
7/7/2010	ML101880651	Slides for Environmental Scoping Meeting for the Turkey Point Site Units 6 and 7 Combined License Application - 7/15/2010 - Spanish Version.	Slides and Viewgraphs	NRC/NRO		05200040 05200041

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7/7/2010	ML101880714	Welcome Sheet for Open House for Environmental Scoping Meeting for the Turkey Point Site Units 6 and 7 Combined License Application - 7/15/2010.	- No Document Type Applies	NRC/NRO/DSER/RAP2		05200040 05200041
7/8/2010	ML101900325	Implementation of NHPA consultation for the Turkey Point Units 6 and 7 Combined License Application.	Letter	US Advisory Council On Historic Preservation	NRC/NRO/D SER/RAP2	05200040 05200041
7/8/2010	ML103500031	2010/07/08 Turkey Point COL Hearing - ACHP response regarding implementing NHPA consultation for Turkey Point	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/8/2010	ML103500032	2010/07/08 Turkey Point COL Hearing - Cultural documents for alt sites audit	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/9/2010	ML101870480	Modification No. 002 to Task Order No. 075 Under Contract No. NRC-42-07-036.	ACQ-Contract Task Order Modification	NRC/ADM/DC	Information Systems Labs, Inc ISL, Inc	05200040 05200041
7/10/2010	ML110060870	2010/07/10 Turkey Point COL Hearing - FW: Draft RAI 4808 regarding SRP Section: 02.04.03 (Probable Maximum Flood on Streams and Rivers) for the Turkey Point Units 6 and 7 COL application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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7/10/2010	ML110060871	2010/07/10 Turkey Point COL Hearing - FW: Draft RAI 4809 regarding SRP Section: 02.04.06 - Probable Maximum Tsunami Flooding for the Turkey Point Units 6 and 7 COL application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110060872	2010/07/10 Turkey Point COL Hearing - FW: Draft RAI 4759 regarding SRP Section: 03.03.01 (Wind Loading) for the Turkey Point Units 6 and 7 COL application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070240	2010/07/10 Turkey Point COL Hearing - FW: Turkey Point Units Proposed 6 & 7 - COLA Part 11 Revision Level	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070241	2010/07/10 Turkey Point COL Hearing - FW: FPL Part 11 Update - Document Control Group Contact	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070242	2010/07/10 Turkey Point COL Hearing - FW: Turkey Point Hydrologic Safety Site Audit Information Needs	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070243	2010/07/10 Turkey Point COL Hearing - FW: Agenda	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070244	2010/07/10 Turkey Point COL Hearing - FW: PTN 6 & 7 COLA Update Call	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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7/10/2010	ML110070245	2010/07/10 Turkey Point COL Hearing - FW: Revised list of agenda and the no. of people travelling to FPL and upcoming questions	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070246	2010/07/10 Turkey Point COL Hearing - FW: PTN 6 & 7 Hydrology Audit - Venue Change	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070247	2010/07/10 Turkey Point COL Hearing - FW: Letter from Vanessa E. Quinn, FEMA, Ref: Turkey Point IFR RA	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070250	2010/07/10 Turkey Point COL Hearing - FW: FPL COLA Reading Room - Frederick Site	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070251	2010/07/10 Turkey Point COL Hearing - FW: Turkey Point Units 6 & 7 - UIC Class V Exploratory Well & Dual Zone Monitoring Well Permit 0293962-001-UC	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070299	2010/07/10 Turkey Point COL Hearing - FW: FPL COLA Reading Room - Oak Ridge Site	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070302	2010/07/10 Turkey Point COL Hearing - FW: FPL COLA Reading Room - Richland Site	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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7/10/2010	ML110070303	2010/07/10 Turkey Point COL Hearing - FW: PTN Units 6 & 7 FSAR 2.5 Technical Advisory Group	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070306	2010/07/10 Turkey Point COL Hearing - FW: South Dade & Homestead Libraries	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070308	2010/07/10 Turkey Point COL Hearing - FW: Drilling at Units 6 and 7 site	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070310	2010/07/10 Turkey Point COL Hearing - FW:	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070312	2010/07/10 Turkey Point COL Hearing - FW: FPL PTN 6 & 7 Legal Counsel	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110070375	2010/07/10 Turkey Point COL Hearing - FW: FPL TO HALT NUCLEAR REACTOR CONSTRUCTION AT TURKEY POINT	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110100253	2010/07/10 Turkey Point COL Hearing - FW: Update on 3/22-24 Hydrology Audit Venue & Logistics	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/10/2010	ML110100372	2010/07/10 Turkey Point COL Hearing - FW: PTN 6 & 7 Hydrology Audit - Venue Change	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/12/2010	ML102320033	General FR Notice Comment Letter - Email from Captain Dan Kipnis.	E-Mail	Biscayne Bay Restoration Review Coordination Team City of Miami, FL Florida Billfish, Inc Miami-Dade County Climate Change Task Force The Green Gallon, Inc	NRC/NRO/D SER/RAP2	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/12/2010	ML102320038	General FR Notice Comment Letter - Letter from Captain Dan Kipnis, Regarding Turkey Point, Units 6 & 7.	Letter	Biscayne Bay Restoration Review Coordination Team		
				Florida Billfish, Inc		
				Miami-Dade County Climate Change Task Force		05200040
				The Green Gallon, Inc	NRC/NRO/D SER/RAP2	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/12/2010	ML102320043	General FR Notice Comment Letter - Attachment to Letter from Captain Dan Kipnis.	Letter	Biscayne Bay Restoration Review Coordination Team City of Miami Beach, FL, Marine Authority Florida Billfish, Inc Miami-Dade County Climate Change Task Force The Green Gallon, Inc	NRC/NRO/D SER/RAP2	05200040 05200041
7/14/2010	ML102250239	Cultural Resources for Glades and Martin,per Email dated 07/14/2010.	E-Mail	Florida Power & Light Co	- No Known Affiliation NRC/NRO/D SER/RAP2	05200040 05200041
7/15/2010	ML102090730	Turkey Point Public Meeting Comments.	Meeting Briefing Package/Handout s	Neal R. Gross & Co., Inc	NRC/NRO/D SER/RAP2	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/15/2010	ML102150591	100723 Corrected Transcript of Turkey Point, Units 6 & 7 Combined License Application & Environmental Scoping Public Meeting: Afternoon Session, 07/15/2010, Pages 1-129.	Meeting Transcript	NRC/NRO/DSER/RAP2		05200040 05200041
7/15/2010	ML102150597	100723 Corrected Transcript of 100715 Turkey Point, Units 6 & 7 Combined License Application & Environmental Scoping Public Meeting: Evening Session, 07/15/2010, Pages 1-103.	Meeting Transcript	NRC/NRO/DSER/RAP2		05200040 05200041
7/15/2010	ML14336A379	FNAI-2010-TN3515 Cooperative_Land_Cover_Map_Final_Report_20101004.	Report, Technical	Florida Natural Areas Inventory	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/19/2010	ML102000359	08/12/10 - Meeting Notice for Design-Centered Working Group (DCWG), Re: Discuss Guidance Associated with Complying with 10 CFR 52.79(a)(31) Regarding Construction Impacts.	Meeting Agenda Meeting Summary	NRC/NRO/DN RL/NWE1	NRC/NRO/D NRL/NWE1	05200014
						05200015
						05200018
						05200019
						05200022
						05200023
						05200025
						05200026
						05200027
						05200028
						05200029
						05200030
						05200040
7/19/2010	ML102030109	2010/07/19 Turkey Point RAI for SER - test	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/19/2010	ML102100040	Turkey Point, Units 6 and 7 - Small-Break Loss of Coolant Accident Analysis, 10 CFR 50.46 Thirty (30) Day Report for the AP1000 Standard Plant Design.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
7/19/2010	ML102210385	08/26/2010 - Revised Meeting Notice - Notice of Forthcoming Public Meeting with the AP1000 Design-Centered Working Group to Discuss Guidance Associated with Complying with 10 CFR 52.79(a)(31) Regarding Construction Impacts.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DNRL/NWE1	NRC/NRO/DNRL/NWE1	05200014 05200015 05200018 05200019 05200022 05200023 05200025 05200026 05200027 05200028 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/19/2010	ML103500030	2010/07/19 Turkey Point COL Hearing - FW: TL PSI	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/20/2010	ML103491018	2010/07/20 Turkey Point COL Hearing - Phone-in Information for July 22 Teleconference with FPL	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/20/2010	ML103491019	2010/07/20 Turkey Point COL Hearing - Fwd: your address	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
7/20/2010	ML103491020	2010/07/20 Turkey Point COL Hearing - Response Regarding Information You Requested	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/22/2010	ML103491016	2010/07/22 Turkey Point COL Hearing - Martin Site Staff and Hydrology Documents for Reading Room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/22/2010	ML110280502	2010/07/22 Turkey Point COL Hearing - Contact with "We the People"	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/23/2010	ML102160400	Comment (2) of Nkenga A. Payne on Behalf of City of South Miami Commission, Opposing Construction of Any Additional Nuclear Power Plants at Turkey Point, Homestead, Florida.	General FR Notice Comment Letter	City of South Miami, FL	NRC/ADM/D AS/RDEB	05200040 05200041
7/26/2010	ML102070502	2010/07/26 Turkey Point RAI for SER - Test 2	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/26/2010	ML110060869	2010/07/26 Turkey Point COL Hearing - RE: Re: Andrew Report access	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/27/2010	ML102100532	Comment (1) of Anonymous on Turkey Point - EIS Scoping.	General FR Notice Comment Letter	- No Known Affiliation	NRC/ADM/D AS/RDEB	05200040 05200041
7/27/2010	ML103491014	2010/07/27 Turkey Point COL Hearing - FW: Turkey Point 6 & 7 Reading Rooms	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
7/27/2010	ML103491015	2010/07/27 Turkey Point COL Hearing - Residence at Biscayne NP	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/28/2010	ML102220345	Comment (3) of Laura A. Kammerer on Behalf of Florida Department of State, for Construction of Any Additional Nuclear Power Plants at Turkey Point, Homestead, Florida.	General FR Notice Comment Letter	State of FL, Dept of State	NRC/ADM/D AS/RDEB	05200040 05200041
7/28/2010	ML103491010	2010/07/28 Turkey Point COL Hearing - RE: Residence at Biscayne NP	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
7/28/2010	ML103491011	2010/07/28 Turkey Point COL Hearing - RE: Residence at Biscayne NP	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/28/2010	ML103491012	2010/07/28 Turkey Point COL Hearing - Re: Residence at Biscayne NP	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
7/28/2010	ML103491013	2010/07/28 Turkey Point COL Hearing - Re: Residence at Biscayne NP	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
7/29/2010	ML102100598	2010/07/29 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 001 RELATED TO SRP SECTION 03.03.01- WIND LOADING FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
7/29/2010	ML102160540	Turkey Point, Units 6 and 7 - Cyber Security Plan, Revision 0.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
7/31/2010	ML14336A333	FPL 2010- TN3664-FPL TP 2B Complete 7-2010.	Report, Technical	Florida Power & Light Co	NRC/NRO US Environmental Protection Agency (EPA)	05200040 05200041
7/31/2010	ML16167A513	Ecological Risk Assessment of Potential Impacts of Turkey Point Units 6 and 7 West Corridor Transmission Lines on Wood Storks, Prepared for FPL by Pandion Systems Inc., July 2010-TN4372.	Environmental Monitoring Report	Pandion Systems, Inc	Florida Power & Light Co NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
8/2/2010	ML101890846	DHS Turkey Point, Units 6 and 7, Site Visit Report Transmittal Letter to Florida Power and Light Company.	Letter	NRC/NRO/DN RL/NWE1	Florida Power & Light Co	05200040 05200041
8/2/2010	ML102140370	2010/08/02 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 002 RELATED TO SRP SECTION 02.04.02- WIND LOADING FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
8/2/2010	ML103491008	2010/08/02 Turkey Point COL Hearing - RE: Attendees for 7/22 Teleconference	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
8/2/2010	ML103491009	2010/08/02 Turkey Point COL Hearing - Attendees for 7/22 Teleconference	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
8/2/2010	ML110060849	2010/08/02 Turkey Point COL Hearing - FW: FW: Request for NRC Certification Code - Response	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
8/2/2010	ML110060867	2010/08/02 Turkey Point COL Hearing - FW: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 002 RELATED TO SRP SECTION 02.04.02-	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		FLOODS FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION				
8/2/2010	ML110060868	2010/08/02 Turkey Point COL Hearing - FW: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 001 RELATED TO SRP SECTION 03.03.01-WIND LOADING FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
8/3/2010	ML102150153	2010/08/03 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 003 RELATED TO SRP SECTION 02.04.03-PROBABLE MAXIMUM FLOOD ON STREAMS AND RIVERS FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
8/3/2010	ML102150446	2010/08/03 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 004 RELATED TO SRP SECTION 02.04.06- PROBABLE MAXIMUM TSUNAMI FLOODINGS FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
8/3/2010	ML102250207	Comment (4) of Heinz J. Mueller, on Behalf of US EPA, Region 4, Supporting EIS for Florida Power & Light Co Combined License Application for Turkey Point Units 6 & 7.	General FR Notice Comment Letter	US Environmental Protection Agency (EPA)	NRC/ADM/D AS/RDEB NRC/NRO/D SER	05200040 05200041
8/3/2010	ML110060901	2010/08/03 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 003 RELATED TO SRP SECTION 02.04.03- PROBABLE MAXIMUM FLOOD ON STREAMS AND RIVERS FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
8/5/2010	ML102170527	07/15/2010-Agenda for Public Scoping Meeting for Turkey Point Units 6 & 7 Combined License Application.	Federal Register Notice Meeting Agenda	NRC/NRO/DS ER/RAP2		05200040 05200041
8/5/2010	ML102250231	Florida Power Light - Turkey Point NEP Ascoping FINAL.	Letter	US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO/D SER/RAP2	05200040 05200041
8/5/2010	ML102320024	General FR Notice Comment Letter - Email Forwarding NMFS Letter.	E-Mail	US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO/D SER/RAP2	05200040 05200041
8/5/2010	ML102320026	General FR Notice Comment Letter - NMFS Letter.	Letter	US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO/D SER/RAP2	05200040 05200041
8/5/2010	ML14328A483	USACE 2010 - TN3562 - USACE 2010 SAJ 2000 - 02346 - White Rock South Permit Only.	Letter	US Dept of the Army, Corps of Engineers	NRC/NRO Vecelio & Grogan, Inc	05200040 05200041
8/9/2010	ML103560420	2010/08/09 Turkey Point COL Hearing - Turkey Point Scoping Process	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Turkey Point Units 6 & 7 Combined License Application in Miami-Dade County.				
8/13/2010	ML102320387	August 13, 2010 Slides Presented by FPL to the Biscayne Bay Regional Restoration Coordinating Team Regarding Turkey Point, Units 6 and 7.	Slides and Viewgraphs	Florida Power & Light Co	NRC/NRO/D SER/RAP2	05200040 05200041
8/13/2010	ML102370765	Comment (6) of Carlos Espinosa, on Behalf of Miami-Dade County, Supporting Turkey Point, Units 6 & 7 Environmental Impact Statement (EIS).	General FR Notice Comment Letter	Miami-Dade County, FL, Dept of Environmental Resources Management	NRC/ADM/D AS/RDEB	05200040 05200041
8/13/2010	ML102390103	Comment (10) of James C. Reynolds, on Behalf of Florida Keys Aqueduct Authority, on Turkey Point Units 6 & 7 Environmental Impact Statement.	General FR Notice Comment Letter	Florida Keys Aqueduct Authority	NRC/ADM/D AS/RDEB	05200040 05200041
8/13/2010	ML103560433	2010/08/13 Turkey Point COL Hearing - Radwaste Dilution	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
8/16/2010	ML102320013	General FR Notice Comment Letter from SFWMD, FPL Turkey Point Units 6 & 7 Combined	E-Mail	South Florida Water Management District	NRC/NRO/D SER/RAP2	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		License Application Review - Scoping Letter.				
8/16/2010	ML102320017	General FR Notice Comment Letter - Cover Letter from SFWMD re: FPL Turkey Point Units 6 & 7 ("Proposed Project") Combined License Application Review Scoping Comments.	Letter	South Florida Water Management District	NRC/ADM/D AS/RDEB	05200040 05200041
8/16/2010	ML102320019	E-mail re: General FR Notice Comment Letter - email Forwarding Attachment to SFWMD Letter.	E-Mail	South Florida Water Management District	NRC/NRO/D SER/RAP2	05200040 05200041
8/16/2010	ML102320022	Ground Water Modeling Summary.	- No Document Type Applies	South Florida Water Management District	NRC/NRO	05200040 05200041
8/16/2010	ML102370759	Comment (8) of James J. Golden, on Behalf of South Florida Water Management District, on Turkey Point Units 6 & 7 COLA Review.	General FR Notice Comment Letter	South Florida Water Management District	NRC/ADM/D AS/RDEB	05200040 05200041
8/16/2010	ML102370766	Comment (7) of Elena De Villiers, on Behalf of Kingston Square Condominium, Inc., Opposing Proposed Turkey Point, Units 6 & 7.	General FR Notice Comment Letter	Kingston Square Condominium, Inc	NRC/ADM/D AS/RDEB	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
8/16/2010	ML103490971	2010/08/16 Turkey Point COL Hearing - RE: Residence at Biscayne NP - additional information	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
8/16/2010	ML103560440	2010/08/16 Turkey Point COL Hearing - RE: Residence at Biscayne NP - additional information	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
8/16/2010	ML110280501	2010/08/16 Turkey Point COL Hearing - NPS comments for NRC scoping, FPL Turkey Point Units 6&7 COLA	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
8/17/2010	ML103490969	2010/08/17 Turkey Point COL Hearing - Re: Phone-in Information for July 22 Teleconference with FPL	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
8/17/2010	ML103490970	2010/08/17 Turkey Point COL Hearing - FW: Phone-in Information for July 22 Teleconference with FPL	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
8/18/2010	ML102600518	2010/08/18-E-mail from Barry J. White (CASE/Citizens Allied for Safe Energy, Inc.) to Emile Julian, Office of the Secretary	NRC Administrative Letter	Citizens Allied for Safe Energy, Inc (CASE)	NRC/SECY	05200040 05200041
8/19/2010	ML102310603	Biscayne Bay Regional Restoration Coordination Team's Discussion Notes From Its May and July Meetings In Relation to Proposed Turkey Point Units 6 & 7.	- No Document Type Applies	NRC/NRO		05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
8/19/2010	ML103490541	2010/08/19 Turkey Point COL Hearing - PREDECISIONAL: Couple of items from TP Status call	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
8/19/2010	ML103490967	2010/08/19 Turkey Point COL Hearing - NRC Letter to PPL on Electronic Reading Room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
8/20/2010	ML103490968	2010/08/20 Turkey Point COL Hearing - Update information; South Miami-Dade Water Issues Coordination, FPL Turkey Point Monitoring	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
8/20/2010	ML103560439	2010/08/20 Turkey Point COL Hearing - RE: NRC Letter to PPL on Electronic Reading Room	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
8/20/2010	ML110030213	2010/08/20 Turkey Point COL Hearing - RE: NRC Letter to PPL on Electronic Reading Room	E-Mail	NRC/NRO		05200040 05200041
8/27/2010	ML110060847	2010/08/27 Turkey Point COL Hearing - Draft RAI 4900 regarding SRP Section: 13.06 (Physical Security) for the Turkey Point Units 6 and 7 COL application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
8/27/2010	ML110060848	2010/08/27 Turkey Point COL Hearing - Draft RAI 4899 regarding SRP Section: 13.06 (Physical Security) for the Turkey	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Point Units 6 and 7 COL application				
8/30/2010	ML102150618	July 22, 2010 Summary of Category 1 Public Teleconference with the Florida Power and Light Company to Discuss Environmental Information Needs for the Turkey Point Units 6 and 7 Combined License Application.	Memoranda	NRC/NRO/DSER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041
8/30/2010	ML102440243	Proposed Turkey Point, Units 6 and 7 - Response to Request for Additional Information Letter No. 001 (eRAI 4759) Standard Review Plan Section 03.03.01 - Wind Loading Review.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
8/30/2010	ML103490965	2010/08/30 Turkey Point COL Hearing - Quote from Sun Sentinel	E-Mail	NRC/NRO		05200040 05200041
8/30/2010	ML103490966	2010/08/30 Turkey Point COL Hearing - RE: Quote from Sun Sentinel	E-Mail	- No Known Affiliation	NRC/NRO/DNRL/NWE1	05200040 05200041
8/30/2010	ML110030214	2010/08/30 Turkey Point COL Hearing - Quote from Sun Sentinel	E-Mail	NRC/NRO		05200040 05200041
8/31/2010	ML102170529	Summary of Public Meetings to Support the Review of the Turkey Point,	Meeting Summary Memoranda	NRC/NRO/DSER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Units 6 and 7, Combined License Application.				
8/31/2010	ML102320391	Letter to FPL Regarding an Electronic Reference Portal for the COL Review for Units 6 and 7.	Letter	NRC/NRO/DSER/RAP2	Florida Power & Light Co	05200040 05200041
8/31/2010	ML13072A693	Golder (Golder Associates, Inc.). 2010. Prevention of Significant Deterioration Application for Landfill Gas-to-Energy Plant at the Medley Landfill. Gainesville, FL (TN1079)	Environmental Report	Golder Associates, Inc	NRC/NRO/DNRL Waste Management , Inc, of Florida	05200040 05200041
9/1/2010	ML102450485	Proposed Turkey Point Units 6 & 7, Response to Request for Additional Information Letter No. 002 (eRAI 4806), Standard Review Plan Section 02.04.02 - Floods.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/1/2010	ML103490963	2010/09/01 Turkey Point COL Hearing - EPA Letter - Proposed Drilling at FP&L Turkey Point Power Plant Waste Treatment System	E-Mail	- No Known Affiliation	NRC/NRO/DNRL/NWE1	05200040 05200041
9/1/2010	ML103560691	2010/09/01 Turkey Point COL Hearing - RE: Meeting between MDWASD and NRC to discuss reclaimed water issues for Turkey Point proposed units 6&7	E-Mail	- No Known Affiliation	NRC/NRO/DNRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
9/2/2010	ML102500206	Turkey Point, Units 6 and 7, Response to Request for Additional Information Letter No. 003 (eRAI 4808) Standard Review Plan Section 02.04.03 - Probable Maximum Flood.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/2/2010	ML102500207	Turkey Point Units 6 and 7, Response to Request for Additional Information Letter No. 004 (eRAI 4809) Standard Review Plan Section 02.04.06 - Probable Maximum Tsunami Flooding.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102500489	Turkey Point Units 6 and 7, Combined License Application Submittal 6, Part 8 Physical Security Plan - Revision 1.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102510452	Turkey Point Units 6 and 7, Response to Request for Additional Information re Final Safety Analysis Report (FSAR) Section 2.5.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102510458	Turkey Point Units 6 & 7 COL Application, SubSection 2.5.3: Surface Faulting.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
9/3/2010	ML102510461	Turkey Point Units 6 & 7 COL Application, Figure 2.5.1-201 to Figure 2.5.1-247.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040
			Map			05200041
9/3/2010	ML102510464	Turkey Point Units 6 & 7 COL Application, Figure 2.5.1-248 to Figure 2.5.1-278.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040
			Map			05200041
9/3/2010	ML102510482	Turkey Point Units 6 & 7 COL Application, Figure 2.5.1-279 to Figure 2.5.1-320.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040
						05200041
9/3/2010	ML102510483	Turkey Point Units 6 & 7 COL Application, Figure 2.5.1-321 to Figure 2.5.1-348.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040
						05200041
9/3/2010	ML102510484	Turkey Point Units 6 & 7 COL Application, SubSection 2.5.1: Basic Geologic and Seismic Information to Table 2.5.1-207.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040
						05200041
9/3/2010	ML102510486	Turkey Point Units 6 & 7 COL Application, SubSection 2.5.2: Vibratory Ground Motion.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040
						05200041
9/3/2010	ML102570371	Turkey Point, Units 6 & 7, Combined License Application Submittals 4 and 5, Submittal of the Annual Update of the COL Application - Revision 1 and		Florida Power & Light Co	NRC/Document Control Desk	05200040
			Letter		NRC/NRO	05200041

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		the Semi-Annual Update of the Departure Report.				
9/3/2010	ML102580400	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information), Rev. 1 - Part 1 - General and Financial Information	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580402	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Master Table of Contents	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580403	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 1 - Introduction and General Description of the Plant	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580404	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.0 - Site Characteristics	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580405	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.1 - Geography and Demography	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580406	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.2 - Nearby Industrial, Transportation, and Military Facilities	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580407	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.3 - Meteorology	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580408	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.1 - Hydrologic Description	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580409	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.2 - Floods	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580410	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.3 - Probable Maximum Flood on Streams and Rivers	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580412	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.4 - Potential Dam Failures	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580413	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.5 - Probable Maximum Surge and Seiche Flooding	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580414	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.6 - Probable Maximum Tsunami Hazards	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580415	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.7 - Ice Effects	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580417	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.8 - Cooling Water Canals and Reservoirs	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580418	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.9 - Channel Diversions	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580419	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.10 - Flooding Protection Requirements	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580420	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.11 - Low Water Considerations	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580421	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580422	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2AA - Transducer Data	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580423	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2BB - Aquifer Pumping Test Results	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580424	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2CC - Groundwater Model Development and Analysis	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580425	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 201-225	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580426	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 226-247	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580427	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 248-251	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580428	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.13 - Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580429	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.14 - Technical Specification and Emergency Operation Requirements	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580430	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.15 - Combined License Information	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580431	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.0 - Geology, Seismology, and Geotechnical Engineering	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580432	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580433	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 201-218	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580434	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 219-238	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580435	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.2 - Vibratory Ground Motion	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580436	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.3 - Surface Faulting	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580437	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.4 - Stability of Subsurface Materials and Foundations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580438	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.5 - Stability of Slopes	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580439	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.6 - Combined License Information	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580440	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 3 - Design of Structures, Components, Equipment and Systems	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580441	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 4 - Reactor	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580442	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 5 - Reactor Coolant System and Connected Systems	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580443	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 6 - Engineered Safety Features	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580444	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 7 - Instrumentation and Controls	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580445	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 8 - Electric Power	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580446	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 9 - Auxiliary Systems	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580447	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 10 - Steam and Power Conversion	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580448	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 11 - Radioactive Waste Management	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580449	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 12 - Radiation Protection	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580450	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 13 - Conduct of Operations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580451	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 14 - Initial Test Program	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580452	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 15 - Accident Analyses	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580453	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 16 - Technical Specifications	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580454	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 17 - Quality Assurance	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580455	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 18 - Human Factors Engineering	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580456	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 1 - Part 2 - FSAR - Chapter 19 - Probabilistic Risk Assessment	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580458	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Master Table of Contents	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580459	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 1 - Introduction	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580460	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 1	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580461	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 2	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580462	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 3	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580463	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 4	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580464	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 5	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580465	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 6	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580466	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.1 - Station Location	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580467	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.2 - Land	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580468	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Water	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580469	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Figures 1-31	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580470	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Figures 32-72	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580471	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.4 - Ecology	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580472	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580473	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.6 - Geology	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580474	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.7 - Meteorology, Air Quality, and Noise	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580475	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.8 - Related Federal Project Activities	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580476	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 3 - Plant Description	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580477	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 4 - Environmental Impacts of Construction	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580478	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 5 - Environmental Impacts of Operation	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580479	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 6 - Environmental Measurements and Monitoring Programs	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580480	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 7 - Environmental Impacts of Postulated Accidents Involving Radioactive Materials	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580481	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 8 - Need for Power	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580482	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER - Chapter 9 - Alternatives to the Proposed Action	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580486	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 1 - Part 3 - ER Chapter 10 - Environmental Consequences of the Proposed Action	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580492	FPL - Turkey Point Units 6 & 7 COLA (Technical Specifications), Rev. 1 - Part 4 Technical Specifications	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			Technical Specifications		NRC/NRO	05200041
9/3/2010	ML102580494	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan), Rev. 1 - Part 5 Emergency Plan	Emergency Preparedness-Emergency Plan	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580495	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan), Rev. 1 - Part 5 Emergency Plan Supplement 1 - ETE	Emergency Preparedness-Emergency Plan	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580496	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan), Rev. 1 - Part 5 Emergency Plan Supplements 2-9	Emergency Preparedness-Emergency Plan	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580498	FPL - Turkey Point Units 6 & 7 COLA (Site Redress Plan), Rev. 1 - Part 6 Limited Work Authorization and Site Redress Plan	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			Site Redress Plan		NRC/NRO	05200041
9/3/2010	ML102580507	FPL - Turkey Point Units 6 & 7 COLA (Other), Rev. 1 - Part 9 Withheld Information Enclosure 6 - Mitigative Strategies Report	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
9/3/2010	ML102580509	FPL - Turkey Point Units 6 & 7 COLA (ITAAC), Rev. 1 - Part 10 License Conditions (Including ITAAC)	Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580526	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 1-FPL New Nuclear Projects Quality Assurance Program Description FPL-2 (QAPD)	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580527	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 1-Final Data Report	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580528	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 2-Appendix A-Survey Report	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580529	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 3-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580530	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 4-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580531	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 5-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580533	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 6-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580534	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 7-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580535	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 8-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580536	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 9-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580537	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 10-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580538	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 11-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580539	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 12-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580540	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 13-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580541	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 14-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580542	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 15-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580543	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 16-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580544	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 17-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580545	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 18-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580546	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 19-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580547	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 20-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580548	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 21-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580549	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 22-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580550	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 23-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580551	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 24-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580552	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 25-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580553	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 26-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580554	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 27-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580555	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 28-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580556	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 29-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580557	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 30-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580558	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 31-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580559	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 32-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580560	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 33-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580561	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 34-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580562	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 35-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580563	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 36-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580565	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 37-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580566	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 38-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580567	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 39-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580569	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 40-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580570	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 41-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580571	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 42-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580572	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 43-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580573	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 44-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580574	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 45-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580575	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 46-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580576	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 1-Appendix C-Cone Penetrometer Test Results	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580577	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 2-Appendix C-Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580578	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 3-Appendix C-Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580579	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 4-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580580	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 5-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580582	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 6-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580583	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 7-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580584	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 8-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580585	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 9-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580586	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 10-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580587	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 11-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580588	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 12-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580589	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 13-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580590	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 14-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580593	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 15-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580596	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 16-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580597	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 17-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580598	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 18-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580599	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 19-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580600	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 20-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580601	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 21-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580602	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 22-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580603	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 23-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580604	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 24-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580605	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 25-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580606	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 26-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580607	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 27-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580609	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 28-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580610	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 29-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580611	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 30-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580612	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 31-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580613	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 32-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580614	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 33-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580615	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 34-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580616	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 35-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580617	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 36-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580618	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 37-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580619	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 38-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580620	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 39-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580621	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 40-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580622	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 41-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580623	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 42-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580624	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 43-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580625	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 44-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580626	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 45-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580627	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 46-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580628	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 47-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580629	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 48-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580630	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 49-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580631	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 50-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580632	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 51-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580633	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 52-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580634	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 53-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580635	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 54-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580636	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 55-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580637	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 56-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580638	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 57-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580639	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 58-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580640	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 59-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580641	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 60-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580643	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 61-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580644	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosures Introduction	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580647	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 1-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580648	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 2-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580649	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 3-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580650	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 4-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580651	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 5-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580652	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 6-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580653	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 7-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580654	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 8-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580655	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 9-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580656	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 10-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/3/2010	ML102580657	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 11-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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9/3/2010	ML102580658	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 12-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580660	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 13-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580661	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 14-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580662	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 15-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580663	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 16-Appendix E-Laboratory Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580664	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 17-Appendix E-Laboratory Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580665	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 18-Appendix E-Laboratory Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580666	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 19-Appendix E-Laboratory Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580667	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 20-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580668	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 21-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580669	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 22-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580670	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 23-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/3/2010	ML102580671	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 4, Part 1-Appendix F-RCTS Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580672	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 1 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 4, Part 2-Appendix G-Groundwater Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
9/3/2010	ML102580761	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information), Rev. 1 - Part 1 - General and Financial Information	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
9/3/2010	ML102580857	FPL - Turkey Point Units 6 & 7 COLA (Generic DCD Departures Report), Rev. 1 - Part 7 - Departures and Exemption Requests	Generic DCD Departures Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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9/7/2010	ML102440473	08/26/2010 Summary of Public Meeting With AP1000 Design-Centered Working Group to Discuss Guidance Associated With Complying With 10 CFR 52.79(a)(31) Regarding Construction Impacts.	Memoranda	NRC/NRO/DN RL/NWE1	NRC/NRO/D NRL/NWE1	05200014
						05200015
						05200018
						05200019
						05200022
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						05200040
						05200041

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9/8/2010	ML102510672	2010/09/08 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 005 RELATED TO SRP SECTION 13.06-PHYSICAL SECURITY FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/8/2010	ML102520024	2010/09/08 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 006 RELATED TO SRP SECTION 13.06-PHYSICAL SECURITY FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/8/2010	ML110060843	2010/09/08 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 005 RELATED TO SRP SECTION 13.06-PHYSICAL SECURITY FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
9/8/2010	ML110060844	2010/09/08 Turkey Point COL Hearing - FW: FPL Letter L-2010-194 Response to RAI Letter No. 004 (eRAI 4809) SRP Section 02.04.06 - Probable Maximum Tsunami Flooding	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/9/2010	ML102510836	Inspection Manual Change Notice 10-019.	Inspection Manual Change Notice	NRC/NRR/DIR S/IRIB		05200040 05200041
9/9/2010	ML103490962	2010/09/09 Turkey Point COL Hearing - Staff for access to electronic reading room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/9/2010	ML110060841	2010/09/09 Turkey Point COL Hearing - RE: safety regulations	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/9/2010	ML110060842	2010/09/09 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 006 RELATED TO SRP SECTION 13.06- PHYSICAL SECURITY FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/14/2010	ML102660296	Seminole Tribe letter - The potential effects of proposed Turkey Point Units 6 and 7.	Letter	Seminole Tribe of Florida	NRC/NRO/D SER/RAP2	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
9/14/2010	ML103490961	2010/09/14 Turkey Point COL Hearing - Turkey Point - Homestead, FL	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
9/16/2010	ML102630092	Turkey Point, Units 6 and 7 - Roadmap of Changes in Combined License Application, Revision 1.	Letter	Florida Power & Light Co	NRC/Docum ent Control Desk NRC/NRO	05200040 05200041
9/16/2010	ML110060864	2010/09/16 Turkey Point COL Hearing - FW: Florida Power & Light Co Turkey Point Units 6 & 7 COLA Load - Submissions 4 & 5 (Public and Non-Public)	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/17/2010	ML102600594	2010-E-mail from E. Julian to B. White (CASE) re: Items Pertaining to Filings in the Turkey Point Proceeding	NRC Administrative Letter	NRC/SECY		05200040 05200041
9/17/2010	ML102640041	Turkey Point, Units 6 and 7 - Supplemental Response to Request for Additional Information Letter No. 002 Standard Review Plan Section 02.04.02 - Floods - Question No. 02.04.02-2 (eRAI 4806).	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Docum ent Control Desk NRC/NRO	05200040 05200041
9/21/2010	ML101880785	Enclosure 2 - Information Needs table for the Summary of the Env. Site Audit related to the review of the Combined License App. for TP Units 6 & 7.	Request for Additional Information (RAI)	NRC/NRO/DS ER		05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
9/21/2010	ML101880786	Summary of the Env. Site Audit Related to the Review of the Combined License Application for Turkey Point Units 6 and 7 + Enclosure 1.	Memoranda Trip Report	NRC/NRO/DSER	NRC/NRO/D SER	05200040 05200041
9/21/2010	ML103490960	2010/09/21 Turkey Point COL Hearing - Summary of 100722 Telecon	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/21/2010	ML110050186	9/21/10 Summary of teleconference with South Florida Water Management District regarding questions in relation to the Turkey Point Units 6 and 7 COL alternative sites.	Note to File incl Telcon Record, Verbal Comm	Battelle Memorial Institute, Pacific Northwest National Lab	NRC/NRO	05200040 05200041
9/22/2010	ML102670160	Turkey Point, Units 6 and 7 - Supplemental Response to Request for Additional Information Letter No. 004 Standard Review Plan Section 02.04.06 - Probable Maximum Tsunami Flooding -Question No. 02.04.06-2 (eRAI 4809).	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
9/23/2010	ML102670065	2010/09/23 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 007 RELATED TO SRP SECTION 03.07.01 SEISMIC DESIGN PARAMETERS FOR THE TURKEY POINT NUCLEAR	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION				
9/27/2010	ML102780781	2010/09/27 Turkey Point COL Hearing - FW: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 007 RELATED TO SRP SECTION 03.07.01- SEISMIC DESIGN PARAMETERS FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/27/2010	ML102780782	2010/09/27 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 007 RELATED TO SRP SECTION 03.07.01- SEISMIC DESIGN PARAMETERS FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
9/28/2010	ML103490983	2010/09/28 Turkey Point COL Hearing - Notes from last week's meeting between NRC and SFWMD: Alternative Site water use issues	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
9/28/2010	ML110060840	2010/09/28 Turkey Point COL Hearing - Draft RAI 5080 regarding SRP Section: 09.03.03 (Equipment and Floor Drainage System) for the Turkey Point Units 6 and 7 COL application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/28/2010	ML110060857	2010/09/28 Turkey Point COL Hearing - Draft RAI 5112 regarding SRP Section: 09.02.04 (Potable and Sanitary Water Systems) for the Turkey Point Units 6 and 7 COL application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
9/28/2010	ML14290A597	TN1505 - Broward County 2010 1989 Broward County Land Use Plan. Fort Lauderdale, Florida.	Operating Plan	Broward County, FL	NRC/NRO	05200040 05200041
9/29/2010	ML103490976	2010/09/29 Turkey Point COL Hearing - FW: Updated: Meeting between MDWASD and NRC to discuss reclaimed water issues for Turkey Point proposed units 6&7	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
9/30/2010	ML103490845	2010/09/30 Turkey Point COL Hearing - RE: Notes from last week's meeting between NRC and SFWMD: Alternative Site water use issues	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
9/30/2010	ML103490977	2010/09/30 Turkey Point COL Hearing - Meeting between MDWASD and NRC to discuss reclaimed water issues for Turkey Point proposed units 6&7	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
9/30/2010	ML103490978	2010/09/30 Turkey Point COL Hearing - RE: Updated: Meeting between MDWASD and NRC to discuss reclaimed water issues for Turkey Point proposed units 6&7	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
9/30/2010	ML103490986	2010/09/30 Turkey Point COL Hearing - RE: Notes from last week's meeting between NRC and SFWMD: Alternative Site water use issues	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
10/4/2010	ML110060795	2010/10/04 Turkey Point COL Hearing - FW: Request for NRC Certification Code	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/4/2010	ML110060796	2010/10/04 Turkey Point COL Hearing - FW: FW: Request for NRC Certification Code - Response	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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10/4/2010	ML110060797	2010/10/04 Turkey Point COL Hearing - FW: Public Meeting in Florida for Turkey Point 6&7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/4/2010	ML110060798	2010/10/04 Turkey Point COL Hearing - FW: RE: RE: FPL Turkey Point application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/4/2010	ML110060799	2010/10/04 Turkey Point COL Hearing - FW: Need of an attorney to file an intervention	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/4/2010	ML110060800	2010/10/04 Turkey Point COL Hearing - FW: Need of an attorney to file an intervention	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/4/2010	ML110060801	2010/10/04 Turkey Point COL Hearing - FW: Response from "Contact the Public Document Room Staff"	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/4/2010	ML110060802	2010/10/04 Turkey Point COL Hearing - FW: NRC Proceeding "Turkey Point 52-040 and 52-041-COL"	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/4/2010	ML110060839	2010/10/04 Turkey Point COL Hearing - FW: Public Meeting in Florida for Turkey Point 6&7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/4/2010	ML14328A517	SFWMD 2010 - TN3553 - SFWMD 2010 Presentation Atlantic Civil Permit.	FACT Sheet	State of FL, Water Management District	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/5/2010	ML103491000	2010/10/05 Turkey Point COL Hearing - RE: Immediate Public Release - SUMMARY OF THE ENVIRONMENTAL SITE AUDIT RELATED TO THE COMBINED LICENSE APPLICATION FOR TURKEY POINT	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
10/5/2010	ML103491001	2010/10/05 Turkey Point COL Hearing - Couple of items	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/6/2010	ML14301A015	TN1526 - NPS (National Park Service) 2010 Evaluation of Potential Impacts of Proposed Florida Power and Light Company Transmission Power Lines on Avian Resources in Everglades National Park SFNRC, Homestead Florida.	FACT Sheet	US Dept of Interior, National Park Service, South Florida Natural Resources Ctr	NRC/NRO	05200040 05200041
10/7/2010	ML102800197	2010/10/07 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 008 RELATED TO SRP SECTION 09.03.03 EQUIPMENT AND FLOOR DRAINAGE SYSTEM FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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10/7/2010	ML102800203	2010/10/07 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 009 RELATED TO SRP SECTION 09.02.04 POTABLE AND SANITARY WATER SYSTEM FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/7/2010	ML103490992	2010/10/07 Turkey Point COL Hearing - RE: Clarification call on site audit report	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
10/7/2010	ML103491002	2010/10/07 Turkey Point COL Hearing - Clarification call on site audit report	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/7/2010	ML103491003	2010/10/07 Turkey Point COL Hearing - RE: Clarification call on site audit report	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
10/7/2010	ML103491004	2010/10/07 Turkey Point COL Hearing - RE: Clarification call on site audit report	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/7/2010	ML103491005	2010/10/07 Turkey Point COL Hearing - RE: Clarification call on site audit report	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

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10/7/2010	ML110060790	2010/10/07 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 009 RELATED TO SRP SECTION 09.02.04-POTABLE AND SANITARY WATER SYSTEM FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/7/2010	ML110060794	2010/10/07 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 008 RELATED TO SRP SECTION 09.03.03-EQUIPMENT AND FLOOR DRAINAGE SYSTEM FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/8/2010	ML102860673	Turkey Point, Units 6 & 7, Response to NRC Request for Additional Information Letter No. 005 (eRAI 4899), Standard Review Plan Section 13.06 - Physical Security.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/8/2010	ML102861200	Update of Turkey Point, Units 6 & 7, Combined License Application -	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040 05200041

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		Revision 1 - Enclosure 1 Date Correction.			NRC/NRO	
10/8/2010	ML102861234	Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 006 (eRAI 4900) Standard Review Plan Section 13.06 - Physical Security.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/8/2010	ML102870120	Turkey Point, Units 6 and 7 - Response to NRC Request for Additional Information Letter No. 005 (eRAI 4899) Standard Review Plan Section 13.06 - Physical Security - Question 13.6-11.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/8/2010	ML12240A302	NPS 2012 Everglades Animals WebLink, TN194.	Database File	US Dept of Interior, National Park Service	NRC/NRO	05200040 05200041
10/11/2010	ML103490991	2010/10/11 Turkey Point COL Hearing - Immediate Public Release - SUMMARY OF THE ENVIRONMENTAL SITE AUDIT RELATED TO THE COMBINED LICENSE APPLICATION FOR TURKEY POINT	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2010	ML103490999	2010/10/14 Turkey Point COL Hearing - FPL-ACOE Letter	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
10/18/2010	ML102930533	Comment (10) of Larry Nicholson on Behalf of Florida Power & Light Co., on Revised Draft Safety Culture Policy Statement.	General FR Notice Comment Letter	Florida Power & Light Co	NRC/ADM/D AS/RDEB	05000250 05000251 05000266 05000301 05000331 05000335 05000389 05000443 05000444 05200040 05200041
10/18/2010	ML103490972	2010/10/18 Turkey Point COL Hearing - Meeting notes from our discussion on 9/27	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/18/2010	ML103620802	2010/10/18 Turkey Point COL Hearing - FW: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 009 RELATED TO SRP SECTION 09.02.04-POTABLE AND SANITARY WATER SYSTEM FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/18/2010	ML103620811	2010/10/18 Turkey Point COL Hearing - Meeting notes from our discussion on 9/27	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
10/21/2010	ML102660659	Summary of the Environmental Alternative sites Audit Related to the Review of the Combined License Application for Turkey Point, Units 6 and 7.	Memoranda Schedule and Calendars	NRC/NRO/DS ER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041 05200040
10/26/2010	ML103490994	2010/10/26 Turkey Point COL Hearing - RE: Call Notes - Dr. Rand	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200041 05200041
10/26/2010	ML103490995	2010/10/26 Turkey Point COL Hearing - Call Notes - Dr. Rand	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

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10/26/2010	ML110200187	10/26/10 Summary of Teleconference with Rand of Florida International University regarding chemicals in treated waste water.	Conference/Symposium/Workshop Paper Meeting Summary	Battelle Memorial Institute, Pacific Northwest National Lab	NRC/NRO/D SER/RAP2	05200040 05200041
10/27/2010	ML103010279	Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 007 (eRAI 4975) Standard Review Plan Section 3.07.01 - Seismic Design Parameters.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/27/2010	ML103490979	2010/10/27 Turkey Point COL Hearing - RE: wastewater aquatic toxicity test plan	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
10/27/2010	ML103490993	2010/10/27 Turkey Point COL Hearing - Notes from 101021 Meeting between NPS and NRC	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/27/2010	ML103491007	2010/10/27 Turkey Point COL Hearing - Re: Notes from 101021 Meeting between NPS and NRC	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
10/27/2010	ML103560788	2010/10/27 Turkey Point COL Hearing - RE: wastewater aquatic toxicity test plan	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
10/28/2010	ML103490980	2010/10/28 Turkey Point COL Hearing - RE: Meeting notes from our discussion on 9/27	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

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10/28/2010	ML103490996	2010/10/28 Turkey Point COL Hearing - NRC Staff and Contractors List for e-Rdg Room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
10/31/2010	ML14279A311	TN1724 - NOAA (National Oceanic and Atmospheric Administration) 2010 Smalltooth Sawfish (Pristis pectinata Latham) 5-Year Review: Summary and Evaluation. National Marine Fisheries Service, St. Petersburg, Florida TN1724.	Environmental Report	US Dept of Commerce, National Marine Fisheries Service	NRC/NRO	05200040 05200041
11/1/2010	ML103080837	Turkey Point, Units 6 & 7, Response 1 to Request for Supplant Information on Environmental Audit.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
11/1/2010	ML103490981	2010/11/01 Turkey Point COL Hearing - RE: Meeting notes from our discussion on 9/27	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
11/1/2010	ML103490982	2010/11/01 Turkey Point COL Hearing - RE: Meeting notes from our discussion on 9/27	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
11/1/2010	ML103490987	2010/11/01 Turkey Point COL Hearing - Re: Alt Sites Audit Summary	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
11/1/2010	ML103490997	2010/11/01 Turkey Point COL Hearing - Mailing address	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/1/2010	ML103490998	2010/11/01 Turkey Point COL Hearing - Alt Sites Audit Summary	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
11/1/2010	ML103491006	2010/11/01 Turkey Point COL Hearing - RE: Meeting notes from our discussion on 9/27	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
11/2/2010	ML103490988	2010/11/02 Turkey Point COL Hearing - Public Telecon(s) on Rev. 3 of the Groundwater Model	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
11/3/2010	ML103070198	Press Release-10-199: Licensing Board to Hear Oral Argument Nov. 19 in Homestead, Fla., on Turkey Point New Nuclear Reactor Application.	Press Release	NRC/OPA		05200040 05200041
11/3/2010	ML103090385	Proposed Turkey Point Units 6 and 7, Fourth Endorsement of Bellefonte R-COLA Standard Content Requests for Additional Information.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
11/5/2010	ML103130131	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter No. 008 (eRAI 5080) Standard Review Plan Section 9.03.03 - Equipment and Floor Drainage System.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/5/2010	ML103130132	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter No. 009 (eRAI 5112) Standard Review Plan Section 9.02.04 - Potable and Sanitary Water System.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
11/5/2010	ML103130133	Proposed Turkey Point, Units 6 and 7 - Combined License Application Online Reference Portal.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
11/5/2010	ML103560722	2010/11/05 Turkey Point COL Hearing - FW: FPL Letter L-2010-195 Response to RAI Letter No. 004 (eRAI 4809) SRP 02.04.06 - Probable Maximum Tsunami Flooding	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041 05200040
11/8/2010	ML103490974	2010/11/08 Turkey Point COL Hearing - RE: eReading Room	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200041 05200041
11/8/2010	ML103490975	2010/11/08 Turkey Point COL Hearing - FPL-EPA R4 Project Briefing on Turkey Point Units 6 & 7	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041 05200040
11/8/2010	ML103490984	2010/11/08 Turkey Point COL Hearing - RE: eReading Room	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200041 05200041 05200040
11/8/2010	ML103490985	2010/11/08 Turkey Point COL Hearing - eReading Room	E-Mail	NRC/NRO		05200040 05200041

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11/8/2010	ML110030215	2010/11/08 Turkey Point COL Hearing - eReading Room	E-Mail	NRC/NRO		05200040 05200041
11/9/2010	ML103420680	2010/11/09 Turkey Point COL Hearing - FPL briefing for staff on Rev 3 of the groundwater model	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
11/9/2010	ML103490973	2010/11/09 Turkey Point COL Hearing - Summary of October 22, 2010 meeting between the Seminole Tribe of Florida, NRC and USACE	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
11/9/2010	ML103620779	2010/11/09 Turkey Point COL Hearing - Summary of October 22, 2010 meeting between the Seminole Tribe of Florida, NRC and USACE	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
11/10/2010	ML103420679	2010/11/10 Turkey Point COL Hearing - FW: Turkey Point 'Me-Too' Letters - Submittals To Date	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
11/12/2010	ML103420674	2010/11/12 Turkey Point COL Hearing - Draft RAI 5191 related to SRP Section 07.05 - Information Systems Important to Safety for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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11/12/2010	ML103420675	2010/11/12 Turkey Point COL Hearing - Draft RAI 5233 related to SRP Section 02.04.05 - Probable Maximum Surge and Seiche Flooding for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
11/12/2010	ML103420676	2010/11/12 Turkey Point COL Hearing - Draft RAI 5132 related to SRP Section 05.04.07 - Residual Heat Removal (RHR) for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
11/12/2010	ML103420677	2010/11/12 Turkey Point COL Hearing - FW: Draft RAI 4901 related to SRP Section: 14.03.12 - Physical Security Hardware - Inspections, Tests, Analyses, and Acceptance Criteria for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
11/15/2010	ML103210407	Turkey Point, Units 6 and 7, Second Endorsement of Vogtle Electric Generating Plant Units 3 and 4, AP1000 R-COLA Standard Content Submittals.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/15/2010	ML103420658	2010/11/15 Turkey Point COL Hearing - Conference call notes for confirmation	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
11/15/2010	ML103420659	2010/11/15 Turkey Point COL Hearing - Meeting notes from our conference call on 11/2; NRC and EPA	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
11/16/2010	ML110050170	Summary of 11/02/10 Teleconference with U.S. EPA Regarding Emerging Pollutants of Concern, Discussed in Relation to Proposed Turkey Point Units 6 and 7.	Note Meeting Summary	Battelle Memorial Institute, Pacific Northwest National Lab	NRC/NRO	05200040 05200041
11/23/2010	ML103420640	2010/11/23 Turkey Point COL Hearing - RE: Access to eReading Room	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
11/23/2010	ML103420641	2010/11/23 Turkey Point COL Hearing - Access to eReading Room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
11/30/2010	ML103230597	12/16/2010-Notice of Public Teleconference Regarding the Groundwater Model for Turkey Point Units 6 & 7 Combined License Application.	Meeting Notice Memoranda	NRC/NRO/DS ER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041
12/1/2010	ML103130610	Memo from to - Scoping Summary Report Related To The Environmental Scoping Process For The Turkey Point Units 6 And 7 Combined License Application.	Memoranda	NRC/NRO/DS ER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/1/2010	ML103130612	Enclosure 1 - Scoping Summary Report Related To The Environmental Scoping Process For The Turkey Point Units 6 And 7 Combined License Application.	Report, Miscellaneous	NRC/NRO/DSER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041
12/2/2010	ML103370087	2010/12/02 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 010 RELATED TO SRP SECTION 02.04.05 PROBABLE MAXIMUM SURGE AND SEICHE FLOODING FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/3/2010	ML103420637	2010/12/03 Turkey Point COL Hearing - RE: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 010 RELATED TO SRP SECTION 02.04.05 PROBABLE MAXIMUM SURGE AND SEICHE FLOODING FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/3/2010	ML103420638	2010/12/03 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 010 RELATED TO SRP SECTION 02.04.05 PROBABLE MAXIMUM SURGE AND SEICHE FLOODING FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/4/2010	ML103410221	2010/12/04 Turkey Point COL Hearing - PSER for Section 6.6 Inservice Inspection of Class 2, 3, and MC Components for Turkey Point Units 6 and 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/6/2010	ML103410112	2010/12/06 Turkey Point COL Hearing - RE: PTN Phase A1 draft PSER Sections 9.1.1 and 9.1.2 - Delivery	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/6/2010	ML103490631	Turkey Point, Units 6 and 7 - Mitigative Strategies Description and Plans, Revision 0.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/7/2010	ML103410225	2010/12/07 Turkey Point COL Hearing - FW: PSER for Section 6.6 Inservice Inspection of Class 2, 3, and MC Components for	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Turkey Point Units 6 and 7 < a e>				
12/8/2010	ML103420623	2010/12/08 Turkey Point COL Hearing - Summary of October 20 2010 Meeting between Seminole Tribe and NRC and Corps	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/8/2010	ML103420639	2010/12/08 Turkey Point COL Hearing - FW: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 010 RELATED TO SRP SECTION 02.04.05 PROBABLE MAXIMUM SURGE AND SEICHE FLOODING FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION < A E>	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/8/2010	ML103620518	2010/12/08 Turkey Point COL Hearing - Links to Transmission Line figures	E-Mail	NRC/NRO		05200040 05200041
12/9/2010	ML103430643	Cancelled - 12/16/2010 - Notice of Public Teleconference Regarding the Groundwater Model for the Turkey Point Units 6 & 7 Combined License Application.	Meeting Notice	NRC/NRO/DS ER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041

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12/13/2010	ML103560717	2010/12/13 Turkey Point COL Hearing - Draft of our discussion	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/15/2010	ML103500027	2010/12/15 Turkey Point COL Hearing - FPL Letter L-2010-295 dated 12-15-2010 - NRC June 2010 Environmental Audit Supplemental Information Request Response 2 Part 2	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
12/15/2010	ML103500029	2010/12/15 Turkey Point COL Hearing - FPL Letter L-2010-294 dated 12-15-2010 - NRC June 2010 Environmental Audit Supplemental Information Request Response 2 Part 1	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
12/15/2010	ML103540248	Turkey Point Units 6 and 7, NRC June 2010 Environmental Audit Supplemental Information Request Response 2 Part 1.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/15/2010	ML103560533	Turkey Point, Units 6 & 7, Supplemental Information Request Response 2 Part 2 on Environmental Audit.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2010	ML103500342	2010/12/16 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 011 RELATED TO SRP SECTION 02.04.12 GROUNDWATER FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/16/2010	ML103500402	2010/12/16 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 012 RELATED TO SRP SECTION 07.05 INFORMATION SYSTEMS IMPORTANT TO SAFETY FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/16/2010	ML103560457	2010/12/16 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 012 RELATED TO SRP SECTION 07.05 INFORMATION SYSTEM IMPORTANT TO SAFETY FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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		AND 7 COMBINED LICENSE APPLICATION				
12/16/2010	ML103560459	2010/12/16 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 011 RELATED TO SRP SECTION 02.04.12 GROUNDWATER FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/16/2010	ML103560461	2010/12/16 Turkey Point COL Hearing - FW: PTN 6 & 7 Info Need 'Met 5'	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/16/2010	ML103560462	2010/12/16 Turkey Point COL Hearing - FW: Turkey Point Tours.doc	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/16/2010	ML103560463	2010/12/16 Turkey Point COL Hearing - FW: PTN 6 & 7 - Info Need G-4 Clarification	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/16/2010	ML103560464	2010/12/16 Turkey Point COL Hearing - FW: PTN 6 & 7 ER Audit - Boat Tour Itinerary	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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12/16/2010	ML103560465	2010/12/16 Turkey Point COL Hearing - FW: Martin Site Staff and Hydrology Documents for Reading Room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/16/2010	ML103560468	2010/12/16 Turkey Point COL Hearing - FW: Turkey Point 6 & 7 Reading Rooms	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/16/2010	ML103560478	2010/12/16 Turkey Point COL Hearing - FW: Staff for access to electronic reading room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/16/2010	ML103560479	2010/12/16 Turkey Point COL Hearing - FW: Staff for access to electronic reading room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/21/2010	ML103620344	Turkey Point, Units 6 and 7, Combined License Application Submittal 8, Part 8 Physical Security Plan - Revision 2.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630059	Turkey Point, Units 6 & 7 - Combined License Application Submittal 7, Early Submittal of the Annual Update of the COL Application - Revision 2 and the Semi-Annual Update of the Departures Report.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630086	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information), Rev. 2 - Packing Slip	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630087	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information), Rev. 2 - Part 1 - General and Financial Information	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/21/2010	ML103630089	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Master Table of Contents	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630090	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 1 - Introduction and General Description of the Plant	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630091	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.0 - Site Characteristics	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630092	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.1 - Geography and Demography	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630093	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.2 - Nearby Industrial, Transportation, and Military Facilities	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630094	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.3 - Meteorology	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630095	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.1 - Hydrologic Description	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630096	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.2 - Floods	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630097	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.3 - Probable Maximum Flood on Streams and Rivers	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630098	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.4 - Potential Dam Failures	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630099	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.5 - Probable Maximum Surge and Seiche Flooding	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630100	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.6 - Probable Maximum Tsunami Hazards	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630101	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.7 - Ice Effects	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630102	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.8 - Cooling Water Canals and Reservoirs	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630103	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.9 - Channel Diversions	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630104	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.10 - Flooding Protection Requirements	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630105	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.11 - Low Water Considerations	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630106	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630107	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2AA - Transducer Data	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630108	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2BB - Aquifer Pumping Test Results	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630109	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2CC - Groundwater Model Development and Analysis	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630110	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 201-225	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630111	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 226-247	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630112	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 248-251	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630113	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.13 - Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630114	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.14 - Technical Specification and Emergency Operation Requirements	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630115	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.15 - Combined License Information	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630116	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.0 - Geology, Seismology, and Geotechnical Engineering	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630117	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630118	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 201-228	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630119	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 229-252	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630120	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 253-278	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630121	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 279-303	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630122	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 304-322	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630123	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 323-348	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630125	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.2 - Vibratory Ground Motion	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630126	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.3 - Surface Faulting	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630127	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.4 - Stability of Subsurface Materials and Foundations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630128	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.5 - Stability of Slopes	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630129	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.6 - Combined License Information	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630130	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 3 - Design of Structures, Components, Equipment and Systems	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630131	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 4 - Reactor	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630132	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 5 - Reactor Coolant System and Connected Systems	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630133	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 6 - Engineered Safety Features	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630134	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 7 - Instrumentation and Controls	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630135	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 8 - Electric Power	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630136	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 9 - Auxiliary Systems	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630137	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 10 - Steam and Power Conversion	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630139	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 11 - Radioactive Waste Management	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630140	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 12 - Radiation Protection	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630141	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 13 - Conduct of Operations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630142	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 14 - Initial Test Program	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630143	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 15 - Accident Analyses	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630144	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 16 - Technical Specifications	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630145	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 17 - Quality Assurance	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630146	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 18 - Human Factors Engineering	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630147	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report), Rev. 2 - Part 2 - FSAR - Chapter 19 - Probabilistic Risk Assessment	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630149	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Master Table of Contents	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630150	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 1 - Introduction	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630151	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 1	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630152	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 2	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630153	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 3	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630154	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 4	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630156	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 5	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630157	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 6	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630158	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.1 - Station Location	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630159	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.2 - Land	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630160	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Water	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630161	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Figures 1-31	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630162	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Figures 32-72	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630163	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.4 - Ecology	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630164	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630165	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.6 - Geology	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630166	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.7 - Meteorology, Air Quality, and Noise	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630167	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.8 - Related Federal Project Activities	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630168	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 3 - Plant Description	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630169	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 4 - Environmental Impacts of Construction	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630170	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 5 - Environmental Impacts of Operation	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630171	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 6 - Environmental Measurements and Monitoring Programs	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630173	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 7 - Environmental Impacts of Postulated Accidents Involving Radioactive Materials	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630174	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 8 - Need for Power	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630175	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER - Chapter 9 - Alternatives to the Proposed Action	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630176	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report), Rev. 2 - Part 3 - ER Chapter 10 - Environmental Consequences of the Proposed Action	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630179	FPL - Turkey Point Units 6 & 7 COLA (Technical Specifications), Rev. 2 - Part 4 Technical Specifications	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			Technical Specifications		NRC/NRO	05200041
12/21/2010	ML103630182	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan), Rev. 2 - Part 5 Emergency Plan	Emergency Preparedness-Emergency Plan	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630183	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan), Rev. 2 - Part 5 Emergency Plan Supplement 1 - ETE	Emergency Preparedness-Emergency Plan	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630184	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan), Rev. 2 - Part 5 Emergency Plan Supplements 2-9	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630186	FPL - Turkey Point Units 6 & 7 COLA (Site Redress Plan), Rev. 2 - Part 6 Limited Work Authorization and Site Redress Plan	License-Application for Combined License (COLA) Site Redress Plan	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630188	FPL - Turkey Point Units 6 & 7 COLA (Generic DCD Departures Report), Rev. 2 - Part 7 Departures and Exemption Requests	Generic DCD Departures Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630195	FPL - Turkey Point Units 6 & 7 COLA (Other), Rev. 2 - Part 9 Withheld Information Enclosure 6 - Mitigative Strategies Report	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630197	FPL - Turkey Point Units 6 & 7 COLA (ITAAC), Rev. 2 - Part 10 License Conditions (Including ITAAC)	Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630226	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information), Rev. 2 - Packing Slip	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630227	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 1-FPL New Nuclear Projects Quality Assurance Program Description FPL-2 (QAPD)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630228	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 1-Final Data Report	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630229	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 2-Appendix A-Survey Report	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630230	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 3-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630231	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 4-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630232	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 5-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630233	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 6-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630234	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 7-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630235	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 8-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630236	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 9-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630238	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 10-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630239	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 11-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630240	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 12-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630241	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 13-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630242	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 14-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630244	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 15-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630245	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 16-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630246	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 17-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630247	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 18-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630248	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 19-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630249	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 20-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630250	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 21-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630251	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 22-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630252	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 23-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630253	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 24-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630254	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 25-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630255	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 26-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630256	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 27-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630257	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 28-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630258	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 29-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630259	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 30-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630261	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 31-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630262	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 32-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630263	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 33-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630264	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 34-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630265	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 35-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630266	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 36-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630268	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 37-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630269	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 38-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630270	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 39-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630271	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 40-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630272	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 41-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630273	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 42-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630274	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 43-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630275	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 44-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630276	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 45-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630277	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 46-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630279	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 1-Appendix C-Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630280	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 2-Appendix C-Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630281	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 3-Appendix C-	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Cone Penetrometer Test Results				
12/21/2010	ML103630282	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 4-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630283	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 5-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630284	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 6-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630285	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 7-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630286	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 8-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630287	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 9-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630288	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 10-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630289	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 11-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630291	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 12-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630292	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 13-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630293	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 14-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630296	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 15-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630297	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 16-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630298	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 17-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630299	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 18-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630300	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 19-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630302	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 20-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630304	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 21-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630305	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 22-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630306	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 23-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630307	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 24-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630308	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 25-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630312	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 26-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630314	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 27-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630315	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 28-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630316	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 29-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630317	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 30-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630318	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 31-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630319	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 32-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630322	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 33-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630323	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 34-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630324	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 35-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630325	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 36-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630326	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 37-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630327	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 38-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630328	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 39-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630329	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 40-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630330	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 41-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630332	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 42-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630333	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 43-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630336	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 44-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630337	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 45-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630338	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 46-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630339	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 47-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630340	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 48-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630341	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 49-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630342	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 50-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630343	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 51-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630344	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 52-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630345	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 53-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630346	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 54-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630348	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 55-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630349	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 56-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630350	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 57-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630351	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 58-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630352	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 59-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630353	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 60-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630354	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 61-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630355	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosures Introduction	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630369	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information), Rev. 2 - Packing Slip	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630370	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 1-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630371	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 2-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630372	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 3-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630373	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 4-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630374	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 5-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630375	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 6-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630376	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 7-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630377	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 8-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630378	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 9-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630380	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 10-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/21/2010	ML103630381	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 11-Appendix E-LaboratoryTest Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/21/2010	ML103630382	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 12-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630383	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 13-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630384	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 14-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630385	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 15-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630386	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 16-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630388	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 17-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630389	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 18-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630390	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 19-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/21/2010	ML103630391	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 20-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630392	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 21-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630393	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 22-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630394	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 23-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/21/2010	ML103630395	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 4, Part 1-Appendix F-RCTS Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/21/2010	ML103630396	FPL - Turkey Point Units 6 & 7 COLA (Enclosures), Rev. 2 - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 4, Part 2-Appendix G-Groundwater Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/22/2010	ML110030216	2010/12/22 Turkey Point COL Hearing - Draft RAI 5309 related to SRP Section 02.03.02 - Local Meteorology for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/22/2010	ML110030217	2010/12/22 Turkey Point COL Hearing - Draft RAI 5310 related to SRP Section 02.03.03 - Onsite Meteorological Measurements Program for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/22/2010	ML110030218	2010/12/22 Turkey Point COL Hearing - Draft RAI 5308 related to SRP Section 02.03.01 Regional Climatology for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/22/2010	ML110030221	2010/12/22 Turkey Point COL Hearing - Draft RAI 5191 related to SRP Section 02.03.05 - Long-Term Atmospheric Dispersion Estimates for Routine Releases for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
12/22/2010	ML12240A310	NOAA NMFS 2010 Sand Tiger Shark, TN190.	Database File Environmental Monitoring Report	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
12/31/2010	ML12192A251	DOT (U.S. Department of Transportation). 2010. National Transportation Statistics 2010. Bureau of Transportation Statistics, Washington, D.C. N408.	Report, Miscellaneous	US Dept of Transportation (DOT)	NRC/NRO	05200040 05200041
12/31/2010	ML12198A094	SFWMD (South Florida Water Management District). 2005. South Dade Wetlands Conceptual Land Management Plan 2005 -	Environmental Protection Plan	South Florida Water Management District	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		2010. West Palm Beach, Florida. TN217.				
12/31/2010	ML12198A160	FWS (U.S. Fish and Wildlife Service). 2010. Cape Sable Seaside Sparrow (Ammodramus maritimus mirabilis) 5-Year Review: Summary and Evaluation. South Florida Ecological Services Field Office, Vero Beach, Florida. TN256.	Environmental Report	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
1/4/2011	ML110050107	2011/01/04 Turkey Point COL Hearing - RE: Reading Room Access for Steve Breithaupt	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
1/4/2011	ML110050109	2011/01/04 Turkey Point COL Hearing - Reading Room Access for Steve Breithaupt	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
1/6/2011	ML110060791	2011/01/06 Turkey Point COL Hearing - FW: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 009 RELATED TO SRP SECTION 09.02.04- POTABLE AND SANITARY WATER SYSTEM FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		AND 7 COMBINED LICENSE APPLICATION				
1/6/2011	ML110070006	2011/01/06 Turkey Point COL Hearing - Availability week of January 24	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
1/7/2011	ML110100019	2011/01/07 Turkey Point COL Hearing - Forwarding Draft RAI From the Corps of Engineers - RAI 5340, Question 19746	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
1/7/2011	ML110100249	2011/01/07 Turkey Point COL Hearing - Forwarding Draft RAI From the Corps of Engineers - RAI 5340, Question 19746	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
1/7/2011	ML110100251	2011/01/07 Turkey Point COL Hearing - Re: Forwarding Draft RAI From the Corps of Engineers - RAI 5340, Question 19746	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
1/7/2011	ML110110003	2011/01/07 Turkey Point COL Hearing - Re: Forwarding Draft RAI From the Corps of Engineers - RAI 5340, Question 19746	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
1/11/2011	ML110110682	2011/01/11 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 013 RELATED TO SRP SECTION 02.03.01- REGIONAL CLIMATOLOGY FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
1/11/2011	ML110110720	2011/01/11 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 014 RELATED TO SRP SECTION 02.03.02- LOCAL METEOROLOGY FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
1/11/2011	ML110110722	2011/01/11 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 015 RELATED TO SRP SECTION 02.03.03 FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
1/11/2011	ML110110758	2011/01/11 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 016 RELATED TO SRP SECTION 02.03.05 FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
1/11/2011	ML110120014	2011/01/11 Turkey Point COL Hearing - FW: Conference call notes for confirmation	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
1/11/2011	ML110190008	2011/01/11 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 016 RELATED TO SRP SECTION 02.03.05 FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
1/11/2011	ML110190009	2011/01/11 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 015 RELATED TO SRP SECTION 02.03.03 FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
1/12/2011	ML110180236	Turkey Point, Units 6 and 7 - Schedule for Response to NRC Request for Additional Information Letter No. 010 (eRAI 5233) - Standard Review Plan Section 02.04.05 Probable Maximum Surge and Seiche Flooding.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
1/14/2011	ML14219A465	TN1317 - Bellmund, S. 2011. Biscayne Bay Salinity Presentation to The Biscayne Bay Regional Restoration Coordination Team, January 14, 2011. Biscayne National Park, Homestead, Florida.	Slides and Viewgraphs	Biscayne Bay Restoration Review Coordination Team	NRC/NRO	05200040 05200041
1/21/2011	ML11195A028	2011/01/21 Turkey Point COL Hearing - Draft RAI 5192 related to SRP Section 09.05.02 Communication Systems for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
1/26/2011	ML11195A029	2011/01/26 Turkey Point COL Hearing - Draft RAI 5351 related to SRP Section 09.05.01 - Fire Protection Program for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
1/26/2011	ML14309A107	FWS 2011 - TN3103-Archie Carr National Wildlife Refuge.	FACT Sheet	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
1/27/2011	ML14309A105	FWS 2011 - TN2993-USFWS 2014 Lake Wales.	FACT Sheet	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
1/31/2011	ML110280293	Inspection of Florida Power & Light Company, Turkey Point Units 6 & 7, Quality Assurance Program Implementation.	Letter	NRC/NRO/DCI P/CQVP	Florida Power & Light Co	05200040 05200041
1/31/2011	ML110330170	Proposed Turkey Point, Units 6 & 7 - Response to NRC Request for Additional Information Letter No. 012 (eRAI 5191) Standard Review Plan Section 07.05 - Information Systems Important to Safety.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
1/31/2011	ML110330171	Proposed Turkey Point, Units 6 & 7 - Schedule for Response to NRC Request for Additional Information Letter No. 011 (eRAI 5190) - Standard Review Plan Section 02.04.12 Groundwater.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
1/31/2011	ML110330172	Turkey Point, Units 6 & 7, Proposed Roadmap of Changes in Combined License Application, Revision 2.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
1/31/2011	ML14267A007	TN1330 - USACE/SFMWD (U.S. Army Corps of Engineers/South Florida Water Management District). 2011. Central and Southern Florida Project Comprehensive Everglades Restoration Plan C-111 Spreader Canal Western Project Final Integrated Project.....	Environmental Impact Statement	State of FL, Water Management District US Dept of the Army, Corps of Engineers, Jacksonville District	NRC/NRO	05200040 05200041
2/1/2011	ML110330126	2011/02/01 Turkey Point COL Hearing - RAI 110131, Corps RAI related to alternatives	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/1/2011	ML110330127	2011/02/01 Turkey Point COL Hearing - Corps RAI	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/2/2011	ML110330476	02/16/2011 - Notice of Public Meeting Regarding the Groundwater Model for the Turkey Point, Units 6 & 7 Combined License Application.	Letter Meeting Agenda Meeting Notice	NRC/NRO/DS ER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041
2/2/2011	ML110340003	2011/02/02 Turkey Point COL Hearing - RE: RAI 5340 Due Date	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/2/2011	ML110340004	2011/02/02 Turkey Point COL Hearing - RAI 5340 Due Date	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/2/2011	ML110340005	2011/02/02 Turkey Point COL Hearing - RE: RAI 5340 Due Date	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
2/2/2011	ML110750161	2011/02/02 Turkey Point COL Hearing - RE: Information for FPL Radial well impacts model	E-Mail	Battelle Memorial Institute, Pacific Northwest National Lab	NRC/NRO US Dept of Interior, Geological Survey (USGS)	05200040 05200041
2/3/2011	ML110350654	2011/02/03 Turkey Point COL Hearing - RE: HP Documents Still Missing From The Electronic Reading Room	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/3/2011	ML110350655	2011/02/03 Turkey Point COL Hearing - HP Documents Still Missing From The Electronic Reading Room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/4/2011	ML110350650	2011/02/04 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 017 RELATED TO SRP SECTION 09.05.02 FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/4/2011	ML110350651	2011/02/04 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 018 RELATED TO SRP SECTION 09.05.01 FOR THE TURKEY POINT	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION				
2/4/2011	ML110380046	2011/02/04 Turkey Point COL Hearing - RE: HP Documents Still Missing From The Electronic Reading Room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/7/2011	ML110380520	02/24/2011 Revised Notice of Public Meeting Regarding the Groundwater Model for the Turkey Point, Units 6 and 7 Combined License Application.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DS ER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041
2/7/2011	ML110400598	2011/02/07 Turkey Point COL Hearing - RE: NRC Groundwater Meeting	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/7/2011	ML110400599	2011/02/07 Turkey Point COL Hearing - RE: NRC Groundwater Meeting	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/7/2011	ML110400600	2011/02/07 Turkey Point COL Hearing - RE: Logistics for 2/24/11 Meeting on the Revised Groundwater Model	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/7/2011	ML110400601	2011/02/07 Turkey Point COL Hearing - Logistics for 2/24/11 Meeting on the Revised Groundwater Model	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
2/8/2011	ML110410383	2011/02/08 Turkey Point COL Hearing - RE: Environmental Review of the FPL Proposal for Turkey Point Units 6 and 7	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/8/2011	ML11131A211	2011/02/08 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 018 RELATED TO SRP SECTION 09.05.01 FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/8/2011	ML12220A408	Miami-Dade Water and Sewer District South District WWTP, 2010 Annual Effluent Analysis, Letter to FDEP dated February 8, 2011.	Letter	Miami Dade Water & Sewer-South	State of FL, Dept of Environment al Protection NRC/NRO	05200040 05200041
2/9/2011	ML110410384	2011/02/09 Turkey Point COL Hearing - RE: Environmental Review of the FPL Proposal for Turkey Point Units 6 and 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/9/2011	ML110410386	2011/02/09 Turkey Point COL Hearing - February 24 Public Meeting on the Groundwater Model	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
2/9/2011	ML110410437	Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 015 (eRAI 5310) Standard Review Plan Section 02.03.03 - Onsite Meteorology Measurement Programs.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
2/9/2011	ML110410444	Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 016 (eRAI 5311) Standard Review Plan Section 02.03.05 - Long Term Atmospheric Dispersion Estimates for Routine Releases.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
2/9/2011	ML110410565	Proposed Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 014 (eRAI 5309) Standard Review Plan Section 02.03.02 - Local Meteorology.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
2/9/2011	ML110410567	Proposed Turkey Point, Units 6 & 7, Response to NRC Request for Additional Information Letter No. 013 (eRAI 5308) Standard Review Plan Section 02.03.01 - Regional Climatology.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
2/9/2011	ML14287A752	TN1471 - FPL (Florida Power and Light) 2011 "Table 4-MDC-D-11: Tree Survey." Golder Associates, Inc., Jacksonville, Florida.	FACT Sheet	Florida Power & Light Co Golder Associates, Inc	NRC/NRO	05200040 05200041
2/9/2011	ML14287A760	TN1473 - Stabenau, E. 2012 Biscayne Bay Simulation Model Based Analysis On the potential impact of the proposed Turkey Point radial collector wells, Updated.	FACT Sheet Meeting Briefing Package/Handouts Slides and Viewgraphs	US Dept of Interior, National Park Service, South Florida Natural Resources Ctr	NRC/NRO	05200040 05200041
2/10/2011	ML110470171	2011/02/10 Turkey Point COL Hearing - Forwarding Draft RAIs 5480, 5481, and 5482	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/14/2011	ML110470172	2011/02/14 Turkey Point COL Hearing - RE: T E N T A T I V E Draft RAIs 5480-5481-5482 Clarification Call w/NRC	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/15/2011	ML12192A238	FPL (Florida Power & Light Company). 2011. Stormwater Management Plan and Calculations. Golder Associates Inc., Jacksonville, Florida. TN303.	Environmental Impact Statement Calculation	Florida Power & Light Co Golder Associates, Inc	NRC/NRO	05200040 05200041
2/16/2011	ML110470173	2011/02/16 Turkey Point COL Hearing - Forwarding Draft RAI 5498 -	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Meteorology, EIS Section 5.7				
2/17/2011	ML110610070	2011/02/17 Turkey Point COL Hearing - Attendee's for the 2/24/11 Groundwater Presentation, 1 to 3 pm	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/18/2011	ML110610054	2011/02/18 Turkey Point COL Hearing - RE: Noted from DERM	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/18/2011	ML110610071	2011/02/18 Turkey Point COL Hearing - 2/24/11 Groundwater Presentation	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/18/2011	ML110610072	2011/02/18 Turkey Point COL Hearing - NPS concerns about possible impacts to wading birds from FPL TP east corridor transmission lines	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/24/2011	ML110530074	Groundwater Model Update by Florida Power and Light, Turkey Point, Units 6 & 7, for February 24, 2011 Public Meeting.	Slides and Viewgraphs Meeting Briefing Package/Handouts	Florida Power & Light Co	NRC/NRO	05200040 05200041
2/24/2011	ML110610074	2011/02/24 Turkey Point COL Hearing - RE: FPL Telephone Attendees for Public Meeting on Groundwater Model	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/24/2011	ML110610075	2011/02/24 Turkey Point COL Hearing - FPL Telephone Attendees for	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Public Meeting on Groundwater Model				
2/24/2011	ML110960843	2011/02/24 Turkey Point COL Hearing - questions about the groundwater model	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/24/2011	ML11131A200	2011/02/24 Turkey Point COL Hearing - FW: TP Site Audit	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/25/2011	ML110610073	2011/02/25 Turkey Point COL Hearing - RE: FPL Telephone Attendees for Public Meeting on Groundwater Model	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/28/2011	ML110610076	2011/02/28 Turkey Point COL Hearing - RE: Groundwater Model Calculation Package	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
2/28/2011	ML110610077	2011/02/28 Turkey Point COL Hearing - Groundwater Model Calculation Package	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
2/28/2011	ML110610686	Turkey Point, Units 6 and 7, Response to NRC Request For Additional Information Letter No. 010 (eRAI 5233) Standard Review Plan Section 02.04.05 - Probable Maximum Surge and Seiche Flooding.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
2/28/2011	ML110610723	Proposed Turkey Point Units 6 and 7, NRC June 2010 Environmental Audit Submittal of Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Revision 1.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
2/28/2011	ML110610724	Turkey Point, Units 6 & 7, Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Revision 1, Cover through Page 65 of 132.	Environmental Report	Bechtel Power Corp	NRC/NRO	05200040 05200041
2/28/2011	ML110610726	Turkey Point, Units 6 & 7, Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Revision 1, Page 66 of 132 through End.	Environmental Report	Bechtel Power Corp	NRC/NRO	05200040 05200041
2/28/2011	ML14287A458	TN1437 - Miami-Dade County. 2011. Safety Studies at High Crash Locations Countywide. Public Works Department, Traffic Engineering Division, Miami, Florida.	Report, Miscellaneous	Miami-Dade County, FL, Public Works Department	NRC/NRO/D NRL/EPB	05200040 05200041

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2/28/2011	ML14336A334	FPL 2011 - TN495-FPL 2011 Round 4 Completeness Responses.	Report, Technical	Florida Power & Light Co	NRC/NRO	05200040 05200041
3/1/2011	ML110601020	Environmental Request for Additional Information Letter 1102231 Related to ESRP Section 2.7, Cultural Resource, for The Combined License Application Review for Turkey Point, Units 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
3/1/2011	ML110601062	Environmental Request for Additional Information Letter 1102232 Related to ESRP Section 9.3.1, Site Selection Process, for the Combined License Application Review for Turkey Point, Units 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
3/1/2011	ML110601071	Environmental Request for Additional Information Letter 1102233 Related to ESRP Section 3.1, External Appearance and Plant Layout, for the combined License Application Review for Turkey Point, Units 6 & 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
3/1/2011	ML110610133	2011/03/01 Turkey Point COL Hearing - Forwarding Draft RAIs 5561, 5563, and 5570	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
3/1/2011	ML12193A196	SFWMD (South Florida Water Management District). 2011. C-111 Spreader Canal and Biscayne Bay Coastal Wetlands Project Updates. West Palm Beach, Florida. Accessed November 28, 2011 TN96.	Environmental Impact Statement	South Florida Water Management District	NRC/NRO/D NRL/EPB1	05200040 05200041
3/2/2011	ML110620652	2011/03/02 Turkey Point COL Hearing - RE: Groundwater Model Calculation Package	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
3/2/2011	ML110620653	2011/03/02 Turkey Point COL Hearing - Forwarding Draft RAI 5562	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/2/2011	ML110620655	2011/03/02 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1102233 RELATED TO ESRP SECTION 3.1, EXTERNAL APPEARANCE AND PLANT LAYOUT, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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3/2/2011	ML110620658	2011/03/02 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1102232 RELATED TO ESRP SECTION 9.3.1, SITE SELECTION PROCESS, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/2/2011	ML110620659	2011/03/02 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1102231 RELATED TO ESRP SECTION 2.7, CULTURAL RESOURCES, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/2/2011	ML110620660	2011/03/02 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1102231 RELATED TO	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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		ESRP SECTION 2.7, CULTURAL RESOURCES, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7				
3/2/2011	ML110620661	2011/03/02 Turkey Point COL Hearing - FW: NRC/FPL Dose Calculation Groundwater Intrusion Event	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
3/2/2011	ML110620662	2011/03/02 Turkey Point COL Hearing - FW: FPL Letter L-2011-082 dated 02/28/2011 - Submittal of the Groundwater Model Report Revision 1	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
3/2/2011	ML110660151	Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 018 (eRAI 5351) Standard Review Plan Section: 09.05.01 - Fire Protection Program.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
3/3/2011	ML110630008	2011/03/03 Turkey Point COL Hearing - Forwarding Draft RAI 5594-Non-Radiological Health	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/3/2011	ML110630009	2011/03/03 Turkey Point COL Hearing - Forwarding Draft RAI 5595-Non-Radiological Waste	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
3/9/2011	ML110680020	Environmental Request for Additional Information Letter 1103091 Related to ESRP Section 5.3.4, Non-Radiological Health, for the Combined License Application Review for Turkey Point, Units 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
3/9/2011	ML110680022	Environmental Request for Additional Information Letter 1103092 Related to ESRP Section 3.4.4, Nonradioactive Waste Systems, for the Combined License Application Review for Turkey Point, Units 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
3/9/2011	ML110680053	Environmental Request for Additional Information Letter 1103093 Related to ESRP Section 2.2, Land Use, for the Combined License Application Review for Turkey Point, Units 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
3/9/2011	ML110680062	Environmental Request for Additional Information Letter 1103094 Related ESRP Section 9.3, Alternative Sites, for the Combined License Application Review for Turkey Point, Units 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
3/9/2011	ML110690007	2011/03/09 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1103094 RELATED TO ESRP SECTION 9.3, ALTERNATIVE SITES, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/9/2011	ML110690008	2011/03/09 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1103093 RELATED TO ESRP SECTION 2.2, LAND USE, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/9/2011	ML110690009	2011/03/09 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1103092 RELATED TO ESRP SECTION 3.4.4,	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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		NONRADIOACTIVE WASTE SYSTEMS, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7				
3/9/2011	ML110690010	2011/03/09 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1103091 RELATED TO ESRP SECTION 5.3.4, NON-RADIOLOGICAL HEALTH, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/9/2011	ML110690011	2011/03/09 Turkey Point COL Hearing - RE: NRC/FPL PTN 6 & 7 COLA Update Call: [NEW CONFERENCE LINE PHONE NUMBER]	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
3/9/2011	ML110690012	2011/03/09 Turkey Point COL Hearing - RE: NRC/FPL PTN 6 & 7 COLA Update Call: [NEW CONFERENCE LINE PHONE NUMBER]	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
3/10/2011	ML110690002	Environmental Request for Additional Information Letter 1103101 Related to ESRP Section 2.4.1, Terrestrial and Wetlands Ecology, for the Combined License Application Review for Turkey Point, Unit 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
3/10/2011	ML110690003	Environmental Request for Additional Information Letter 1103102 Related to ESRP Section 2.5, Socioeconomics, for the Combined License Application Review for Turkey Point, Unit 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
3/10/2011	ML110730036	2011/03/10 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1103102 RELATED TO ESRP SECTION 2.5, SOCIOECONOMICS, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
3/10/2011	ML110730037	2011/03/10 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1103101 RELATED TO ESRP SECTION 2.4.1, TERRESTRIAL AND WETLANDS ECOLOGY, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/11/2011	ML102030501	Invitation To Become A Cooperating Agency For The U.S. Nuclear Regulatory Commission's Environmental Impact Statement For Florida Power And Light Company Combined License Application For Turkey Point, Units 6 and 7, Miami-Dade County, Florida.	Letter	NRC/NRO/DS ER/RAP2	US Dept of Interior, National Park Service	05200040 05200041
3/14/2011	ML110620060	Meeting Summary of February 24, 2011, Category 3 Public Meeting with the Florida Power and Light Company to Discuss the Revised Groundwater Model for the Turkey Point Units 6 and 7 Combined License Application.	Memoranda Meeting Agenda Meeting Summary	NRC/NRO/DS ER/RAP2	NRC/NRO/D SER/RAP2	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
3/14/2011	ML110740010	2011/03/14 Turkey Point COL Hearing - Groundwater I/O Files Hard Drives	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
3/15/2011	ML110750167	2011/03/15 Turkey Point COL Hearing - Forwarding Draft RAI 5588-Alternatives - Process	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/15/2011	ML110750169	2011/03/15 Turkey Point COL Hearing - Forwarding Draft RAI 5588-Alternatives - Site-Specific Items	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/15/2011	ML110811357	2011/03/15 Turkey Point COL Hearing - RAI email list	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
3/17/2011	ML110810929	Turkey Point, Units 6 & 7, Response to NRC Request for Additional Information eRAI 5340 Revision 1 Standard Review Plant Section: EIS USACE - US Army Corps of Engineers Application Section: 9.3.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
3/17/2011	ML110820044	2011/03/17 Turkey Point COL Hearing - FPL Letter L-2011-085 dated 03-17-2011	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
3/17/2011	ML110820046	2011/03/17 Turkey Point COL Hearing - FW: L-2011-098 dated 03-17-2011 Submittal of Groundwater Flow Model (MODFLOW) Calculation Revision 4 Input/Output Files	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
3/17/2011	ML110830787	Turkey Point Units 6 and 7 - Proposed, NRC June 2010 Environmental Audit Submittal of Groundwater Flow Model (MODFLOW) Calculation Revision 4 Input/Output Files.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
3/17/2011	ML14328A471	USCB - 2011 - TN472 - Census 2010.	FACT Sheet Press Release	US Dept of Commerce, Bureau of Census	NRC/NRO	05200040 05200041
3/18/2011	ML110800598	Proposed Turkey Point Units 6 and 7, Revised Response to NRC Request for Additional Information Letter No. 012 (eRAI5191) Standard Review Plan Section 07.05 - Information Systems Important to Safety.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
3/22/2011	ML110811354	2011/03/22 Turkey Point COL Hearing - FW: Turkey Point emails related to reference list	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/22/2011	ML110811356	2011/03/22 Turkey Point COL Hearing - FW: Turkey Point-USGS correspondence regarding RAIs-public	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/22/2011	ML110820043	2011/03/22 Turkey Point COL Hearing - Scheduling Alternatives RAIs Clarification Call	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
3/22/2011	ML110820960	Turkey Point, Units 6 & 7, Updated Administrative Contact Information.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
3/22/2011	ML110840025	Turkey Point Units 6 & 7, Response To Request For Additional Information 02.04.05-1, Letter No. 010, Probable Maximum Surge And Seiche Flooding.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
3/22/2011	ML11131A213	2011/03/22 Turkey Point COL Hearing - RE: FPL Letter L-2011-112 dated 03-22-2011 - Updated Administrative Contact Information	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/22/2011	ML11131A214	2011/03/22 Turkey Point COL Hearing - FPL Letter L-2011-112 dated 03-22-2011 - Updated Administrative Contact Information	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
3/23/2011	ML110871104	2011/03/23 Turkey Point COL Hearing - RE: Scheduling Alternatives RAls Clarification Call	E-Mail	Florida Power & Light Co	NRC/NRO/D NRL/NWE1	05200040 05200041
3/23/2011	ML110871107	2011/03/23 Turkey Point COL Hearing - RE: Scheduling Alternatives RAls Clarification Call	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/28/2011	ML14342A036	Terzagian 2011 - TN998 - FLDOH 2011 PAM - Naegleria Fowleri Summary.	Environmental Impact Statement	State of FL, Dept of Health	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
3/30/2011	ML110900004	2011/03/30 Turkey Point COL Hearing - Clarification Call for Alternatives RAIs	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
3/31/2011	ML12212A063	FWCC (Florida Fish and Wildlife Conservation Commission). 2011. Supplemental Information for the Everglades Mink Biological Status Review Report. Tallahassee, Florida.	Environmental Impact Statement	State of FL, Fish and Wildlife Conservation Commission	NRC/NRO/D NRL/EPB1	05200040 05200041
4/4/2011	ML110900071	IR 05200041-11-201 and Notice of Violation, on 02/28/11 through 03/04/11, Florida Power & Light Company.	Inspection Report Letter Notice of Violation	NRC/NRO/DCI P/CQVP	Florida Power & Light Co	05200040 05200041
4/6/2011	ML110960520	Environmental Request for Additional Information Letter 1104071 Related To ESRP Section 9.3.1, Alternative Site Selection Process, for the Combined License Application Review for Turkey Point, Units 6 And 7.	Letter Request for Additional Information (RAI)	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
4/6/2011	ML110980612	Turkey Point, Unit 6 & 7, Response to NRC Environmental Request for Additional Information Letter 1103094 (RAI 5563) Environmental Standard Review Plan Section 9.3 - Alternative Sites.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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4/6/2011	ML110980613	Turkey Point, Units 6 and 7, Response to Request for Additional Information 02.04.05-3, Letter No. 010 (eRAI 5233) Standard Review Plan Section 02.04.05 - Probable Maximum Surge and Seiche Flooding.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/6/2011	ML111010003	2011/04/06 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1104071 RELATED TO ESRP SECTION 9.3.1, ALTERNATIVE SITE SELECTION PROCESS, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/6/2011	ML111010004	2011/04/06 Turkey Point COL Hearing - L-2011-127 dated 04-06-2011, Response to NRC Environmental Request for Additional Information Letter 1103094 (RAI 5563) Environmental Standard Review Plan Section 9.3 - Alternative Sites	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

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4/6/2011	ML11131A175	2011/04/06 Turkey Point COL Hearing - Turkey Point Calculations	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/6/2011	ML11131A212	2011/04/06 Turkey Point COL Hearing - Turkey Point Calculations	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/7/2011	ML110970500	2011/04/07 Turkey Point COL Hearing - Turkey Point Calculations	E-Mail	NRC/NRO/DN RL/NWE1	NRC/NRO/D NRL/NWE1	05200040 05200041
4/7/2011	ML11132A120	2011/04/07 Turkey Point COL Hearing - Turkey Point Calculations	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/8/2011	ML14345B000	TN1801 USGS Hydro Internet Map Service Data Library.	Environmental Impact Statement	US Dept of Interior, Geological Survey (USGS)	NRC/NRO	05200040 05200041
4/11/2011	ML111020020	2011/04/11 Turkey Point COL Hearing - Turkey Point and Sea Level Rise & storm events	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/11/2011	ML111020021	2011/04/11 Turkey Point COL Hearing - FW: Article on Turkey Point and Sea Level Rise & storm events	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/11/2011	ML111020022	2011/04/11 Turkey Point COL Hearing - Forwarding Draft RAI 5699-Compliance and Consultations	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
4/11/2011	ML12219A159	Letter to Florida Department of Environmental Protection dated April 11, 2012 -- Miami-Dade Water and Sewer District Annual Wastewater Stream Analysis South District Wastewater Treatment Plant, Permits 61787-022-UO and 61787-023-UC.	Letter Environmental Monitoring Report	Miami Dade Water & Sewer-South	NRC/NRO State of FL, Dept of Environmental Protection	05200040 05200041
4/11/2011	ML14309A106	FWS 2011- TN3101-Pelican Island National Wildlife Refuge.	FACT Sheet	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
4/12/2011	ML111010357	Environmental Request For Additional Information Letter 1104121 Related to ESRP Section 9.3, Alternative Sites, for the Combined License Application Review For Turkey Point, Units 6 And 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
4/12/2011	ML111030057	2011/04/12 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1104121 RELATED TO ESRP SECTION 9.3, ALTERNATIVE SITES, FOR THE COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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		REVIEW FOR TURKEY POINT, UNITS 6 AND 7				
4/12/2011	ML111030058	2011/04/12 Turkey Point COL Hearing - Forwarding Draft RAIs 5704, 5707, and 5708-Aquatic Ecology for Chapters 2, 4, and 9	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/12/2011	ML11131A168	2011/04/12 Turkey Point COL Hearing - Draft RAI 5405- related to SRP Section 10.04.05 - Circulating Water for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/12/2011	ML11131A169	2011/04/12 Turkey Point COL Hearing - Draft RAI 5679 related to SRP Section 13.03 - Emergency Planning for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/12/2011	ML11131A170	2011/04/12 Turkey Point COL Hearing - Subject: Draft RAI 5492 related to SRP Section 09.02.02 - Reactor Auxiliary Cooling Water Systems for the	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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		Turkey Point Units 6 and 7 combined license application.				
4/12/2011	ML11131A171	2011/04/12 Turkey Point COL Hearing - Draft RAI 5154 related to SRP Section 03.02.02 - System Quality Group Classification for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/12/2011	ML11131A172	2011/04/12 Turkey Point COL Hearing - Draft RAI 5403 related to SRP Section 09.02.02- Reactor Auxiliary Cooling System for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/12/2011	ML11131A174	2011/04/12 Turkey Point COL Hearing - Draft RAI 5643 related to SRP Section 02.04.12 - Groundwater for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/14/2011	ML11131A167	2011/04/14 Turkey Point COL Hearing - Draft RAI 5691 related to SRP Section 02.05.02 -Vibratory	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		ground motion for the Turkey Point Units 6 and 7 combined license application.				
4/15/2011	ML11108A139	Turkey Point, Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1102232 (RAI 5481 Rev. 2) Environmental Standard Review Plan Section 9.3.1 - 1 Site Selection Process.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/15/2011	ML11108A142	Turkey Point, Units 6 and 7 - 10 CFR 50.46 Annual Report for the AP1000 Standard Plant Design.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/15/2011	ML11108A146	Turkey Point, Units 6 and 7 - Response to NRC Environmental Request for Additional Information Letter 1102233 (eRAI 5482) Environmental Standard Review Plan, Section 3.1 - External Appearance and Plant Layout.	Letter Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/15/2011	ML11109A017	Attachment 1, FPL Response to NRC RAI No. 2.7-1 (eRAI 5480) Enclosure 1, Pages 52 - 104, Attachment 2: Photographs of the Site Conditions.	Photograph	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
4/15/2011	ML11109A018	Florida Power & Light Company - Turkey Point Units 6 and 7 - Response to NRC Request for Additional Information Letter 1102231 (eRAI 5480) Environmental Standard Review Plan Section 2.7 - Cultural Resources.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/15/2011	ML11109A019	Attachment 1, FPL Response to NRC RAI No. 2.7-1 (eRAI 5480) Enclosure 1, Cultural Resource Assessment Survey for the Turkey Point Units 6 & 7 Site, Associated Non-Linear Facilities, and Spoils Areas on Plant Property.	- No Document Type Applies	Florida Power & Light Co	NRC/NRO	05200040 05200041
4/15/2011	ML11109A021	Attachment 1, FPL Response to NRC RAI No. 2.7-1 (eRAI 5480) Enclosure 2, Cultural Resource Assessment Survey Work Plan for the Turkey Point Units 6 & 7 Site, Associated Non-Linear Facilities.	Operating Plan	Florida Power & Light Co Golder Associates, Inc Janus Research	NRC/NRO	05200040 05200041

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4/15/2011	ML11109A022	Attachment 1, FPL Response to NRC RAI No. 2.7-1 (eRAI 5480) Enclosure 3, Preliminary Cultural Resources Report for Turkey Point Units 6 & 7 Associated Linear Facilities [Redacted] & Enclosure 4: Cultural Resource Assessment Survey Work Plan [Redacted].	Operating Plan Report, Technical	Florida Power & Light Co Golder Associates, Inc Janus Research	NRC/NRO	05200040 05200041
4/15/2011	ML11116A066	2011/04/15 Turkey Point COL Hearing - FPL Letter L-2011-130 dated 04-15-2011	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/15/2011	ML11116A067	2011/04/15 Turkey Point COL Hearing - RE: FPL Letter L-2011-095 dated 04-15-2011	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/20/2011	ML11111A127	Turkey Point, Units, 6 and 7, Third Endorsement of Vogtle Electric Generating Plant Units 3 and 4 AP1000 R-COLA Standard Content Submittals.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/20/2011	ML11117A179	Proposed Turkey Point, Units 6 & 7, Response to NRC Environmental Request for Additional Information Letter 1103071 (RAI 5498) Environmental Standard Review Plan Section 5.7 - Meteorology and Air Quality Impacts.	Letter Map	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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4/20/2011	ML11117A229	2011/04/20 Turkey Point COL Hearing - L-2011-155 dated 04-20-2011 RAI Ltr 1103071 eRAI 5498 Response	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/21/2011	ML11117A230	2011/04/21 Turkey Point COL Hearing - L-2011-161 dated 04-21-1011 RAI Ltr 1103092 eRAI 5595 Response	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/21/2011	ML11122A054	Turkey Point, Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1103092 (RAI 5595) Environmental Standard Review Plan Section 3.4.4 - Non-Radioactive Waste Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/22/2011	ML111160378	Letter from National Park Service, Southeast Regional Office, Accepting the NRC Invitation to Become a Cooperating Agency for the Turkey Point Units 6 & 7 Combined License Environmental Impact Statement.	Letter	US Dept of Interior, National Park Service	NRC/NRO/D SER	05200040 05200041
4/25/2011	ML11115A094	2011/04/25 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 019 RELATED TO SRP SECTION 02.02.03	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED LICENSE APPLICATION				
4/25/2011	ML11116A006	2011/04/25 Turkey Point COL Hearing - Phone number for tomorrows call	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/25/2011	ML11116A160	Turkey Point Units 6 & 7, Response to NRC Environmental Request for Additional Information Letter 1103093 (RAI 5561) Environmental Standard Review Plan, Section 2.2 - Land Use.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/25/2011	ML11116A161	Turkey Point, Units 6 & 7, Response to NRC Environmental Request for Additional Information Letter 1103091 (RAI 5594) Environmental Standard Review Plan Section 5.3.4 - Non-Radiological Health.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/25/2011	ML11117A231	2011/04/25 Turkey Point COL Hearing - RE: RAI Call Tuesday - Are we on?	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/25/2011	ML11117A232	2011/04/25 Turkey Point COL Hearing - L-2011-157 Signed 04-25-2011 RAI Ltr 1103093 eRAI 5498 Response	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

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4/25/2011	ML11117A233	2011/04/25 Turkey Point COL Hearing - RE: L-2011-157 Signed 04-25-2011 RAI Ltr 1103093 eRAI 5561 Response	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/25/2011	ML11117A234	2011/04/25 Turkey Point COL Hearing - RE: Phone number for tomorrows call	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/25/2011	ML11117A236	2011/04/25 Turkey Point COL Hearing - L-2011-158 Signed 04-25-2011 RAI Ltr 1103091 eRAI 5594 Response	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/25/2011	ML11131A217	2011/04/25 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 019 RELATED TO SRP SECTION 02.05.02 FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/26/2011	ML11117A225	2011/04/26 Turkey Point COL Hearing - Forwarding Draft RAI 5565-Need for Power	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/26/2011	ML11117A226	2011/04/26 Turkey Point COL Hearing - RE: L-2011-163 Signed 04-26-2011 RAI Ltr 1103101 RAI 5562 Response	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
4/26/2011	ML11117A227	2011/04/26 Turkey Point COL Hearing - 2010 NEE Sustainability Report	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/26/2011	ML11117A228	2011/04/26 Turkey Point COL Hearing - RE: L-2011-163 Signed 04-26-2011 RAI Ltr 1103101 RAI 5562 Response	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
4/26/2011	ML11118A175	Letter from Florida Power and Light re: Response to NRC Environmental Request for Additional Information Letter 1103101 (RAI 5562) Environmental Standard Review Plan Section 2.4.1 - Terrestrial and Wetlands Ecology. Attachments 1 through 5.	- No Document Type Applies Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/26/2011	ML11118A177	Proposed Turkey Point, Units 6 and 7 - Response to NRC Environmental Request for Additional Information Letter 1103102 (RAI 5570) Environmental Standard Review Plan, Section 2.5 - Socioeconomics.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
4/26/2011	ML11122A002	2011/04/26 Turkey Point COL Hearing - RE: L-2011-163 Signed 04-26-2011 RAI Ltr 1103101 RAI 5562 Response	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
4/26/2011	ML111250079	Letter from U.S. Army Corps of Engineers, Jacksonville District, to NRC Forwarding a Request for Additional Information Related to the Environmental Review for the Combined License Application for Turkey Point Units 6 and 7.	Letter	US Dept of the Army, Corps of Engineers, Jacksonville District	NRC/NRO/D SER/RAP2	05200040 05200041
4/27/2011	ML111170533	Environmental Request for Additional Information Letter 1104271 Related to ESRP Section 1.5, Compliance and Consultations, for the Combined License Application Review for Turkey Point, Units 6 and 7.	Letter Request for Additional Information (RAI)	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041
4/27/2011	ML11117A284	2011/04/27 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR NO. 020 RELATED TO SRP SECTION 13.03 EMERGENCY PLANNING FOR THE TURKEY POINT UNITS 6 AND 7 COL APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
4/27/2011	ML11131A216	2011/04/27 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 020 RELATED TO SRP SECTION 03.03 FOR	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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		THE TURKEY POINT UNITS 6 AND 7 COL APPLICATION				
4/28/2011	ML11122A001	2011/04/28 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1104271 RELATED TO ESRP SECTION 1.5, COMPLIANCE AND CONSULTATIONS, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/3/2011	ML11124A004	2011/05/03 Turkey Point COL Hearing - Eenvironmental RAI 1104121 (eRAI 5589) Related to ESRP Section 9.3, Alternative Sites	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/4/2011	ML111230733	Environmental Request For Additional Information Letter 1105041 Related To ESRP Section 9.3, Alternative Sites, For The Combined License Application Review For Turkey Point, Units 6 And 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041

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5/4/2011	ML111240011	Environmental Request For Additional Information Letter 1105042 Related to ESRP Section 2.4.2, Aquatic Ecology, For the Combined License Application Review For Turkey Point, Units 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DSER/RAP2	Florida Power & Light Co	05200040 05200041
5/4/2011	ML111240013	Environmental Request For Additional Information Letter 1105043 Related to ESRP Section 4.3.2, Aquatic Impacts, For the Combined License Application Review For Turkey Point, Units 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DSER/RAP2	Florida Power & Light Co	05200040 05200041
5/4/2011	ML111250580	Proposed Turkey Point Units 6 and 7 - Reply to Notices of Violation 2011-201-01 and 2011-201-02.	Letter Licensee Response to Notice of Violation	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
5/4/2011	ML11125A017	2011/05/04 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1105042 RELATED TO ESRP SECTION 4.3, AQUATIC IMPACTS, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/DNRL/NWE1	05200040 05200041

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5/4/2011	ML11125A018	2011/05/04 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1105042 RELATED TO ESRP SECTION 2.4, AQUATIC ECOLOGY, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/4/2011	ML11125A019	2011/05/04 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1105041 RELATED TO ESRP SECTION 9.3, ALTERNATIVE SITES, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/5/2011	ML111240406	Environmental Request for Additional Information Letter 1105051 Related to ESRP Section 8.4, Assessment of Need for Power, for the Combined License Application Review for Turkey Point, Units 6 And 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DS ER/RAP2	Florida Power & Light Co	05200040 05200041

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5/5/2011	ML11129A002	2011/05/05 Turkey Point COL Hearing - Forwarding Draft RAls 5769 and 5770-Hydrology for Chapter 9	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/5/2011	ML11129A003	2011/05/05 Turkey Point COL Hearing - Forwarding Draft RAls 5766 and 5767-Hydrology for Chapter 5	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/5/2011	ML11129A004	2011/05/05 Turkey Point COL Hearing - Forwarding Draft RAls 5765 and 5768-Hydrology for Chapters 4 and 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/5/2011	ML11129A005	2011/05/05 Turkey Point COL Hearing - Forwarding Draft RAls 5763 and 5764-Hydrology for Chapters 2 and 3	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/5/2011	ML11129A006	2011/05/05 Turkey Point COL Hearing - ENVIRONMENTAL REQUEST FOR ADDITIONAL INFORMATION LETTER 1105051 RELATED TO ESRP SECTION 8.4, ASSESSMENT OF NEED FOR POWER, FOR THE COMBINED LICENSE APPLICATION REVIEW FOR TURKEY POINT, UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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5/5/2011	ML11129A058	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter No. 011 (eRAI 5190) Standard Review Plan Section 02.04.12 - Groundwater.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
5/10/2011	ML111260408	05/24/2011 Notice of Forthcoming Meeting with AP1000 Design-Centered Working Group (DCWG) to Discuss the Closure Plan for the AP1000 Piping Design Acceptance Criteria.	Meeting Notice Meeting Agenda Memoranda	NRC/NRO/DN RL/NWE1	NRC/NRO/D NRL/NWE1	05200014 05200015 05200018 05200019 05200022 05200023 05200025 05200026 05200027 05200028 05200029 05200030 05200040 05200041

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5/10/2011	ML111390647	05/24/2011 Revised Notice of Meeting With AP1000 Design-Centered Working Group (DCWG).	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/NWE1	NRC/NRO/D NRL/NWE1	05200014
						05200015
						05200018
						05200019
						05200022
						05200023
						05200025
						05200026
						05200027
						05200028
						05200029
						05200030
						05200040
5/11/2011	ML11131A215	2011/05/11 Turkey Point COL Hearing - Information needs	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
5/11/2011	ML11131A218	2011/05/11 Turkey Point COL Hearing - FW: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 019 RELATED TO SRP SECTION 02.05.02 FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION <a e.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/13/2011	ML111310647	05/25/11 & 05/26/11 Notice of Public Forthcoming Meetings With Florida Power And Light On Geology, Seismology, And Geotechnical Engineering.	Meeting Notice Meeting Agenda	NRC/NRO/DN RL/NWE1	NRC/NRO/D NRL/NWE1	05200040 05200041
5/13/2011	ML11133A391	2011/05/13 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 21 RELATED TO SRP SECTION 02.02.03 FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/13/2011	ML11149A017	2011/05/13 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 021 RELATED TO SRP 2.04.12 AND 2.4.13 GROUNDWATER FOR	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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		THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION				
5/16/2011	ML11136A069	2011/05/16 Turkey Point COL Hearing - FW: Forwarding Draft RAIs 5480, 5481, and 5482	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/16/2011	ML11136A070	2011/05/16 Turkey Point COL Hearing - FW: T E N T A T I V E Draft RAIs 5480- 5481-5482 Clarification Call w/NRC	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/16/2011	ML11136A071	2011/05/16 Turkey Point COL Hearing - FW: Forwarding Draft RAI 5498 - Meteorology, EIS Section 5.7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/16/2011	ML11136A072	2011/05/16 Turkey Point COL Hearing - FW: Progress of Geology	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/16/2011	ML11136A073	2011/05/16 Turkey Point COL Hearing - FW: Updated Contact Info for Rick Orthen - FPL	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/16/2011	ML11136A074	2011/05/16 Turkey Point COL Hearing - FW: Turkey Point, Units 6 and 7, Response to Request for Additional Information Letter No. 003 (eRAI 4808)	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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		Standard Review Plan Section 02.04.03 - Probable Maximum Flood. 09/02/2010				
5/17/2011	ML111370115	05/25/2011 - 05/26/2011 Notice of Cancelled Forthcoming Public Meeting With Florida Power and Light on Geology, Seismology, and Geotechnical Engineering.	Meeting Notice Memoranda	NRC/NRO/DN RL/NWE1	NRC/NRO/D NRL/NWE1	05200040 05200041
5/18/2011	ML11138A325	2011/05/18 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 022 RELATED TO SRP 9.2.2 REACTOR AUX. COOLING WATER SYSTEM FOR THE TURKEY POINT PLANT UNITS 6 AND 7	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/18/2011	ML11139A444	2011/05/18 Turkey Point COL Hearing - L-2011-174 Signed 05-18-11 ER Audit Items H13_AQ4 Response	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
5/18/2011	ML11143A090	Turkey Point, Units 6 & 7, Response to NRC Environmental Audit Data and Information Need Items AQ-4, H-13, H-23, H-31, H- 34, H-35, H-38, H-40, NR-6.	Letter	Florida Power & Light Co	NRC/Docum ent Control Desk NRC/NRO	05200040 05200041

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5/19/2011	ML111370387	Florida Power and Light Response to NRC Inspection Reports 05200040/2011-201 and 50200041/2011-201 Notice of Violation.	Letter	NRC/NRO/DCI P/CQVP	Florida Power & Light Co	05200040 05200041
5/19/2011	ML11139A328	2011/05/19 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 023 RELATED TO SRP 9.2.2 REACTOR AUX. COOLING WATER SYSTEM FOR THE TURKEY POINT PLANT UNITS 6 AND 7	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/19/2011	ML11139A467	2011/05/19 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 024 RELATED TO SRP 10.452 CIRCULATING WATER SYSTEM FOR THE TURKEY POINT PLANT UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/19/2011	ML11139A468	2011/05/19 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 024 RELATED TO SRP 10.04.05 CIRCULATING WATER SYSTEM FOR THE	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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		TURKEY POINT PLANT UNITS 6 AND 7				
5/19/2011	ML11149A005	2011/05/19 Turkey Point COL Hearing - FW: TP Documents available in the reading room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/19/2011	ML11149A015	2011/05/19 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 023 RELATED TO SRP SECTION 09.02.02 FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/19/2011	ML11149A016	2011/05/19 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 022 RELATED TO SRP SECTION 09.02.02 FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/19/2011	ML11153A004	2011/05/19 Turkey Point COL Hearing - Proposed Scheduling of Clarification Calls for dRAIs 5763 - 5770	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

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5/23/2011	ML11143A055	2011/05/23 Turkey Point COL Hearing - L-2011-188 Signed 05-23-2011 RAI Ltr 1104071 RAI 5588 First Response	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
5/23/2011	ML11145A041	Turkey Point, Units 6 and 7, First Response to NRC Environmental Request for Additional Information Letter 1104071 (RAI 5588) Environmental Standard Review Plan Section 9.3.1 - Alternative Site Selection Process.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
5/23/2011	ML11145A042	Proposed Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 020 (eRAI 5679) Standard Review Plan Section 13.03 -Emergency Planning.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
5/23/2011	ML11146A005	2011/05/23 Turkey Point COL Hearing - Miami-Dade Completeness QuestionsUnits6 & 7	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

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5/24/2011	ML111460084	Meeting Handouts for 5/24/11 - AP1000 DCWG Meeting to Discuss Piping DAC and Initial Test Program License Conditions.	Slides and Viewgraphs Meeting Briefing Package/Handouts	Southern Nuclear Operating Co, Inc Southern Co	NRC/NRO	05200014
						05200015
						05200018
						05200019
						05200022
						05200023
						05200025
						05200026
						05200027
						05200028
						05200029
						05200030
						05200040
						05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		and 7 combined license application				
5/25/2011	ML11149A012	2011/05/25 Turkey Point COL Hearing - REVISED: Draft RAI 5399 related to SRP Section 09.02.1- Station Service Water System for the Turkey Point Units 6 and 7 combined license application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/25/2011	ML11149A013	2011/05/25 Turkey Point COL Hearing - Draft RAI 5414 related to SRP Section 03.05.1.6- Aircraft hazard for the Turkey Point Units 6 and 7 combined license application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/25/2011	ML11149A014	2011/05/25 Turkey Point COL Hearing - Draft RAI 5399 related to SRP Section 09.02.1- Station Service Water System for the Turkey Point Units 6 and 7 combined license application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/25/2011	ML11153A076	2011/05/25 Turkey Point COL Hearing - FW: Ostadan Paper	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
5/27/2011	ML11151A188	2011/05/27 Turkey Point COL Hearing - L-2011-195 Signed 05-27-2011 RAI Ltr	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		1104121 RAI 5589 First Response				
5/27/2011	ML11151A189	2011/05/27 Turkey Point COL Hearing - Forwarding Draft RAI 5773-Corps Request for Alternative Transmission Line Route for Chapter 9	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/27/2011	ML11151A191	2011/05/27 Turkey Point COL Hearing - Forwarding Revisions to Draft RAIs 5763, 5765, 5766, 5768, and 5769, Hydrology for Chapters 2, 4, 5, 7, and 9	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/27/2011	ML11151A198	Turkey Point, Units 6 and 7, First Response to NRC Environmental Request for Additional Information Letter 1104121 (RAI 5589) Environmental Standard Review Plan Section 9.3 - Alternative Sites.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
5/29/2011	ML11153A016	2011/05/29 Turkey Point COL Hearing - FW: FPL Letter L-2011-196 dated 5/23/2011 - Response to NRC RAI Letter No. 020 (eRAI 5679) SRP Section 13.03 -Emergency Planning	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/29/2011	ML11153A017	2011/05/29 Turkey Point COL Hearing - FW: Some specifics regarding what the	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		geologists would like to see if possible				
5/29/2011	ML11153A070	2011/05/29 Turkey Point COL Hearing - FW: NRC NOV to FPL	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/29/2011	ML11153A071	2011/05/29 Turkey Point COL Hearing - FW: Draft RAI 5491 related to SRP Section 09.02.1- Station Service Water System for the Turkey Point Units 6 and 7 combined license application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/29/2011	ML11153A072	2011/05/29 Turkey Point COL Hearing - FW: Ostadan Paper	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/29/2011	ML11153A073	2011/05/29 Turkey Point COL Hearing - FW: info for Turkey Pt elect room	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/29/2011	ML11153A074	2011/05/29 Turkey Point COL Hearing - FW: Proposed Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 020 (eRAI 5679) Standard Review Plan Section 13.03 -Emergency Planning. 05/23/2011	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
5/29/2011	ML11153A077	2011/05/29 Turkey Point COL Hearing - FW: Ostadan Paper	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041

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5/29/2011	ML11153A078	2011/05/29 Turkey Point COL Hearing - FW: Need info for Turkey Pt	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/1/2011	ML11153A081	2011/06/01 Turkey Point COL Hearing - Draft RAI 5350 related to SRP Section 09.05.01-Fire Protection Program for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/1/2011	ML11153A095	2011/06/01 Turkey Point COL Hearing - FW: Proposed Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 020 (eRAI 5679) Standard Review Plan Section 13.03 -Emergency Planning. 05/23/2011	E-Mail	NRC/NSIR	NRC/NRO/D NRL/NWE1	05200040 05200041
6/2/2011	ML11153A079	2011/06/02 Turkey Point COL Hearing - Turkey Point reactor application	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/2/2011	ML11153A080	2011/06/02 Turkey Point COL Hearing - RE: Turkey Point calc report	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
6/2/2011	ML11154A024	2011/06/02 Turkey Point COL Hearing - Federal Register notice for Acquisition of FPL lands EIS	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
6/2/2011	ML11178A355	2011/06/02 Turkey Point COL Hearing - FW: Turkey Point calc report	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/3/2011	ML11157A123	Proposed Turkey Point, Units 6 & 7, Response to NRC Environmental Request for Additional Information Letter 1104271 (RAI 5699), Environmental Standard Review Plan Section EIS 1.5 - Compliance and Consultations.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
6/3/2011	ML11158A002	2011/06/03 Turkey Point COL Hearing - L-2011-214 Signed 06-03-2011 RAI Ltr 1104271 RAI 5699 Response	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041
6/3/2011	ML12269A221	FPL (Florida Power and Light Company). 2011. Conceptual Earthwork and Materials Disposal Plan. Juno Beach, Florida. TN1042.	Letter Report, Miscellaneous	Florida Power & Light Co	NRC/NRO/D NRL/EPB1	05200040 05200041
6/6/2011	ML11158A001	2011/06/06 Turkey Point COL Hearing - Notes from 110606 TP Hydro RAI Clarification Call	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/7/2011	ML11180A031	2011/06/07 Turkey Point COL Hearing - Re: Turkey Point reactor application	E-Mail	- No Known Affiliation	NRC/NRO/D NRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
6/8/2011	ML11159A203	2011/06/08 Turkey Point COL Hearing - FW: Requested Public Release - Florida and Redacted Miami-Dade/Monroe REP Plans	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/8/2011	ML11159A204	2011/06/08 Turkey Point COL Hearing - FW: Requested Public Release - Florida and Redacted Miami-Dade/Monroe REP Plans	E-Mail	NRC/NRO	NRC/NRO/D NRL/NWE1	05200040 05200041
6/8/2011	ML11160A071	Turkey Point, Units 6 and 7, Schedule for Response to NRC Request for Additional Information Letter No. 019 (eRAI 5691) - Standard Review Plan Section 02.05.02 Vibratory Ground Motion.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/10/2011	ML11178A010	2011/06/10 Turkey Point COL Hearing - L-2011-208 Signed 06-10-2011 RAI Ltr 1105041 RAI 5708 Response	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
06/13/2011	ML11166A051	Turkey Point, Units 6 and 7 - Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #1, #2 and #3.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
06/14/2011	ML11178A009	2011/06/14 Turkey Point COL Hearing - L-2011-218 Signed 06_14_2011 RAI Ltr 1105042 RAI 5704 Response	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
06/14/2011	ML11178A011	2011/06/14 Turkey Point COL Hearing - RE: L-2011-218 Signed 06_14_2011 RAI Ltr 1105042 RAI 5704 Response	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
06/16/2011	ML11175A138	2011/06/16 Turkey Point COL Hearing - Final RAI EIS 2.3 (RAI No. 5763) - Hydrology	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/20/2011	ML11172A285	Turkey Point, Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1105043 (RAI 5707) Environmental Standard Review Plan Section 4.3.2 - Aquatic Impacts.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
06/21/2011	ML11178A344	2011/06/21 Turkey Point COL Hearing - FW: Turkey Point 13.6 review- Telcon	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
06/23/2011	ML11178A352	2011/06/23 Turkey Point COL Hearing - FW: SUNSI review	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
06/28/2011	ML11180A004	2011/06/28 Turkey Point COL Hearing - Corrected Attachment 2 to FPL Letter L-2011-247	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/29/2011	ML11181A254	2011/06/29 Turkey Point COL Hearing - RE: FPL Letter L-2011-240 dated 6-29-2011- Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #4, #5, and #6	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
06/29/2011	ML11181A253	2011/06/29 Turkey Point COL Hearing - Corrected Copy L-2011-222 - Response to NRC Environmental Request for Additional Information Letter 1105051 (RAI 5565) Related to Environmental Standard Review Plan Section 8.4, Assessment of Need for Power	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
06/30/2011	ML14267A014	TN1361 - 110630- Excerpts from NREL 2010 Annual Wind Market Report.	Environmental Impact Statement Report, Technical	US Dept of Energy, Office of Scientific & Technical Information	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/05/2011	ML11186A958	2011/07/05 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 027 RELATED TO SRP 02.02.03 EVALUATION OF POTENTIAL ACCIDENTS FOR THE TURKEY POINT PLANT UNITS 6 AND 7	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
07/05/2011	ML11186A908	2011/07/05 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 026 RELATED TO SRP 02.02.03 EVALUATION OF POTENTIAL ACCIDENTS FOR THE TURKEY POINT PLANT UNITS 6 AND 7	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/06/2011	ML11198A015	2011/07/06 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 028 RELATED TO SRP 09.02.01 STATION SERVICE WATER SYSTEM FOR THE TURKEY POINT PLANT UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
07/06/2011	ML11187A283	2011/07/06 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 028 RELATED TO SRP 09.02.01 STATION SERVICE WATER SYSTEM FOR THE TURKEY POINT PLANT UNITS 6 AND 7	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/07/2011	ML11200A027	2011/07/07 Turkey Point COL Hearing - Second Response to NRC Environmental Request for Additional Information Letter 1103101 (RAI 5562) Environmental Standard Review Plan Section 2.4.1 - Terrestrial and Wetlands Ecology	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
07/07/2011	ML11195A164	Proposed Turkey Point Units 6 and 7, Second Response to NRC Environmental Request for Additional Information Letter 1103101 (RAI 5562) Environmental Standard Review Plan Section 2.4.1 - Terrestrial and Wetlands Ecology.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/12/2011	ML11228A168	Fluid Conductivity Temperature Log.	Graphics incl Charts and Tables Report, Miscellaneous Routine Status Report (Recurring Weekly/Monthly)	McNabb Hydrogeologic Consulting, Inc MV Geophysical	NRC/NRO State of FL, Dept of Environmental Protection	05200040 05200041
07/13/2011	ML11195A032	2011/07/13 Turkey Point COL Hearing - Deletion of Draft RAI 5847	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
07/18/2011	ML11199A015	2011/07/18 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO 30 RELATED TO SRP SECTION 02..4.06 FOR TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/20/2011	ML11206B439	2011/07/20 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR NO. 031 RELATED TO SRP SECTION 12.03 FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 CO	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
07/20/2011	ML11201A294	2011/07/20 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 032 RELATED TO SRP SECTION 19- FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 & 7 COL	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
07/22/2011	ML11207A159	Proposed Turkey Point Units 6 and 7 - Supplemental Response to NRC Request for Additional Information Letter No. 020 (eRAI 5679) Standard Review Plan	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Section 13.03 - Emergency Planning.				
07/26/2011	ML11212A004	2011/07/26 Turkey Point COL Hearing - Draft RAI 5908 related to SRP Section 02.03.01 - Regional Climatology for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRR	NRC/NRO/DN RL/NWE1	05200040 05200041
07/26/2011	ML11213A050	Turkey Point, Units 6 & 7, Schedule for Response to NRC Request for Additional Information Letter No. 025 (eRAI 5414) - Standard Review Plan Section 3.5.1.6 Aircraft Hazard.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/28/2011	ML11212A001	2011/07/28 Turkey Point COL Hearing - FPL Letter L-2011-285 Dated 07-28-2011 RAI Ltr 2011001 RAI 5770 Response	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
07/29/2011	ML11214A031	Turkey Point, Units 6 & 7, Response to NRC Environmental Request for Additional Information Letter 110614 (RAI 5764 Revision 2) Environmental Standard Review Plan Section 3.2.2 - Structures With a Major Environmental Interface.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
07/29/2011	ML11214A032	Proposed Turkey Point, Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 110614, (RAI 5763 Revision 2) Environmental Standard Review Plan Section 2.3 - Water.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/01/2011	ML11213A317	2011/08/01 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 033 RELATED TO SRP SECTION 14.03.10-EP-ITAAC FOR THE TURKEY POINT UNITS 6 AND 7 COL APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
08/01/2011	ML12195A316	GMFMC(Gulf of Mexico Fishery Management Council).2011.Final Amendment 10 to the Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and South Atlantic,Including Final EIS, Regulatory Impact Review, and Regulation TN 214.	Environmental Impact Statement	Gulf of Mexico, Fishery Management Council South Atlantic Fishery Management Council US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO/DN RL/EPB1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/03/2011	ML11235A682	FRN-Official Acknowledgement Receipt of COL for Turkey PT, Units 6 & 7.	Federal Register Notice	NRC/NRO/DNR L/NWE1		05200040 05200041
08/03/2011	ML11216A202	Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 024 (eRAI 5405) Standard Review Plan Section 10.04.05 Circulating Water System.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
08/03/2011	ML11216A218	Proposed Turkey Point, Units 6 and 7, Schedule for Response to NRC Request for Additional Information Letter No. 029 (eRAI 5491) - Standard Review Plan Section 09.02.01 Station Service Water System.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/12/2011	ML11228A165	Proposed Turkey Point Units 6 and 7, Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #10, #11, and #12.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
08/15/2011	ML11244A195	2011/08/15 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 034 RELATED TO SRP SECTION 02.03.01 FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
08/16/2011	ML14223A053	TN1357 - FPSC (Florida Public Service Commission) 2011 Notice of Proposed Agency Action Order Modifying and Approving Demand-Side Management Plan Docket No. 100155-EG, Order No. PSC-11-0346-PAA-EG.	FACT Sheet Legal-Order	State of FL, Public Service Commission	NRC/NRO/DN RL	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/17/2011	ML11231A241	Proposed Turkey Point, Units 6 & 7 - Schedule for Response to NRC Request for Additional Information Letter No. 030 (eRAI 5818) - Standard Review Plan Section 02.04.06 Probable Maximum Tsunami Flooding.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
08/18/2011	ML11241A001	2011/08/18 Turkey Point COL Hearing - L-2011-320 submittal of the UIC Intermediate Casing Setting Depth Recommendation	E-Mail	- No Known Affiliation	NRC/NRO/DNRL/NWE1	05200040 05200041
08/18/2011	ML11234A014	Submittal of Underground Injection Control Exploratory Well Intermediate Casing Setting Depth Recommendation.	Graphics incl Charts and Tables	Florida Power & Light Co	NRC/Document Control Desk	05200040
			Letter Report, Miscellaneous		NRC/NRO	05200041
08/18/2011	ML11234A015	Turkey Point Power Plant, Borehole Compensated SONIC with/ Variable Density Log.	Graphics incl Charts and Tables Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/19/2011	ML11234A268	Turkey Point, Units 6 and 7, Schedule for Response to NRC Request for Additional Information Letter No. 032 (eRAI 5889) - Standard Review Plan Section 19 Probabilistic Risk Assessment and Severe Accident Evaluation.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/29/2011	ML11242A189	Turkey Point, Units 6 & 7, Revision to the Response to NRC Request for Additional Information Letter No. 022 (eRAI 5403) - Standard Review Plan Section 09.02.02 Reactor Auxiliary Cooling Water System.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
08/31/2011	ML11244A001	2011/08/31 Turkey Point COL Hearing - L-2011-353 - Submittal of UIC Exploratory Well Weekly Construction Summaries - #13, #14, #15	E-Mail	- No Known Affiliation	NRC/NRO/DNRL/NWE1	05200040 05200041
08/31/2011	ML11250A035	Enclosure 3 to L-2011-353, Turkey Point, Units 6 & 7, Exploratory Well Project; Permit #0293962-001 - UC, Weekly Construction Summary #15 Dated August 19, 2011.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/31/2011	ML11245A200	Enclosure 1 to L-2011-353, Turkey Point, Units 6 & 7, Exploratory Well Project; Permit #0293962-001 - UC, Weekly Construction Summary #13 dated August 5, 2011.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041
09/06/2011	ML11250A001	2011/09/06 Turkey Point COL Hearing - L-2011-364 Dated September 6, 2011: Response to NRC Environmental RAI Letter 110614 (RAI 5763 Revision 2) ESRP Section 2.3 - Water	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
09/06/2011	ML11251A170	Turkey Point, Units 6 & 7 - TR-94 Armed Responder Matrix, Revision 0.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
09/12/2011	ML11256A002	2011/09/12 Turkey Point COL Hearing - FPL Turkey Point Uprate Annual Monitoring Report - August 2011	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/13/2011	ML11257A010	2011/09/13 Turkey Point COL Hearing - L-2011-378 Dated 13SEP11: Response to NRC Environmental RAI Letter 1104071 (RAI 5588) ESRP Section 9.3.1- Alternative Site Selection Process	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
09/13/2011	ML11258A156	Proposed Turkey Point Units 6 and 7 - Response to NRC Environmental Request for Additional Information Letter 110614 (RAI 5763 Revision 2) Environmental Standard Review Plan Section 2.3 - Water.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
09/14/2011	ML11259A054	Turkey Point, Units 6 and 7, Fourth Endorsement of Vogtle Electric Generating Plant, Units 3 and 4, AP1000 R-COLA Standard Content Submittals.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/15/2011	ML11277A217	2011/09/15 Turkey Point COL Hearing - Draft RAI 5993 related to SRP Section 08.02 - Offsite Power Systems for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
09/15/2011	ML11262A204	Proposed Turkey Point Units 6 and 7, Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #16, #17, and #18.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
09/15/2011	ML11259A237	Proposed Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 032 (eRAI 5889) Standard Review Plan Section 19 - Probabilistic Risk Assessment and Severe Accident Evaluation.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/16/2011	ML12212A064	FHWA (Federal Highway Administration). 2011. Annual Vehicle Distance Traveled in Miles and Related Data, Highway Statistics 2005 (Table VM-1). Office of Highway Policy Information, Washington, D.C TN639.	Environmental Impact Statement	US Dept of Transportation, Federal Highway Admin	NRC/NRO/DN RL/EPB1	05200040 05200041
09/21/2011	ML11277A206	2011/09/21 Turkey Point COL Hearing - Draft RAI 5995 related to SRP Section 08.03.01 - AC Power Systems (Onsite) for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
09/21/2011	ML11264A066	2011/09/21 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 36 RELATED TO SRP SECTION 02.04.05 FOR THE TURKEY POINT UNITS 6 AND 7	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		COMBINED LICENSE APPLICATION				
09/30/2011	ML11277A003	2011/09/30 Turkey Point COL Hearing - L-2011-395 Dated 30SEP11: Response to NRC Environmental RAI Letter 1104121 (RAI 5589) ESRP Section 9.3- Alternative Sites	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
09/30/2011	ML11276A099	Proposed Turkey Point Units 6 and 7, Response to NRC Environmental Request for Additional Information Letter 1104121 (RAI 5589) Environmental Standard Review Plan Section 9.3 - Alternative Sites.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/30/2011	ML11276A101	Proposed Turkey Point Units 6 and 7, Second Response to NRC Request for Additional Information Letter No. 035 (eRAI 5681) Standard Review Plan Section 13.03, Emergency Planning.	Letter Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/03/2011	ML11277A179	2011/10/03 Turkey Point COL Hearing - Draft RAI 5997 related to SRP Section 13.03 - Emergency Planning for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
10/03/2011	ML11277A180	2011/10/03 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 39 RELATED TO SRP 08.03.01- AC POWER SYSTEMS FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/03/2011	ML11277A178	2011/10/03 Turkey Point COL Hearing - Draft RAI 6006 related to SRP Section 02.05.04 -Stability of Subsurface materials and Foundations for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
10/03/2011	ML11277A181	2011/10/03 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 38 RELATED TO SRP 08.02- OFFSITE POWER SYSTEM FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
10/03/2011	ML11277A186	2011/10/03 Turkey Point COL Hearing - FW: Turkey Pt Response to RAI on construction worker dose	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/03/2011	ML11276A136	2011/10/03 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 039 RELATED TO SRP SECTION 08.03.01 FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
10/03/2011	ML11276A137	2011/10/03 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 038 RELATED TO SRP SECTION 08.02 FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/11/2011	ML11286A004	2011/10/11 Turkey Point COL Hearing - Submittal of L-2011-428 - Underground Injection Control Exploratory Well Weekly Construction Summaries - #19, #20, and #21	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
10/11/2011	ML11286A091	Proposed Turkey Point, Units 6 & 7, Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #19, #20, and #21.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/20/2011	ML11307A535	2011/10/20 Turkey Point COL Hearing - Draft RAI 5875 related to SRP Section 02.05.03 -Surface Faulting for the Turkey Point Units 6 and 7 combined license application	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/20/2011	ML11307A534	2011/10/20 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 41 RELATED TO SRP 02.05.01- FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/21/2011	ML11298A089	Turkey Point, Units 6 and 7, Response Schedule to NRC Request for Additional Information Letter No. 036 (eRAI 5860) SRP Section: 02.04.05 Probable Maximum Surge and Seiche Flooding.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/27/2011	ML11307A524	2011/10/27 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 43 RELATED TO SRP 02.05.03-SURFACE FAULTING FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DNRL/NWE1	05200040 05200041
10/27/2011	ML111040122	Issuance of a Revised Review Schedule for the Combined License Application Review for Turkey Point, Units 6 and 7.	Letter	NRC/NRO/DNRL	Florida Power & Light Co	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/28/2011	ML11304A201	Proposed Turkey Point, Units 6 & 7 - Response to NRC Request for Additional Information Letter No. 030 (eRAI 5818) Standard Review Plan Section 02.04-.06 Probable Maximum Tsunami Flooding.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/31/2011	ML11319A035	Turkey Point, Units 6 & 7 - Section 404(b)(1) Alternatives Analysis, 093-87652, October 2011.	Environmental Report	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/31/2011	ML11306A138	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter No. 038 (eRAI 5993) Standard Review Plan Section 08.02 - Offsite Power Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/31/2011	ML11306A139	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter No. 039 (eRAI 5995) Standard Review Plan Section 08.03.01 - AC Power Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
11/01/2011	ML11307A254	2011/11/01 Turkey Point COL Hearing - RE: FPL - NRC Telecon on USCB 2010 Updates <<PLACEHOLDER>>	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
11/02/2011	ML11307A520	2011/11/02 Turkey Point COL Hearing - FW: L-2011-460 Response and Response Schedule to NRC Request for Additional Information Letter No. 037 (eRAI 5896) SRP Section - 02.05.02 Vibratory Ground Motion	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/02/2011	ML11307A522	2011/11/02 Turkey Point COL Hearing - FW: L-2011-462 Response to NRC Request for Additional Information Letter No. 039 (eRAI 5995) Standard Review Plan Section 08.03.01 - AC Power Systems	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
11/02/2011	ML11307A297	2011/11/02 Turkey Point COL Hearing - FW: calculation numbers	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
11/02/2011	ML11307A517	2011/11/02 Turkey Point COL Hearing - FW: Turkey Point RAI 5997	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
11/02/2011	ML11307A299	2011/11/02 Turkey Point COL Hearing - FW: Draft RAI 5875 related to SRP Section 02.05.03 -Surface Faulting for the Turkey Point Units 6 and 7 combined license application	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/04/2011	ML11312A275	Proposed Turkey Point, Units 6 and 7, Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #22, #23, and #24.	Letter Report, Miscellaneous	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
11/10/2011	ML11319A036	Turkey Point, Units 6 & 7 - Figures 1.1-1 through 4.3-4.	Drawing	Florida Power & Light Co	NRC/NRO	05200040 05200041
11/14/2011	ML11237A086	Turkey Pt FRN Cover Letter.	Letter	NRC/NRO/DNR L/NWE1	Florida Power & Light Co	05200040 05200041
11/16/2011	ML12240A294	NOAA 2011 Biscayne Bay Bottlenose Dolphin Photo ID Project 2011 Weblink, TN182.	Database File	US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/16/2011	ML11321A318	Proposed Turkey Point, Units 6 and 7 - Response and Response Schedule to NRC Request for Additional Information Letter No. 040 (eRAI 6006) SRP Section - 02.05.04 Stability of Subsurface Materials and Foundations.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
11/16/2011	ML11321A319	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter No. 037 (eRAI 5896) SRP Section - 02.05.02 Vibratory Ground Motion.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
11/17/2011	ML11322A001	2011/11/17 Turkey Point COL Hearing - FW: L-2011-490 Dated 10NOV11: Revised Response Schedule for NRC Environmental RAI 5763 Revision 2	E-Mail	- No Known Affiliation	NRC/NRO/DNRL/NWE1	05200040 05200041
11/18/2011	ML14345A284	TN4121 - NRC 2011 Croc Fatality 11-18-11 Email.	E-Mail	NRC/NRO	- No Known Affiliation	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/21/2011	ML11236A136	Second 50.43a FRN for Lee-Harris-Levy-Turkey Point.	Federal Register Notice	NRC/NRO/DNR L/NWE1		05200022
						05200023
						05200018
						05200019
						05200029
						05200030
						05200040
11/28/2011	ML11334A028	Turkey Point, Units 6 and 7, Response to NRC Schedule Request for Additional Information Letter No. 043 (eRAI 5875) SRP Section - 02.05.03 Surface Faulting.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
11/29/2011	ML11342A040	2011/11/29 Turkey Point COL Hearing - map to PTN/Land Utilization Building	E-Mail	- No Known Affiliation	NRC/NRO/DNRL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/02/2011	ML11354A362	Enclosure 3 to L-2011-538, Turkey Point, Units 6 & 7, Exploratory Well Project; Permit #0293962-001-UC, Weekly Construction Summary #30 dated December 2, 2011 Through Page 124.	Graphics incl Charts and Tables Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041
12/05/2011	ML11341A023	Turkey Point Units 6 and 7: Response to NRC Request for Additional Information Letter No. 041, (eRAI 6024) SRP Section: 02.05.01 - Basic Geologic and Seismic Information.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/08/2011	ML11353A502	2011/12/08 Turkey Point COL Hearing - Environmental Request for Additional Information Letter 1112082 Related to ESRP Section 9.3, Alternative Sites, for the Combined License Application Review for Turkey Point, Units 6 and 7	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2011	ML11353A499	2011/12/14 Turkey Point COL Hearing - US FWS Biological Opinion for Turkey Point existing units	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
12/15/2011	ML11355A058	Proposed Turkey Point Units 6 and 7 - Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #28, #29, and #30.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11354A061	2011/12/16 Turkey Point COL Hearing - L-2011-538 w/o enclosures Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #28, #29, and #30	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041
12/16/2011	ML12016A024	2011/12/16 Turkey Point COL Hearing - Draft RAI 6077 related to SRP Section 02.01.03 - Population Distribution for the Turkey Point Units 6	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		and 7 combined license application.				
12/16/2011	ML11362A200	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 1-Final Data Report	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A232	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 32-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A266	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 19-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A247	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 46-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A301	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 54-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A154	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Water	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A229	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 29-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A310	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 5-Special Nuclear Material (SNM) Material Control and Accounting Program Description	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A334	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 16-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A158	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.4 - Ecology	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A224	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 24-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A289	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 42-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A323	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 5-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A234	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 34-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A258	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 11-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A280	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 33-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A217	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 17-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A276	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 29-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A262	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 15-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A201	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 2-Appendix A-Survey Report	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A211	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 11-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A311	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 6-New Fuel Shipping Plan	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A330	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 12-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A221	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 21-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A338	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 20-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A278	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 31-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A261	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 14-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A327	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 9-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A219	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 19-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A206	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 6-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A236	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 36-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A286	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 39-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A329	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 11-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A326	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 8-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A149	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 4	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A293	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 46-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A332	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 14-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A321	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 3-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A265	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 18-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A267	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 20-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A298	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 51-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A204	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 4-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A242	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 42-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A341	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 23-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A203	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 3-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A160	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.6 - Geology	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A328	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 10-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A313	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosures Introduction	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A163	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 3 - Plant Description	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A257	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 10-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A208	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 8-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A215	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 15-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A296	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 49-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A263	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 16-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A295	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 48-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A279	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 32-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A213	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 13-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A306	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 58-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A259	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 12-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2011	ML11362A325	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 7-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A218	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 18-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A231	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 31-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A106	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 201-225	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A095	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.5 - Probable Maximum Surge and Seiche Flooding	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A122	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.4 - Stability of Subsurface Materials and Foundations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A126	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 4 - Reactor	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A110	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.14 - Technical Specification and Emergency Operation Requirements	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A087	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.0 - Site Characteristics	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A136	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 14 - Initial Test Program	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A107	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 226-247	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A120	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.2 - Vibratory Ground Motion	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A116	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 253-278	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A115	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 229-252	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A137	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 15 - Accident Analyses	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2011	ML11362A121	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.3 - Surface Faulting	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A102	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2011	ML11362A112	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.0 - Geology, Seismology, and Geotechnical Engineering	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2011	ML11362A098	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.8 - Cooling Water Canals and Reservoirs	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2011	ML11355A057	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006) SRP Section - 02.05.04 Stability of Subsurface Materials and Foundations.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2011	ML11362A184	FPL - Turkey Point Units 6 & 7 COLA (Other) - Part 9 Withheld Information Enclosure 1 - Florida State E-Plan Annex A	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/20/2011	ML12016A023	2011/12/20 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 45 RELATED TO SRP 18.0 HUMAN FACTORS ENGINEERING FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
12/20/2011	ML12016A022	2011/12/20 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 46 RELATED TO SRP 2.1.3 POPULATION DISTRIBUTION FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/20/2011	ML11356A071	Turkey Point, Units 6 and 7 - Revised Response Schedule to NRC Request for Additinal Information Letter No. 041 (eRAI 6024) SRP Section: 02.05.01 - Basic Geologic and Seismic Information.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/22/2011	ML14223A057	TN1358 - FPSC (Florida Public Service Commission). 2011. Order Denying Protests, Consummating Proposed Agency Action Orders, and Closing Dockets. Docket Nos. 100155-EG and 100160-EG, Order No. PSC-11-0590-FOR-EG.	FACT Sheet Legal-Order	State of FL, Public Service Commission	NRC/NRO/DNRL	05200040 05200041
12/30/2011	ML14336A335	FPL 2011 - TN2471 - FPL Annual Crocodile Report Final.	Letter Report, Technical	Florida Power & Light Co	NRC/NRO US Dept of Interior, Fish & Wildlife Service	05200040 05200041

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01/04/2012	ML12014A141	2012/01/04 Turkey Point COL Hearing - FW: Proposed Turkey Point, Units 6 and 7 - Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #28, #29, and #30. 12/15/2011	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
01/04/2012	ML12014A017	2012/01/04 Turkey Point COL Hearing - FW: L-2011-538 Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #28, #29, and #30	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
01/04/2012	ML12014A119	2012/01/04 Turkey Point COL Hearing - FW: Proposed Turkey Point, Units 6 and 7 - Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #28, #29, and #30. 12/15/2011	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

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01/04/2012	ML12014A118	2012/01/04 Turkey Point COL Hearing - FW: L-2011-552 Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006) SRP Section - 02.05.04 Stability of Subsurface Materials and Foundations	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
01/04/2012	ML12014A120	2012/01/04 Turkey Point COL Hearing - FW: REQUEST FOR ADDITIONAL INFORMATION LTR. No: 47 RELATED TO SRP 02.04.06 PROBABLE MAXIMUM TSUNAMI FLOODING FOR THE TURKEY POINT UNITS 6 AND 7 COL APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

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01/04/2012	ML12014A020	2012/01/04 Turkey Point COL Hearing - FW: Draft RAI 6225 related to SRP Section 02.04.06 -Probable Maximum Tsunami Flooding for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
01/04/2012	ML12014A116	2012/01/04 Turkey Point COL Hearing - FW: L-2011-552 Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006) SRP Section - 02.05.04 Stability of Subsurface Materials and Foundations	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
01/04/2012	ML12014A114	2012/01/04 Turkey Point COL Hearing - FW: FPL Letters L-2011-529 & L-2011-530 dated 12-16-2011 - Turkey Point Units 6 & 7 COLA Rev 3 COL Application Submittals 9 & 10	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/04/2012	ML12014A024	2012/01/04 Turkey Point COL Hearing - FW: L-2011-538 w/o enclosures Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #28, #29, and #30	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
01/04/2012	ML12014A023	2012/01/04 Turkey Point COL Hearing - FW: Draft RAI 6077 related to SRP Section 02.01.03 - Population Distribution for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
01/04/2012	ML14189A254	TN111 - CERP (Comprehensive Everglades Restoration Plan). 2011. Water Flow Maps of the Everglades: Past, Present & Future. West Palm Beach, Florida.	Meeting Briefing Package/Handouts	US Dept of the Army, Corps of Engineers	NRC/NRO US Environmental Protection Agency (EPA)	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/09/2012	ML14282A864	TN1395 - NREL (National Renewable Energy Laboratory). 2012. United States - Land-based and Offshore Annual Average Wind Speed at 80m. Golden, Colorado.	Map	AWS Truepower National Renewable Energy Lab	NRC/NRO	05200040 05200041
01/11/2012	ML12025A353	2012/01/11 Turkey Point COL Hearing - (REVISED) Draft RAI 6258 related to SRP Section 06.02.02 - Containment Heat Removal Systems for the Turkey Point Units 6 and 7 combined license application (REVISED)	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
01/11/2012	ML12025A355	2012/01/11 Turkey Point COL Hearing - RE: Reading file update request	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/11/2012	ML12011A091	Citizens Allied for Safe Energy, Inc., January 2012 Disclosure Notice in the Matter of Florida Power & Light Company, Turkey Point, Units 6 and 7.	Legal- Correspondence /Miscellaneous	Citizens Allied for Safe Energy, Inc (CASE)	Emory Univ School of Law Nabors, Giblin & Nickerson, PA NRC/OGC Pillsbury, Winthrop, Shaw, Pittman, LLP Turner Environmental Law Clinic	05200040 05200041
01/13/2012	ML12030A069	Proposed Turkey Point, Units 6 & 7, Submittal of Underground Injection Control Exploratory Well, Weekly Construction Summaries - #34, #35, and #36 Enclosure 3, Weekly Construction Summary #36.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/17/2012	ML120170092	01/30/2012 Notice of Forthcoming Public Meeting with Florida Power & Light Company to Discuss Geology, Stratigraphy and Tectonics Related to Issues to Turkey Point Units 6 & 7 COL.	Meeting Notice Meeting Agenda Memoranda	NRC/NRO/DNR L/LB4	NRC/NRO/DN RL/LB4	05200040 05200041
01/20/2012	ML12025A249	Turkey Point, Units 6 and 7, Schedule for Response to NRC Request for Additional Information Letter No. 047 (eRAI 6225) - Standard Review Plan Section 02.04.06 - Probable Maximum Tsunami Flooding.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
01/25/2012	ML12025A114	2012/01/25 Turkey Point COL Hearing - Draft RAI 6297 related to SRP Section 17.01 - Quality Assurance during design and Construction Phase for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/26/2012	ML12026A799	Redacted Version - Turkey Point COLA Emergency Plan - Supplemental Information 2 through 9.	Emergency Preparedness-Emergency Plan	NRC/NSIR		05200040 05200041
01/27/2012	ML12031A261	2012/01/27 Turkey Point COL Hearing - RAI Letter 49 Related to Fitness for Duty for Turkey Point Units 6 and 7 COL Application	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
01/27/2012	ML120300285	Enclosure 4: Turkey Point COLA, Radiological Emergency Preparedness Plan, Monroe County, Florida, (Redated Version).	Emergency Preparedness-Emergency Plan	Monroe County, FL	NRC/NSIR	05200040 05200041
01/30/2012	ML14328A512	USACE and SFWMD - 2014 - TN3046 - CERP Project Loxahatchee National Wildlife Refuge Internal Canal Structures.	FACT Sheet	State of FL, Water Management District US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/02/2012	ML12033A133	2012/02/02 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 051 RELATED TO SRP SECTION 14.03 ITAAC FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COL APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
02/06/2012	ML14309A109	FWS 2012- TN3733- Core Area Map- Panther.	E-Mail FACT Sheet Map	US Dept of Interior, Fish & Wildlife Service	NRC/NRO Pacific Northwest National Lab	05200040 05200041
02/06/2012	ML12193A520	Opler, P.A., K. Lotts, and T. Naberhaus, coordinators. 2012. Butterflies and Moths of North America. TN142.	Environmental Impact Statement	NRC/NRO/DNR L/EPB1		05200040 05200041
02/06/2012	ML12193A526	FWS (U.S. Fish and Wildlife Service). 2012. Species Profile Red Knot (Calidris canutus ssp. rufa). Environmental Conservation Online	FACT Sheet	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		System, Arlington, Virginia. TN146.				
02/15/2012	ML12048A235	Proposed Turkey Point Units 6 and 7 - Supplemental Response Schedule for NRC Request for Additional Information Letter No. 042 (eRAI 5997) Standard Review Plan Section 13.03 - Emergency Planning.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
02/24/2012	ML14309A044	BLS 2012- TN447- BLS_energy prices.	Press Release	US Dept of Labor, Bureau of Labor Statistics	NRC/NRO/DN RL/EPB	05200040 05200041
02/27/2012	ML14309A049	EPA- TN551-Draft Inventory of US GHG 1990_2010.	Environmental Protection Plan FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO/DN RL	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/27/2012	ML12060A101	Proposed Turkey Point Units 6 and 7 - Response to NRC Request for Additional Information Letter No. 048 (eRAI 6258) - Standard Review Plan Section 6.2.2 - Containment Heat Removal Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
03/01/2012	ML12067A321	2012/03/01 Turkey Point COL Hearing - FW: Access to Reading Room	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
03/01/2012	ML12067A322	2012/03/01 Turkey Point COL Hearing - FW: Access to Reading Room	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
03/02/2012	ML12067A259	2012/03/02 Turkey Point COL Hearing - List of topics for discussion on March 6, 2012 for Public conference call with Turkey Point	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
03/02/2012	ML12067A258	2012/03/02 Turkey Point COL Hearing - RE: List of SME s participating on March 6, 2012	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041

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03/05/2012	ML12067A253	2012/03/05 Turkey Point COL Hearing - FW: Access to Reading Room	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
03/06/2012	ML12269A202	EPA (U.S. Environmental Protection Agency) 2012. Water Science & Technology, Contaminants of Emerging Concern Washington, D.C. TN1018.	Database File	US Environmental Protection Agency (EPA)	NRC/NRO/DN RL/EPB1	05200040 05200041
03/06/2012	ML12067A257	2012/03/06 Turkey Point COL Hearing - FW: All Turkey Point Public Meetings	E-Mail	NRC/NRO	NRC/NRO/DN RL/NWE1	05200040 05200041
03/07/2012	ML12069A136	Enclosure 1 to L-2012-087, Turkey Point, Units 6 & 7 - Exploratory Well Project; Permit #0293962-001-UC Weekly Construction Summary #40 dated February 10, 2012.	- No Document Type Applies	McNabb Hydrogeologic Consulting, Inc	NRC/NRO State of FL, Dept of Environmental Protection	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/07/2012	ML12069A138	Enclosure 2 to L-2012-087, Turkey Point, Units 6 & 7 - Exploratory Well Project; Permit #0293962-001-UC, Weekly Construction Summary #41 dated February 17, 2012.	- No Document Type Applies	McNabb Hydrogeologic Consulting, Inc	NRC/NRO State of FL, Dept of Environmental Protection	05200040 05200041
03/07/2012	ML12069A135	Proposed Turkey Point, Units 6 and 7 - Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #40, #41, and #42.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
03/07/2012	ML12219A160	Miami Dade Water and Sewer District, South District Laboratory FDOH.	Letter	Miami Dade Water & Sewer-South	NRC/NRO	05200040 05200041
03/07/2012	ML12074A041	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 1112081 (RAI 5765) Related to ESRP Section 4.2, Water-Related Impacts.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/12/2012	ML12096A518	2012/03/12 Turkey Point COL Hearing - Draft RAI 6340 related to SRP Section 06.04 - Control Room Habitability for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
03/12/2012	ML14190B151	TN1107 - EPA (U.S. Environmental Protection Agency). 2012. Envirofacts TRI Envirofacts Report: Engelhard Hexcore. Washington, D.C.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
03/12/2012	ML14190B054	TN1104 - EPA (U.S. Environmental Protection Agency). 2012. Envirofacts TRI Envirofacts Report: DM Industries, LTD. Washington, D.C.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/13/2012	ML12074A005	Environmental Request For Additional Information Letter 120316 Related To ESRP Section 9.3-U.S. Army Corps of Engineers, For The Combined License Application Review For Turkey Point, Units 6 and 7.	Letter Request for Additional Information (RAI)	NRC/NRO/DNR L/EPB1	Florida Power & Light Co	05200040 05200041
03/20/2012	ML14224A673	TN1318 - SFWMD (South Florida Water Management District) 2012. "Project Information Biscayne Bay Monitoring." West Palm Beach, Florida.	FACT Sheet	South Florida Water Management District	NRC/NRO/DN RL	05200040 05200041
03/21/2012	ML12198A335	FWS (U.S. Fish and Wildlife Service). 2012. Ivory-Billed woodpecker (Campephilus Principalis). Environmental Conservation Online System, Washington, D.C. TN286.	Environmental Impact Statement	US Dept of Interior, Fish & Wildlife Service	NRC/NRO/DN RL/EPB1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/22/2012	ML120810265	04/04/2012-Notice of Forthcoming Public Meeting to Discuss Soil Structure Issues Related to Turkey Point Units 6 & 7 Combined License Application.	Meeting Notice Meeting Agenda Memoranda	NRC/NRO/DNR L/LB4	NRC/NRO/DN RL/LB4	05200040 05200041
03/22/2012	ML12081A068	Environmental Requests For Additional Information Letter 122103 Related To ESRP Section 5.2, Water Related Impacts For the Combined License Application Review For Turkey Point, Units 6 and 7.	Request for Additional Information (RAI) Letter	NRC/NRO/DNR L/EPB1	Florida Power & Light Co	05200040 05200041
03/23/2012	ML14224A677	TN1320 - SFWMD (South Florida Water Management District)2012 "Station Information: BBCW10 Station - Biscayne Bay Coastal Wetlands, Site 10 Surface Water." West Palm Beach, Florida.	FACT Sheet	South Florida Water Management District	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/27/2012	ML12089A333	Turkey Point, Units 6 and 7 - 24" Casting Cement Top Temperature Log, Enclosure 2 to L-2012-111, Page 37 of 65 through page 65 of 65.	- No Document Type Applies	Florida Power & Light Co	NRC/NRO	05200040 05200041
03/27/2012	ML12089A340	Turkey Point, Units 6 and 7 - Exploratory Well Project; Permit #0293962-001 -UC Weekly Construction Summary #43 dated March 2, 2012, Enclosure 1 to L-2012-111.	- No Document Type Applies	Florida Power & Light Co	NRC/NRO	05200040 05200041
03/31/2012	ML14328A519	SFWMD 2012- TN2883-SFWMD 2012 jtf_lakeo_responsibilities .	- No Document Type Applies	State of FL, Water Management District	NRC/NRO	05200040 05200041
04/02/2012	ML12192A298	BLS (Bureau of Labor Statistics). 2012. Local Area Unemployment Statistics. U.S. Department of Labor, Washington, D.C. TN440.	Database File	US Dept of Labor, Bureau of Labor Statistics	NRC/NRO/DN RL	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/02/2012	ML12219A151	Miami-Dade Water and Sewer District, South District Wastewater Treatment Plant, Letter from Pace Analytical dated April 2, 2012.	Letter	Pace Analytical Services, Inc	Miami Dade Water & Sewer-South NRC/NRO	05200040 05200041
04/03/2012	ML14328A470	USCB 2010- TN473-ACS.	- No Document Type Applies	US Dept of Commerce, Bureau of Census	NRC/NRO	05200040 05200041
04/05/2012	ML12097A022	2012/04/05 Turkey Point COL Hearing - FW: List of SME s participating on March 6, 2012	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
04/05/2012	ML12097A020	2012/04/05 Turkey Point COL Hearing - Draft RAI 6384--Reliability Study	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
04/05/2012	ML12097A023	2012/04/05 Turkey Point COL Hearing - FW: FPL - Orbera et al. (1990) Cuba citation	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/05/2012	ML12097A025	2012/04/05 Turkey Point COL Hearing - FW: FW: NRC/FPL Call on Draft RAI 6367 related to SRP Section 01.03 - Financial Qualification for PTN Units 6 & 7	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
04/05/2012	ML12097A028	2012/04/05 Turkey Point COL Hearing - FW: Public Meeting on soil structure interaction issues related to Turkey Point 6 & 7 COLA	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
04/09/2012	ML12102A052	Proposed Turkey Point, Units 6 and 7 - 10 CFR 50.46 Annual Report for the AP1000 Standard Plant Design.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
04/11/2012	ML14345A281	TN4118 - Bellmund 2012 - Salinity Data.	Memoranda	Pacific Northwest National Lab	US Dept of Interior, National Park Service	05200040 05200041
04/12/2012	ML12129A098	2012/04/12 Turkey Point COL Hearing - FW: FPL - Orbera et al. (1990) Cuba citation	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/12/2012	ML14338A459	BEA 2009 - TN436- BEA_2011b.	Report, Miscellaneous	US Dept of Commerce, Bureau of Economic Analysis	NRC/NRO	05200040 05200041
04/13/2012	ML12212A055	BLS (Bureau of Labor Statistics), 2012, Injuries, Illnesses, and Fatalities State Occupational Injuries, Illnesses, and Fatalities. Washington, D.C. TN669.	Environmental Impact Statement	US Dept of Labor, Bureau of Labor Statistics	NRC/NRO/DN RL/EPB1	05200040 05200041
04/14/2012	ML12212A060	EPA (U.S. Environmental Protection Agency). 2012. 2012 U.S. Greenhouse Gas Inventory Report, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010. EPA 430- R-12-001, Washington, D.C. TN640.	Environmental Impact Statement	US Environmental Protection Agency (EPA)	NRC/NRO/DN RL/EPB1	05200040 05200041
04/17/2012	ML12117A205	Enclosure 3: Turkey Point Units 6 & 7 - Exploratory Well Project, Weekly	- No Document Type Applies	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Construction Summary #48 Dated April 6, 2012.				
04/19/2012	ML14216A474	TN1163 - NOAA (National Oceanic and Atmospheric Administration) 1986 "NAD 83 - NAD 27 Datum Shifts in Seconds of Arc North American Datum Conversion Utility, National Geodetic Survey, Silver Spring, Maryland.	FACT Sheet	US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO	05200040 05200041
04/20/2012	ML12194A603	NPS (National Park Service). 2012. Big Cypress National Preserve, Florida. Washington, D.C. TN707.	Environmental Impact Statement	US Dept of Interior, National Park Service	NRC/NRO/DN RL	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/01/2012	ML12129A089	2012/05/01 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR 58 CONCERNING IMPLEMENTATION OF FUKUSHIMA TASK FORCE RECOMMENDATIONS FOR TURKEY POINT 6 & 7 COL APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
05/02/2012	ML12129A347	Proposed Turkey Point, Units 6 and 7, Submittal of Digital Seed and Spectrum Compatible Time Histories for NRC Request for Additional Information Letter No. 007 (eRAI 4975) Standard Review Plan Section 3.07.01 - Seismic Design Parameters.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/07/2012	ML12130A166	Proposed Turkey Point, Units 6 and 7 - Response Schedule for NRC Request for Additional Information Letter 122103 (RAI 5766 Rev. 2) Related to ESRP Section 5.2 - Water Related Impacts.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
05/08/2012	ML12130A440	Proposed Turkey Point Units 6 and 7, Submittal of Underground Injection Control Exploratory Well Weekly Construction Summaries - #49, #50, and #51.	Letter Status Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/09/2012	ML12124A140	04/17/2012 Summary of Category 2 Meeting with the AP1000 Design-Centered Working Group (DWCG) and the General Public to Discuss the Completion and Inspection Strategy for the Design Acceptance Criteria (DAC) Associated with AP1000 Human Factors Design.	Meeting Summary Memoranda	NRC/NRO/DCI P/CIPB	NRC/NRO/DCI P/CIPB	05200014
						05200015
						05200018
						05200019
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						05200040
						05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/10/2012	ML12122A886	Request For Additional Information Letter 120510 Related To ESRP Section 5.2 Water Related Impacts For the The Combined License Application Review For Turkey Point, Units 6 and 7.	Letter Request for Additional Information (RAI)	NRC/NRO/DNR L/EPB1	Florida Power & Light Co	05200040 05200041
05/14/2012	ML12156A420	2012/05/14 Turkey Point COL Hearing - RE: FPL Letter L-2012-228 dated 05-11-2012 - Response to NRC COLA Review Schedule Letter dated May 4, 2012	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
05/14/2012	ML12136A550	Proposed Turkey Point, Units 6 and 7 - Response to NRC Request for Additional Information Letter No. 056 (ERAI 6251) - SRP Section: 02.03.01 - Regional Climatology.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/16/2012	ML12156A418	2012/05/16 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 60 RELATED TO SRP: 13.01.02 OPERATING ORGANIZATION FOR THE TURKEY POINT UNITS 6 AND 7 COLA	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
05/16/2012	ML12156A419	2012/05/16 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 59 RELATED TO SRP: 13.01.01 MANAGEMENT & TECHNICAL SUPPORT FOR THE TURKEY POINT UNITS 6 AND 7 COLA	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/16/2012	ML12137A329	2012/05/16 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 60 RELATED TO SRP: 13.01.02 OPERATING ORGANIZATION FOR THE TURKEY POINT UNITS 6 AND 7 COLA	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
05/16/2012	ML12138A201	Proposed Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 057 (eRAI 6367) Standard Review Plan Section 01 - Introduction and Interfaces.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
05/21/2012	ML12156A413	2012/05/21 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 62 RELATED TO SRP: 3.08.05 FOUNDATIONS FOR THE TURKEY POINT UNITS 6 AND 7	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		COMBINED LICENSE APPLICATION				
05/21/2012	ML12156A414	2012/05/21 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 61 RELATED TO SRP: 3.07.01 SEISMIC DESIGN FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/21/2012	ML12142A019	2012/05/21 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 62 RELATED TO SRP: 3.08.05 FOUNDATIONS FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
05/21/2012	ML12143A357	Turkey Point, Units 6 & 7, Response to NRC Request for Additional Information Letter 122103 (RAI 5766 Rev. 2) Related to ESRP Section 5.2 - Water Related Impacts.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
05/21/2012	ML12143A356	Proposed Turkey Point, Units 6 & 7, Response to NRC Request for Additional Information Letter 120403 (RAI 6350 Rev. 1) Related to ESRP Section 5.8.1 - Etiological Agents.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/22/2012	ML12269A241	USACESFWMD (U.S. Army Corps of Engineers South Florida Water Management District). 2012. About CERP Brief Overview. Washington, D.C. TN1035.	FACT Sheet	South Florida Water Management District US Dept of the Army, Corps of Engineers	NRC/NRO/DN RL/EPB1	05200040 05200041
05/22/2012	ML12144A360	Turkey Point, Units 6 and 7, Supplemental Information for the Combined License Application Part 2, Final Safety Analysis Report Chapter 11 (Radioactive Waste Management).	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
05/28/2012	ML12198A213	Turkey Point, Units 6 & 7, Water Containments of Emerging Concern. USEPA 2012.	Database File	US Environmental Protection Agency (EPA)	NRC/NRO/DN RL/EPB2	05200040 05200041
06/04/2012	ML12156A416	2012/06/04 Turkey Point COL Hearing - FW: L-12-223 - Response to NRC Request for Additional Information Letter No. 056	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/04/2012	ML12156A423	2012/06/04 Turkey Point COL Hearing - FW: RAI LTR 58 CONCERNING IMPLEMENTATION OF FUKUSHIMA TASK FORCE RECOMMENDATIONS FOR PTN 6&7 - Seismic - NEW DATE	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
06/04/2012	ML12156A417	2012/06/04 Turkey Point COL Hearing - FW: FDEP siting office link to Turkey Point 6&7 T&E Species Management Plan (public)	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
06/04/2012	ML12156A416	2012/06/04 Turkey Point COL Hearing - FW: L-12-223 - Response to NRC Request for Additional Information Letter No. 056	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
06/04/2012	ML12156A423	2012/06/04 Turkey Point COL Hearing - FW: RAI LTR 58 CONCERNING IMPLEMENTATION OF FUKUSHIMA TASK FORCE RECOMMENDATIONS	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		FOR PTN 6&7 - Seismic - NEW DATE				
06/04/2012	ML12156A417	2012/06/04 Turkey Point COL Hearing - FW: FDEP siting office link to Turkey Point 6&7 T&E Species Management Plan (public)	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
06/11/2012	ML13072A625	Wheelabrator (Wheelabrator Technologies Inc.) 2012. Wheelabrator South Broward Inc., [Plant] Hampton, New Hampshire. (TN1086).	Database File	Wheelabrator Technologies, Inc	NRC/NRO/DN RL	05200040 05200041
06/11/2012	ML14190B036	TN1101 - EPA (U.S. Environmental Protection Agency). 2012. Envirofacts TRI Envirofacts Report: Benada Aluminum of Florida. Washington, D.C.	Environmental Report	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
06/11/2012	ML13072A634	EPA (U.S. Environmental Protection Agency) 2012. Homestead Power Plant. Washington, D.C. (TN1082).	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/11/2012	ML14190B147	TN1106 - EPA (U.S. Environmental Protection Agency). 2012. Envirofacts AFS Plant Information: Eastern Aero Marine, Inc. Washington, D.C.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
06/11/2012	ML13072A599	EPA (U.S. Environmental Protection Agency) 2012. Plant Information Contender Boats Incorporated. Washington, D.C. (TN1092).	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
06/11/2012	ML14206B139	TN1127 - Florida State Parks 2012 Windley Key Fossil Reef Geological State Park Tallahassee, Florida.	FACT Sheet	State of FL, Park Service	NRC/NRO	05200040 05200041
06/11/2012	ML14211A391	TN1129 - Florida State Parks 2012 John U. Lloyd Beach State Park Tallahassee, Florida.	FACT Sheet	State of FL, Park Service	NRC/NRO/DN RL	05200040 05200041
06/11/2012	ML13072A455	EPA (U.S. Environmental Protection Agency) 2012. Plant Information Exteria Building Products, LLC., Washington, D.C. (TN1097).	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/11/2012	ML14195A319	TN1120 - Florida State Parks. 2012. The Barnacle Historic State Park. Tallahassee, Florida.	Report, Miscellaneous	State of FL, Park Service	NRC/NRO	05200040 05200041
06/13/2012	ML12167A300	Proposed Turkey Point Units 6 and 7, Supplemental Updated Ecology Information for the Combined License Application, Part 3 - Environmental Report.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
06/21/2012	ML12179A238	Turkey Point, Units 6 and 7, Enclosure 2 to L-2012-255, Exploratory Well Project Permit #0293962-001-UC Weekly Construction Summary #56 Dated June 1, 2012.	Routine Status Report (Recurring Weekly/Monthly)	Florida Power & Light Co	NRC/NRO	05200040 05200041
06/21/2012	ML12179A237	Turkey Point, Units 6 and 7, Enclosure 1 to L-2012-255, Exploratory Well Project #0293962-001-UC Weekly Construction Summary #55 Dated May 25, 2012, Part 1 of 2.	Routine Status Report (Recurring Weekly/Monthly)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/25/2012	ML12178A552	Turkey Point, Units 6 & 7, Response to NRC Request for Additional Information Letter 120510 (RAI 6384 Rev. 1) Related to ESRP Section 5.2 - Water Related Impacts.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
06/29/2012	ML121850685	Proposed Turkey Point, Units 6 and 7 - Response to NRC Request for Additional Information Letter No. 58 (eRAI 6434) - Concerning Implementation of Fukushima Near-Term Task Force Recommendations.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
06/29/2012	ML121850701	Proposed Turkey Point, Units 6 and 7 - Schedule for Response to NRC Request for Additional Information Letter No. 061 (eRAI 6432) Related to SRP Section 03.07.01 - Seismic Design Parameters.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
06/30/2012	ML14287A531	TN1445 - FNAI (Florida Natural Areas Inventory) 2012 "Florida Conservation Lands	FACT Sheet Map	Florida Natural Areas Inventory	NRC/NRO	05200040 05200041

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		[interactive map]." Tallahassee, Florida.				
07/05/2012	ML14209A003	TN1256 - U.S. Department of Energy/Energy Information Administration, 2012 Electric Power Monthly Table 1.1 Net Generation by Energy Source: Total (All Sectors), 1998 through April 2012.	FACT Sheet	US Dept of Energy, Energy Information Administration (EIA)	NRC/NRO/DN RL	05200040 05200041
07/12/2012	ML14230A159	TN1325 - SAFMC 2012 Fish Regulations by Species.	FACT Sheet	South Atlantic Fishery Management Council	NRC/NRO/DN RL	05200040 05200041
07/12/2012	ML12198A020	Proposed Turkey Point Units 6 and 7 - 10 CFR 50.46 Thirty (30) Day Report for the AP1000 Standard Plant Design.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRR	05200040 05200041
07/17/2012	ML14231B324	TN1325 - SAFMC (South Atlantic Fishery Management Council) 2012 Federal Fishing Regulations for South Atlantic Waters.	FACT Sheet	South Atlantic Fishery Management Council	NRC/NRO	05200040 05200041

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07/18/2012	ML12194A585	FWS (U.S. Fish & Wildlife Service); Crocodile Lake National Wildlife Refuge Recreation and Education Opportunities. Key Largo, Florida, TN706.	Database File	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
07/18/2012	ML12193A532	FWS (U.S. Fish and Wildlife Service). 2012. Species Profile Florida Leafwing Butterfly (Anaea troglolyta floridalis). Environmental Conservation Online System, Arlington, Virginia. TN148.	Database File	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
07/18/2012	ML12271A517	2012/07/18 Turkey Point COL Hearing - FPL Letter L-2012-285 Dated 18JUL12: Response to NRC RAI Letter 120329 (eRAI 6354 Rev. 0) ESRP 2.3.1 - Hydrology	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
07/18/2012	ML12202A068	Proposed Turkey Point, Units 6 and 7 - Response to NRC Request for Additional Information Letter 120329 (eRAI 6354 Rev. 0) Related to	Letter	Florida Power & Light Co	NRC/NRO NRC/Document Control Desk	05200040 05200041

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		ESRP Section 2.3.1 - Hydrology.				
07/20/2012	ML12192A293	BEA (Bureau of Economic Analysis). 2011. Bearfacts Miami-Dade, Florida. U.S. Department of Commerce, Washington, D.C. TN434.	Environmental Impact Statement FACT Sheet	US Dept of Commerce, Bureau of Economic Analysis	NRC/NRO/DN RL/EPB1	05200040 05200041
07/20/2012	ML12192A260	DOT (U.S. Department of Transportation). 2008. Traffic Safety Facts, Martin County, Florida 2004-2008. National Highway Traffic Safety Administration, Washington, D.C.	FACT Sheet	US Dept of Transportation, National Highway Traffic Safety Admin	NRC/NRO	05200040 05200041
07/23/2012	ML14328A464	USCB 2000- TN470- Census2000.	FACT Sheet	US Dept of Commerce, Bureau of Census	NRC/NRO	05200040 05200041
07/25/2012	ML12271A411	2012/07/25 Turkey Point COL Hearing - South District 2009 Annual Effluent Analysis	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041

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07/31/2012	ML12271A516	2012/07/31 Turkey Point COL Hearing - FPL Letter L-2012-304 Dated 31JUL12: Revised Schedule for Response to NRC RAI Letter 120329 (eRAI 6354 Rev. 0) ESRP 2.3.1 - Hydrology	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
07/31/2012	ML12214A542	Turkey Point, Units 6 and 7 - Revised Schedule for Response to NRC Request for Additional Information Letter 120329 (eRAI 6534 Rev. 0) Related to ESRP Section 2.3.1 - Hydrology.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
08/02/2012	ML12271A421	2012/08/02 Turkey Point COL Hearing - Florida DEP Submitted Annual Effluent Data	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
08/02/2012	ML12216A378	Turkey Point, Units 6 and 7 - Submittal of Underground Injection Control Exploratory, Well Weekly Construction Summaries - #61, #62, and 63.	Letter Report, Miscellaneous	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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08/15/2012	ML12229A455	Turkey Points, Units 6 and 7 - Submittal of Underground Injection Control Exploratory Well Weekly Construction Summary - #64.	Letter Weekly Activities/LEAP (WAR)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
08/18/2012	ML12221A192	7/25/12 - Summary of Meeting With Florida Power and Light To Discuss The Environmental Review Related To Turkey Point Units 6 and 7 Combined License Application - Socioeconomics.	Meeting Summary Memoranda	NRC/NRO/DNR L/EPB1	NRC/NRO/DN RL/EPB1 NRC/NRO/DSEA	05200040 05200041
08/20/2012	ML14217A581	TN1314 - USDA (U.S. Department of Agriculture), 2012, Custom Soil Resource Report for Miami-Dade County Area, Florida, Natural Resources Conservation Service, Washington, D.C.	Environmental Monitoring Report	US Dept of Agriculture, Natural Resources Conservation Service	NRC/NRO/DN RL	05200040 05200041
08/20/2012	ML12234A549	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter 120329 (eRAI 6354 Rev. 0) Related to ESRP Section 2.3.1 - Hydrology.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/21/2012	ML12271A513	2012/08/21 Turkey Point COL Hearing - RE: Clarification regarding alt. sites RAIs	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
08/27/2012	ML12240A305	NPS 2011 BBNP Science Weblink, TN193.	Database File	US Dept of Interior, National Park Service	NRC/NRO	05200040 05200041
08/27/2012	ML12240A276	NPS 2012 Biscayne National Park - Nature and Science Weblink, TN184.	Database File	US Dept of Interior, National Park Service	NRC/NRO	05200040 05200041
08/27/2012	ML12240A289	NOAA 2010 Elkhorn Coral WebLink, TN177.	Database File	US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO	05200040 05200041
08/27/2012	ML12271A477	2012/08/27 Turkey Point COL Hearing - FW: FPL Letter L-2012-227 Dated 22MAY12: Supplemental Information for the Combined License Application Part 2 Final Safety Analysis Report Chapter 11 (Radioactive Waste Management)	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

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08/27/2012	ML12271A470	2012/08/27 Turkey Point COL Hearing - FW: L-2012-283 dated 13JUL12: Response to NRC RAI Letter No. 063 (eRAI 5695) SRP Section 11.02 - Liquid Waste Management System	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
08/27/2012	ML12240A282	SCA Appendix 10.7.1.3 Threatened & Endangered Species Evaluation and Management Plan, TN170.	Environmental Monitoring Report	- No Known Affiliation	NRC/NRO	05200040 05200041
09/07/2012	ML14287A516	TN1442 - Swain, E.D. and J.D. Decker. 2009. "Development, Testing, and Application of a Coupled Hydrodynamic Surface-Water/Groundwater Model (FTLOADDS).	Report, Miscellaneous	US Dept of Interior, Geological Survey (USGS)	NRC/NRO/DN RL/EPB	05200040 05200041
09/10/2012	ML12254B166	2012/09/10 Turkey Point COL Hearing - FW: L-2012-254, Response to NRC Request for Additional Information Letter No. 059 (eRAI 6387) Standard Review Plan Section 13.01.01 - Management and	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

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		Technical Support Organization				
09/10/2012	ML12254B171	2012/09/10 Turkey Point COL Hearing - FW: L-2012-283 dated 13JUL12: Response to NRC RAI Letter No. 063 (eRAI 5695) SRP Section 11.02 - Liquid Waste Management System	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
09/11/2012	ML14328A467	USCB - 2009 - TN475 - AS5.	FACT Sheet	US Dept of Commerce, Bureau of Census	NRC/NRO	05200040 05200041
09/12/2012	ML12261A403	Turkey Point, Units 6 and 7 - Clarification Information for the Combined License Application Part 3 - Environmental Report, Subsection 4.4.2.2.4 - Transportation.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
09/12/2012	ML14309A041	BLS 2010- TN441-BLS_2012b.	Report, Technical	US Dept of Labor, Bureau of Labor Statistics	NRC/NRO/DN RL/EPB	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/25/2012	ML14328A532	NPS 2012- TN465- Biscayne.	- No Document Type Applies	US Dept of Interior, National Park Service	NRC/NRO	05200040 05200041
09/25/2012	ML12269A213	EPA (U.S. Environmental Protection Agency). 2011. AP-42, Compilation of Air Pollutant Emission Factors, Volume I. Fifth Edition, Research Triangle Park, North Carolina (TN1088).	Database File	US Environmental Protection Agency (EPA)	NRC/NRO/DN RL/EPB1	05200040 05200041
09/25/2012	ML14328A466	USCB-2009- TN474- ACS3.	FACT Sheet	US Dept of Commerce, Bureau of Census	NRC/NRO	05200040 05200041
09/25/2012	ML12269A229	FPL (Florida Power and Light Company). 2012. Turkey Point Nuclear Power Plant Fact Sheet. Miami, Florida. TN1058.	FACT Sheet	Florida Power & Light Co	NRC/NRO/DN RL/EPB1	05200040 05200041
09/25/2012	ML12269A200	CEPP (Central Everglades Planning Project). 2011. Facts & Information Getting to the Heart of CERP. West Palm Beach, Florida. Accession No. TN107.	FACT Sheet	US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/25/2012	ML12269A239	U.S. Coast Guard 2012. Letter FR D.Patterson to J.Ward, PNNL,dated May 25, 2012, Reg FOIA Request Concerning Bargetug or Large Vessel Groundings Near the Turkey Point Site TN 1063.	Letter	Battelle Memorial Institute, Pacific Northwest National Lab US Dept of Homeland Security, Coast Guard	NRC/NRO/DN RL/EPB1	05200040
						05200041
09/26/2012	ML12272A000	2012/09/26 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 65 RELATED TO SRP: 08.03 STABILITY OF OFFSITE POWER SYSTEM FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/26/2012	ML12271A285	Turkey Point Units 6 and 7, Revised Schedule for Response to NRC Request for Additional Information Letter 120329 (eRAI 6354 Rev. 0) Related to ESRP Section 2.3.1 - Hydrology.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
09/30/2012	ML12297A282	Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations (Revision 2), Page 67 of 133 through Page 133 of 133.	Environmental Report	Bechtel Corp	NRC/NRO	05200040 05200041
09/30/2012	ML12297A285	Turkey Point, Units 6 and 7, Enclosure 2 to L-2012-366 - Groundwater Flow Model for Biscayne Aquifer Calculation Input/Output Files (Revision 6) - September 2012 (5 OSM).	Environmental Report Calculation	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/03/2012	ML12278A115	2012/10/03 Turkey Point COL Hearing - FW: "Draft RAI" Response Schedule	E-Mail	NRC/NRO	NRC/NRO/DNRL/LB4	05200040 05200041

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10/03/2012	ML12278A113	2012/10/03 Turkey Point COL Hearing - FW: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 5896 Basic Geologic and Seismic Information	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
10/03/2012	ML12278A135	2012/10/03 Turkey Point COL Hearing - FW: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 6024 Basic Geologic and Seismic Information - Part 1 of 4	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
10/15/2012	ML12291A859	Turkey Point, Units 6 and 7 - Response to NRC Request for Additional Information Letter No. 62 (eRAI 6433) Related to SRP Section 03.08.05 - Foundations.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/16/2012	ML12299A444	2012/10/16 Turkey Point COL Hearing - DRAFT RAIs Regarding the LEDPA Evaluation versus Submittals to NRC -- Turkey Point Environmental Review (public)	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

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10/17/2012	ML12299A448	2012/10/17 Turkey Point COL Hearing - RE: Mailing Address Confirmation (public)	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
10/17/2012	ML12299A446	2012/10/17 Turkey Point COL Hearing - FPL Letter L-2012-366 Dated 17OCT12: Groundwater Flow Model Revision 6	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
10/17/2012	ML12297A284	Turkey Point, Units 6 and 7 - Groundwater Flow Model Revision 6.	Environmental Report Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/17/2012	ML12293A236	Proposed Turkey Point, Units 6 and 7 - Response to NRC Request for Additional Information Letter 120329 (eRAI 6354 Rev. 0) Related to ESRP Section 2.3.1 - Hydrology.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/31/2012	ML12306A182	2012/10/31 Turkey Point COL Hearing - RE: FPL Draft RAI Responses for eRAI 6353 - Alternative Site Selection Process (public)	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

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11/01/2012	ML12306A599	2012/11/01 Turkey Point COL Hearing - FW: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 6024 Basic Geologic and Seismic Information	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
11/01/2012	ML12306A571	2012/11/01 Turkey Point COL Hearing - FW: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 5896 Basic Geologic and Seismic Information	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
11/01/2012	ML12306A597	2012/11/01 Turkey Point COL Hearing - FW: FSAR Sec 2.5 RAI Schedule for Draft Responses	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
11/01/2012	ML12306A570	2012/11/01 Turkey Point COL Hearing - FW: "Draft RAI" Response Schedule	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
11/01/2012	ML12306A593	2012/11/01 Turkey Point COL Hearing - FW: DRAFT RAI Responses FPL Turkey Point 6 & 7 for eRAI 5896 - Vibratory Ground Motion	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

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11/01/2012	ML12306A596	2012/11/01 Turkey Point COL Hearing - FW: Relocation of State E-Plan in the COLA	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
11/06/2012	ML12346A210	2012/11/06 Turkey Point COL Hearing - NRC-FPL Clarification Call - NEPA v. LEDPA dRAI 6879 Attendee List	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
11/07/2012	ML12346A218	2012/11/07 Turkey Point COL Hearing - Potential date change for public meeting on alternative sites (public)	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
11/07/2012	ML12346A219	2012/11/07 Turkey Point COL Hearing - RE: Potential date change for public meeting on alternative sites (public)	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
11/08/2012	ML12346A222	2012/11/08 Turkey Point COL Hearing - Draft RAI 6918 related to SRP Section 11.05 Process and Effluent Radiological Monitoring Instrumentation and Sampling for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

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11/14/2012	ML12346A225	2012/11/14 Turkey Point COL Hearing - FW: Environmental Request for Additional Information Letter 121114 Related to Environmental Standard Review Plan Section 9.3.1. Alternative Site Selection,	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
11/14/2012	ML123250326	Turkey Point, Units 6 & 7, Clarification Response to NRC Request for Additional Information Letter 1112081 (RAI 5765) Related to ESRP Section 4.2. Water-Related Impacts.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
11/15/2012	ML12346A275	2012/11/15 Turkey Point COL Hearing - Draft RAI 6916 regarding section 9.02.04 Potable and Sanitary Water Systems for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
11/20/2012	ML12325A184	2012/11/20 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR.	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

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		No: 66 RELATED TO SRP 02.01.02 EXCLUSION AREA AUTHORITY FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION				
12/04/2012	ML13008A296	2012/12/04 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 68 RELATED TO SRP: 09.02.04 INITIAL PLANT TEST PROGRAM FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
12/04/2012	ML13008A295	2012/12/04 Turkey Point COL Hearing - Request: Electronic copies of the BA	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
12/04/2012	ML12339A469	2012/12/04 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 67 RELATED TO SRP: 14.02 INITIAL PLANT TEST	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		PROGRAM FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION				
12/04/2012	ML12339A487	2012/12/04 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 68 RELATED TO SRP: 09.02.04 POTABLE AND SANITARY WATER SYSTEMS FOR THE TURKEY POINT UNITS 6 AND 7 COL	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
12/05/2012	ML12340A468	Draft Revised Response for NRC RAI Letter No. 037 (eRAI 5896) 2.5.2-13.	- No Document Type Applies	NRC/NRO/DNRL/LB 4	05200040 05200041	
12/05/2012	ML12340A467	Draft Revised Response for NRC RAI Letter No. 037 (eRAI 5896) 2.5.2-9.	- No Document Type Applies	NRC/NRO/DNRL/LB 4	05200040 05200041	
12/06/2012	ML12341A193	Draft Revised Response for NRC RAI Letter No. 040, RAI 02.05.04-2 (eRAI 6006).	- No Document Type Applies	Florida Power & Light Co	NRC/NRO/DN RL/LB4	05200040 05200041

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12/06/2012	ML12341A187	Draft Revised Response for NRC RAI Letter No. 040, RAI 02.05.04-1 (eRAI 6006).	- No Document Type Applies	Florida Power & Light Co	NRC/NRO/DN RL/LB4	05200040 05200041
12/07/2012	ML13002A490	12/7/2012 Meeting Notice for the Turkey Point Units 6 & 7 Environmental Review on Alternative Sites - Actions Items.	Meeting Notice Request for Additional Information (RAI)	NRC/NRO/DNRL/EP B1	05200040 05200041	
12/11/2012	ML12345A335	01/31/2013 - Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Notice Meeting Agenda Memoranda	NRC/NRO/DNR L/LB4	NRC/NRO/DN RL/LB4	05200018 05200019 05200022 05200023 05200027 05200028 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/12/2012	ML13036A217	2012/12/12 Turkey Point COL Hearing - L-2012-440 dated 12DEC12: Response to NRC RAI Letter 120830 (eRAI 6353 Rev. 2) ESRP Section 9.3.1 - Alternative Site Selection	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
12/12/2012	ML12349A243	Proposed Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter 120830 (eRAI 6353 Rev. 2) Related to ESRP Section 9.3.1 - Alternative Site Selection.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A300	2012/12/14 Turkey Point COL Hearing - RE: NRC Electronic Reading Room Information (public)	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
12/14/2012	ML13008A589	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 13-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/14/2012	ML13008A667	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 28-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A476	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 1	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A721	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 3-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/14/2012	ML13008A568	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 1-FPL New Nuclear Projects Quality Assurance Program Description FPL-2 (QAPD)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A666	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 27-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A483	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 4	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A501	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 3 - Plant Description	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A576	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 4-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A628	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 41-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A594	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 16-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A733	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 14-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A614	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 32-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A627	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 40-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A487	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.1 - Station Location	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A662	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 24-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A723	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 5-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A738	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 18-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A701	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 56-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A588	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 12-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A471	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER Chapter 1 - Introduction - Appendix A - Consultation Letters and Responses (Part A)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A685	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 41-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A607	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 26-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A584	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 10-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A637	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 1-Appendix C-Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A466	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 1 - Introduction	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A644	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 7-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A496	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.6 - Geology	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A704	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 59-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A740	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 20-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A571	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 2-Appendix A-Survey Report	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A636	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 46-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A654	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 16-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A609	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 28-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A515	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER Chapter 10 - Environmental Consequences of the Proposed Action	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A734	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 15-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A681	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 38-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A640	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 3-Appendix C-Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A668	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 29-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A703	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 58-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A658	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 20-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A621	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 36-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A676	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 35-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A632	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 44-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A700	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 55-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A729	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 11-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A743	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 23-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A742	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 22-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A651	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 13-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A590	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 14-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A601	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 22-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A741	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 21-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A452	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 12 - Radiation Protection	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A461	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 19 - Probabilistic Risk Assessment	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A396	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Master Table of Contents	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A430	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 253-278	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A439	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.5 - Stability of Slopes	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A421	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 248-251	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A459	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 17 - Quality Assurance	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A427	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A414	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A429	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 229-252	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A412	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.10 - Flooding Protection Requirements	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/14/2012	ML13008A442	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 4 - Reactor	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A449	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 9 - Auxiliary Systems	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A409	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.7 - Ice Effects	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A408	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.6 - Probable Maximum Tsunami Hazards	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A443	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 5 - Reactor Coolant System and Connected Systems	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/14/2012	ML13008A540	FPL - Turkey Point Units 6 & 7 COLA (Generic DCD Departures Report) - Part 7 Departures and Exemption Requests	Generic DCD Departures Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML13008A552	FPL - Turkey Point Units 6 & 7 COLA (ITAAC) - Part 10 License Conditions (Including ITAAC)	Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/14/2012	ML123660081	Florida Power & Light Company Proposed Turkey Point Units 6 and 7 Combined License Application Submittal 11 - Submittal	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		of the Annual Update of the COL Application - Revision 4 and the Semi-Annual Update of the Departures Report.				
12/14/2012	ML12356A429	Enclosure 1 Figures 1 - 67 and Enclosure 2, Groundwater Flow Model Revision for Biscayne Aquifer Calculation Input/Output Files.	Map	Florida Power & Light Co	NRC/NRO	05200040 05200041
12/17/2012	ML13008A301	2012/12/17 Turkey Point COL Hearing - FW: Tsunami follow-up	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
12/20/2012	ML12355A450	Draft Revised Response for NRC RAI Letter No. 041, RAI 02.05.01-23 (eRAI 6024).	- No Document Type Applies	NRC/NRO/DNRL/LB 4	05200040 05200041	
12/20/2012	ML12355A469	Draft Revised Response for NRC RAI Letter No. 041, RAI 02.05.01-28 (eRAI.6024).	- No Document Type Applies	NRC/NRO/DNRL/LB 4	05200040 05200041	
12/20/2012	ML12355A457	Draft Revised Response for NRC RAI Letter No. 041, RAI 02.05.01-25 (eRAI 6024).	- No Document Type Applies	NRC/NRO/DNRL/LB 4	05200040 05200041	

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/20/2012	ML14336A341	FPL 2012 - TN2470 - 20121220 Cover Letter and 2012 FPL Annual Report for Crocodiles at Turkey Point Power Plant.	Report, Technical	Florida Power & Light Co	NRC/NRO US Dept of Interior, Fish & Wildlife Service	05200040 05200041
12/31/2012	ML14216A529	TN1244 - NOAA (National Oceanic and Atmospheric Administration) 2007 Coastal Zone Management Program Strategic Plan: Improving Management of the Nation's Coastal Areas, FY 2007 2012 Office of Ocean and Coastal Resource Management.	FACT Sheet	US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO	05200040 05200041
01/03/2013	ML13003A309	FPL Draft Responses on Turkey Point Units 6 & 7 Environmental RAI 6353 Question 9.3.1-10.	- No Document Type Applies	Florida Power & Light Co	NRC/NRO/DN RL	05200040 05200041
01/03/2013	ML13003A304	FPL Draft Responses on Turkey Point Units 6 & 7 Environmental RAI 6353 Questions 9.3.1-1 - 9.3.1-9; 9.3.1-12 - 9.3.1-14.	- No Document Type Applies	Florida Power & Light Co	NRC/NRO/DN RL	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/03/2013	ML13003A320	FPL Draft Responses on Turkey Point 6 & 7 Environmental RAI 6353 Question 9.3.1-11.	- No Document Type Applies	Florida Power & Light Co	NRC/NRO/DN RL	05200040 05200041
01/03/2013	ML12352A203	Meeting Summary for the December 7, 2012, Regarding Florida Power and Light's Requests for Additional Information Responses Relating to the Alternative Site Selection Process.	Meeting Summary Memoranda	NRC/NRO/DNR L/EPB1	NRC/NRO/DN RL/EPB1	05200040 05200041
01/04/2013	ML13008A235	Proposed Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter No. 066 (eRAI 6905) - SRP Section 02.01.02 - Exclusion Area Authority and Control.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
01/10/2013	ML13036A223	2013/01/10 Turkey Point COL Hearing - FPL Letter L-2013-007 Dated 10JAN13: Response to NRC RAI Letter No. 120830 (eRAI 6353 Rev. 2) EIS 9.3.1-14	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/10/2013	ML13011A351	Proposed Turkey Point Units 6 and 7 - Schedule for Response to NRC Request for Additional Information Letter No. 68 (eRAI 6916) - Related to SRP Section 09.02.04 Potable and Sanitary Water Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
01/14/2013	ML13036A225	2013/01/14 Turkey Point COL Hearing - NRC-FPL Category 1 Public Teleconference on Alternative Site Selection Process, LEDPAA	E-Mail	- No Known Affiliation	NRC/NRO/DNRL/LB4	05200040 05200041
01/15/2013	ML14279A347	TN1846 - NOAA (National Oceanic and Atmospheric Administration) 2006 "Magnuson-Stevens Fishery Conservation and Management Act Reauthorized."	Environmental Report FACT Sheet	US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)	NRC/NRO	05200040 05200041
01/16/2013	ML13022A102	Proposed Turkey Point Units 6 and 7 - Response to NRC Request for Additional Information Letter No. 069 (eRAI 6918) - SRP Section 11.05 - Process & Effluent Radiological	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Monitoring Instrumentation and Sampling Systems.				
01/17/2013	ML13036A234	2013/01/17 Turkey Point COL Hearing - FW: Summary of the Public Meeting to Discuss Environmental Requests for Additional Information Draft Responses Relating to the Alternative Site (public)	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
01/18/2013	ML13023A416	Revised Response to NRC Request for Additional Information Letter No. 026 (eRAI 5653) Standard Review Plan Section 02.02.03 - Evaluation of Potential Accidents.	Letter	Florida Power & Light Co	NRC/NRO NRC/Document Control Desk	05200040 05200041
01/22/2013	ML13036A363	2013/01/22 Turkey Point COL Hearing - Draft RAI No:6985 regarding section 11.02 Liquid Waste Management System for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/28/2013	ML13031A047	Turkey Point, Units 6 and 7 - Combined License Application Submittal 11 - Annual Update of the COL Application - Revision 4 - Administrative Corrections.	Letter Emergency Preparedness-Emergency Plan	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
01/30/2013	ML13064A049	2013/01/30 Turkey Point COL Hearing - L-2012-036, COLA Rev 4 Roadmap	E-Mail	- No Known Affiliation	NRC/NRO/DNRL/LB4	05200040 05200041
01/30/2013	ML13032A173	Turkey Point, Units 6 and 7, Proposed Roadmap of Changes in Combined License Application, Revision 4.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/30/2013	ML13030A311	01/31/2013- CANCELLED-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DNR L/LB4	NRC/NRO/DN RL/LB4	05200018
						05200019
						05200022
						05200023
						05200027
						05200028
						05200029
						05200030
01/31/2013	ML13064A050	2013/01/31 Turkey Point COL Hearing - RE: L-2012-036, COLA Rev 4 Roadmap	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040
						05200041
02/04/2013	ML13064A004	2013/02/04 Turkey Point COL Hearing - FW: NRC-FPL Public Meeting on Alternative Sites - 01FEB13 Applicant Participants	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/13/2013	ML13064A143	2013/02/13 Turkey Point COL Hearing - FW: NRC/FPL PTN 6 & 7 COLA Weekly Call (public)	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
02/13/2013	ML13042A155	Follow-Up Questions For Environmental Request For Additional Information 6353 Question 3 Draft Response Related To ESRP Section 9.3.1 Alternative Site Selection, For The Combined License Application Review For Turkey Point, Units 6 And 7.	Letter	NRC/NRO/DNR L/EPB1	Florida Power & Light Co	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		COMBINED LICENSE APPLICATION				
02/19/2013	ML13064A146	2013/02/19 Turkey Point COL Hearing - Supplemental questions for RAI6353 Q3 on alt site selection (ML13042A155) (PUBLIC)	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
02/20/2013	ML13064A216	2013/02/20 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 71 RELATED TO SRP: 11.02 LIQUID WASTE MANAGEMENT FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
02/20/2013	ML13064A219	2013/02/20 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 72 RELATED TO SRP: 11.02 LIQUID WASTE MANAGEMENT	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

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		SYSTEM FOR THE TURKEY POINT UNITS 6 AND 7 COLA				
02/20/2013	ML13053A268	Turkey Point, Units 6 and 7, Revised Schedule for Response to NRC Request for Additional Information Letter No. 61 (eRAI 6432) Related to SRP Section 03.07.01 - Seismic Design Parameters.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
02/25/2013	ML13058A050	Proposed Turkey Point Units 6 and 7, Alternative Site Selection Process and Least Environmentally Damaging Practicable Alternatives.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
03/05/2013	ML13064A046	2013/03/05 Turkey Point COL Hearing - FW: L-2013-050 dated 06FEB13: Response to NRC RAI Letter 120830 (eRAI 6353 Rev. 2; 9.3.1-1) ESRP Section 9.3.1 - Alternative Site Selection Process	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/07/2013	ML13070A340	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter No. 61 (eRAI 6432) Related to SRP Section 03.07.01 - Seismic Design Parameters.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
03/11/2013	ML14309A110	FWS 2013- TN2604-FWS_MiamiDade_SppList.	FACT Sheet	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
03/21/2013	ML13100A097	2013/03/21 Turkey Point COL Hearing - RE: FDEP Hosted Information	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
03/26/2013	ML13127A052	2013/03/26 Turkey Point COL Hearing - FPL Letter L-2013-098 Dated 03-26-2013: Supplemental Response to NRC RAI Letter 120329 (eRAI 6354 Rev. 0)	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
04/01/2013	ML13127A048	2013/04/01 Turkey Point COL Hearing - FPL Letter L-2013-118 Dated 04-01-2013: Schedule for Supplemental Response to NRC Follow-Up Questions to	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041

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		RAI Letter 120830 (eRAI 6353 Rev. 2)				
04/02/2013	ML13127A051	2013/04/02 Turkey Point COL Hearing - FPL Letter L-2013-122 Dated 04-02-2013: Response to NRC Schedule Letter - Alternaive Sites	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
04/09/2013	ML13093A353	04/18/2013 - Revised - Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center COL Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DNR L/LB4	NRC/NRO/DN RL/LB4	05200018 05200019 05200022 05200023 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/09/2013	ML13098A083	05/30/2013-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DNR L/LB4	NRC/NRO/DN RL/LB4	05200018
						05200019
						05200022
						05200023
						05200029
						05200030
						05200040
						05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/12/2013	ML13100A302	04/04/2013-Summary of Public Teleconference Meeting Regarding Levy Nuclear Plant, Units 1 and 2 Combined License Application.	Meeting Summary Memoranda	NRC/NRO/DNR L/LB4	NRC/NRO/DN RL/LB4	05200018
						05200019
						05200022
						05200023
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						05200030
						05200040
04/18/2013	ML13127A056	2013/04/18 Turkey Point COL Hearing - Draft RAI 7080 related to SRP Section 06.04 - Control Room Habitability for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040
						05200041
04/18/2013	ML13109A431	Turkey Point, Units 6 and 7, Supplemental Response to NRC Request for Additional Information Letter 120830 (eRAI 6353 Rev. 2) Related to	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		ESRP Section 9.3.1 - Alternative Site Selection Process.				
04/19/2013	ML14309A076	FWS -2013- TN3056- Hobe Sound National Wildlife Refuge.	FACT Sheet	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
04/29/2013	ML13127A131	2013/04/29 Turkey Point COL Hearing - L- 2013-145 - Revised Schedule for Response to NRC Request for Additional Information Letters 120830 (eRAI 6353 Rev. 2) and 121114 (eRAI 6879) Related to ESRP Section 9.3.1 Alternative Site Selection Process	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041
04/29/2013	ML13121A075	Turkey Point, Units 6 and 7, Revised Schedule for Response to NRC Request for Additional Information Letters 120830 (eRAI 6353 Rev. 2) and 121114 (eRAI 6879) Related to ESRP Section 9.3.1 Alternative Site Selection Process.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/08/2013	ML12310A245	Cover Letter - Turkey Point Chapter 4, "Reactor" ASE With No Open Items.	Letter	NRC/NRO/DNR L/LB4	Florida Power & Light Co	05200040 05200041
05/08/2013	ML12311A152	Letter to Applicant - Turkey Point, Units 6 and 7 ASE With No Open Items For Chapter 16, "Technical Specifications."	Letter	NRC/NRO/DNR L/LB4	Florida Power & Light Co	05200040 05200041
05/14/2013	ML13162A077	2013/05/14 Turkey Point COL Hearing - Draft RAI 7097 related to SRP Section 11.02 - Liquid Waste Management System for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
05/14/2013	ML13162A084	2013/05/14 Turkey Point COL Hearing - Draft RAI 7103 related to SRP Section 11.05 - Process & Effluent Radiological monitoring and sampling for the Turkey Point Units 6 and 7 combined license application	E-Mail	NRC/NRO	NRC/NRO/DN RL/LB4	05200040 05200041
05/21/2013	ML13162A087	2013/05/21 Turkey Point COL Hearing - NRC-FPL 22MAY13 Public Meeting -	E-Mail	- No Known Affiliation	NRC/NRO/DN RL/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Alternative Sites Evaluation Presentation				
05/29/2013	ML13149A287	06/27/2013-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DNR L/LB4	NRC/NRO/DN RL/LB4	05200018 05200019 05200029 05200030 05200040 05200041
05/29/2013	ML13149A150	06/13/2013-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DNR L/LB4	NRC/NRO/DN RL/LB4	05200018 05200019 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/05/2013	ML13189A264	2013/06/05 Turkey Point COL Hearing - USACOE RAI 20130604 - Transmission Features	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
06/06/2013	ML13189A263	2013/06/06 Turkey Point COL Hearing - RE: NRC/FPL PTN 6 & 7 COLA Weekly Call MOVED from 7/4 due to Holiday	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
06/06/2013	ML13155A532	Levy Combined License, Units 1 and 2 Summary of May 2, 2013 Public Teleconference.	Meeting Summary Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018 05200022 05200023 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/13/2013	ML13164A335	2013/06/13 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 73 RELATED TO SRP 11.02 LIQUID WASTE MANAGEMENT PROGRAM FOR THE TURKEY POINT UNITS 6 AND 7 COL APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
06/13/2013	ML13164A383	2013/06/13 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 74 RELATED TO SRP 11.05 PROCESS & RADIOLOGICAL MONITORING INSTRUMENTATION FOR THE TURKEY POINT UNITS 6 AND 7 COL	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

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06/14/2013	ML13189A268	2013/06/14 Turkey Point COL Hearing - L-2013-186 - Submittal of AP1000 Combined License Application Semi-Annual Departure Report	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
06/14/2013	ML13189A270	2013/06/14 Turkey Point COL Hearing - RE: L-2013-186 - Submittal of AP1000 Combined License Application Semi-Annual Departure Report	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
06/14/2013	ML13189A267	2013/06/14 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 74 RELATED TO SRP 11.05 PROCESS & RADIOLOGICAL MONITORING INSTRUMENTATION FOR THE TURKEY POINT UNITS 6 AND 7 COL	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

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06/19/2013	ML13169A091	07/25/2013-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200022
						05200023
						05200029
						05200030
						05200040
						05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/19/2013	ML13169A088	07/11/2013-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.				05200018
						05200019
						05200022
						05200023
						05200029
			Meeting Agenda			05200030
			Meeting Notice			05200040
			Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200041
06/19/2013	ML13158A220	5/22/2013 - Summary of the Public Meeting to Discuss the Environmental Review for Florida Power and Light's Turkey Point Units 6 and 7 Combined License Application.	Meeting Summary			05200040
			Memoranda	NRC/NRO/DN RL/EPB1	NRC/NRO/DNR L/EPB1	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/20/2013	ML13189A275	2013/06/20 Turkey Point COL Hearing - FPL Letter L-2013-170 Dated 06-20-2013: Changes in COLA FSAR Section 10.4.5 - CWS	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
06/20/2013	ML13189A272	2013/06/20 Turkey Point COL Hearing - BBRRCT	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
06/20/2013	ML13175A006	Proposed Turkey Point Units 6 and 7, Voluntary Submittal of Proposed Final Safety Analysis Report Changes in Section 10.04.05 - Circulating Water System.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/27/2013	ML13189A284	2013/06/27 Turkey Point COL Hearing - Draft RAI 7112 related to SRP Section 11.03 - Gaseous Waste Management Systems Important to Safety for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
06/27/2013	ML13189A278	2013/06/27 Turkey Point COL Hearing - Draft RAI 7104 related to SRP Section 11.04 - Solid Waste Management Systems for the Turkey Point Units 6 and 7 combined license application	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/01/2013	ML13176A365	06/13/2013-Meeting Summary For Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Summary Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200029
						05200030
						05200040
						05200041
07/02/2013	ML13183A290	2013/07/02 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO.075 RELATED TO SRP SECTION 06.04 CONTROL ROOM HABITABILITY FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COL	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/03/2013	ML13200A080	Letter from National Park Service (NPS) Signed Memorandum of Agreement Between the NRC, U. S. Army Corps of Engineers, and NPS Associated with Construction and Operation of Turkey Point, Units 6 and 7.	Letter	State of GA US Dept of Interior (DOI)	NRC/NRO	05200040 05200041
07/08/2013	ML13196A063	Turkey Point, Units 6 and 7, Response to NRC Request for Additional Information Letter 120830 (eRAI 6353 Rev. 2) Related to ESRP Section 9.3.1 - Alternative Site Selection.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
07/08/2013	ML13196A064	Response to NRC Request for Additional Information Letter 121114 (eRAI 6879) Related to ESRP Section 9.3.1 Alternative Site Selection.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/10/2013	ML13218A691	2013/07/10 Turkey Point COL Hearing - Draft RAI 7129 related to SRP Section 10.04.05- Circulating Water System for the Turkey Point Units 6 and 7 combined license application	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/16/2013	ML14342A014	DOA 2013 - TN2777 - MOR EA for Atlantic Civil Works project 1995-6797 - fill source.	Environmental Assessment Memoranda	US Dept of the Army, Environmental Ctr	NRC/NRO	05200040 05200041
07/18/2013	ML14328A487	USACE 2013 - TN3473 - USACE 2013 SAJ - 1995-6797 Atlantic Civil, Inc., Final Permit IP-AG.	Letter Map	US Dept of the Army, Corps of Engineers	Atlantic Civil, Inc NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/23/2013	ML13218A713	2013/07/23 Turkey Point COL Hearing - RAI LETTER NO.078 RELATED TO SRP SECTION 10.04.05 CIRCULATING WATER SYSTEMS FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/23/2013	ML13204A334	2013/07/23 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR. .078 RELATED TO SRP SECTION 10.04.05 CIRCULATING WATER SYSTEM FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COLA	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/23/2013	ML13074A087	Applicant Letter - Turkey Point, Units 6 and 7, Chapter 15, "Accident Analysis."	Letter	NRC/NRO/DN RL/LB4	Florida Power & Light Co	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/23/2013	ML13193A206	07/11/2013-Cancelled Notice of Forthcoming Public Teleconference to Discuss AP1000 Design Center Combined License Review Issues.	Meeting Notice Meeting Agenda Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200029
						05200030
						05200040
						05200041
07/24/2013	ML13206A420	Turkey Point, Units 6 & 7, Schedule for Response to NRC Request for Additional Information Letter No. 074 (eRAI 7103) Related to SRP Section 11.02 - Process and Radiological Monitoring Instrumentation and Sampling Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/24/2013	ML13101A081	Letter To Applicant: Turkey Point, Units 6 & 7, ASE without Open Items for Chapter 18, "Human Factors Engineering."	Letter	NRC/NRO/DN RL/LB4	Florida Power & Light Co	05200040 05200041
07/24/2013	ML13206A421	Turkey Point, Units 6 & 7, Schedule for Response to NRC Request for Additional Information Letter No. 073 (eRAI 7097) Related to SRP Section 11.02 - Liquid Waste Management Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
07/24/2013	ML13074A125	Applicant Letter - Turkey Point Units 6 and 7 - ASE Without Open Items For Chapter 17, "Quality Assurance."	Letter	NRC/NRO/DN RL/LB4	Florida Power & Light Co	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/24/2013	ML12262A238	ASE - Turkey Point Chapter 17 - Quality Assurance.	NRO Safety Evaluation Report (SER)- Delayed	NRC/NRO/DN RL/LB4		05200040 05200041
07/24/2013	ML12262A247	Turkey Point Chapter 18 - Human Factors Engineering.	NRO Safety Evaluation Report (SER)- Delayed	NRC/NRO/DN RL/LB4		05200040 05200041
07/29/2013	ML13218A761	2013/07/29 Turkey Point COL Hearing - RAI LETTER NO.076 RELATED TO SRP SECTION 11.04 SOLID WASTE MANAGEMENT SYSTEMS FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/29/2013	ML13210A401	2013/07/29 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR. No: 76 RELATED TO SRP: 11.04 SOLID WASTE MANAGEMENT FOR THE TURKEY POINT UNITS 6 AND 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/29/2013	ML13218A738	2013/07/29 Turkey Point COL Hearing - RAI LETTER NO.077 RELATED TO SRP SECTION 11.03 GASEOUS WASTE SYSTEMS FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/29/2013	ML13210A400	2013/07/29 Turkey Point RAI for SER - RAI LETTER NO.077 RELATED TO SRP SECTION 11.03 GASEOUS WASTE MANAGEMENT SYSTEMS FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COMBINED	Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/30/2013	ML13218A770	2013/07/30 Turkey Point COL Hearing - FW: NRC/FPL FSAR Chapter 11, eRAI 6985, suggested Meeting Agenda - Additional details	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/30/2013	ML13218A774	2013/07/30 Turkey Point COL Hearing - FW: NRC/FPL FSAR Chapter 11, eRAI 6985, suggested Meeting Agenda	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/30/2013	ML13218A765	2013/07/30 Turkey Point COL Hearing - FW: NRC/FPL FSAR Chapter 11, eRAI 6985, suggested Meeting Agenda - Additional details	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/30/2013	ML13218A795	2013/07/30 Turkey Point COL Hearing - FW: Turkey Point Units 6 & 7 2013 Supplemental Boring Schedule	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/31/2013	ML14342A023	Golder-2013-TN2982-Golder Assoc 2013 Ft. Meyers plant.	Environmental Impact Statement	Golder Associates, Inc	Florida Power & Light Co NRC/NRO	05200040 05200041
07/31/2013	ML13214A037	Turkey Point Units 6 & 7 - Response to NRC Request for Additional Information Letter No. 074 (eRAI 7103) - SRP Section 11.02 - Process and Radiological Monitoring Instrumentation & Sampling Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/01/2013	ML12172A173	Memorandum from G. Tracy to R. W. Borchardt: Agreement between U.S. Army Corps of Engineers (Jacksonville District), U.S. National Park Service (Southeast Region) and U.S. Nuclear Regulatory Commission on Environmental Review - Turkey Point.	Memoranda	NRC/NRO	NRC/EDO	05200040 05200041
08/05/2013	ML13218A799	2013/08/05 Turkey Point COL Hearing - MOA	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
08/06/2013	ML13218A636	2013/08/06 Turkey Point COL Hearing - FW: Memorandum of Agreement for Environmental Review Related To The Issuance of Authorizations To Build And Operate Turkey Point	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/08/2013	ML13225A447	Proposed Turkey Point Units 6 and 7, Schedule for Response to NRC Request for Additional Information Letter No. 075 (eRAI 6225) Related to SRP Section 06.04 - Control Room Habitability Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
08/08/2013	ML13219A125	08/22/2013-Notice of Forthcoming Public Meeting To Discuss Deep Well Injection Related Draft RAs with Florida Power and Light's COL Application For Turkey Point, Units 6 and 7.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/08/2013	ML13219A353	08/08/2013-CANCELLED-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200029
						05200030
						05200040
						05200041
08/08/2013	ML13218A259	07/25/2013-Summary of Public Teleconference with AP1000 Design Center Combined License Applicants To Discuss Application Review Issues.	Meeting Summary Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200029
						05200030
						05200040
						05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/09/2013	ML13225A029	Turkey Point, Units 6 and 7 - Response to NRC Request for Additional Information Letter No. 072 (eRAI 6985) - SRP Section 11.02 - Liquid Waste Management Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
08/12/2013	ML14309A078	FWS 2013 - TN3749 - USFWS2013 Indigo Snake EIS Standard Protection Measures Final.	- No Document Type Applies	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
08/13/2013	ML13249A600	2013/08/13 Turkey Point COL Hearing - Today's call with the USACE (public)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
08/14/2013	ML13227A344	Turkey Point, Units 6 & 7 - Revised Schedule for Response to NRC Request for Additional Information Letter No. 072 (eRAI 6985) re SRP Section 11.2.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/15/2013	ML13249A599	2013/08/15 Turkey Point COL Hearing - Draft RAI 7215 related to SRP Section 13.03 Emergency Planning for the Turkey Point Units 6 and 7 combined license application.	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
08/16/2013	ML13231A153	Turkey Point, Units 6 & 7, Response to NRC Request for Additional Information Letter No. 78 (eRAI 7129) - Related to SRP Section 10.04.05 Circulating Water Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/19/2013	ML13226A135	09/12/2013-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200022
						05200023
						05200029
						05200030
						05200040
						05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/19/2013	ML13226A139	09/26/2013-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200022
						05200023
						05200029
						05200030
						05200040
08/20/2013	ML13249A598	2013/08/20 Turkey Point COL Hearing - RE: FPL NRC Electronic Reading Room DRAFT EMAIL TO PM's	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040
						05200041
08/20/2013	ML13249A597	2013/08/20 Turkey Point COL Hearing - RE: FPL NRC Electronic Reading Room DRAFT EMAIL TO PM's	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/23/2013	ML13239A055	Notification of Part 21 Report of Evaluation of Deviation Involving Technical Specifications Identified in Corrective Action Report as Having a Time Response Surveillance Requirement that Cannot be Directly Measured Due to Logic Pathway where Overlap...	Deficiency Report (per 10CFR50.55e and Part 21)	Westinghouse Electric Co	NRC/Document Control Desk NRC/NRO	05200014
						05200015
						05200018
						05200019
						05200022
						05200023
						05200025
						05200026
						05200027
						05200028
08/23/2013	ML13239A055	Notification of Part 21 Report of Evaluation of Deviation Involving Technical Specifications Identified in Corrective Action Report as Having a Time Response Surveillance Requirement that Cannot be Directly Measured Due to Logic Pathway where Overlap...	Deficiency Report (per 10CFR50.55e and Part 21)	Westinghouse Electric Co	NRC/Document Control Desk NRC/NRO	05200029
						05200030
						05200040
08/23/2013	ML13239A055	Notification of Part 21 Report of Evaluation of Deviation Involving Technical Specifications Identified in Corrective Action Report as Having a Time Response Surveillance Requirement that Cannot be Directly Measured Due to Logic Pathway where Overlap...	Deficiency Report (per 10CFR50.55e and Part 21)	Westinghouse Electric Co	NRC/Document Control Desk NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2013	ML13235A170	08/22/2013- CANCELLED-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200022
						05200023
						05200029
						05200030
						05200040
						05200041
08/28/2013	ML13249A596	2013/08/28 Turkey Point COL Hearing - RE: FPL NRC Electronic Reading Room DRAFT EMAIL TO PM's	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/28/2013	ML13240A502	2013/08/28 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LTR. No. 79 RELATED TO SRP SECTION 13.03 EMERGENCY PLANNING FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 & 7 COMBINED LICENSE APPLICATION	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
08/29/2013	ML13249A595	2013/08/29 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LTR. No. 79 RELATED TO SRP SECTION 13.03 EMERGENCY PLANNING FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 & 7 COMBINED LICENSE APPLICATION	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/29/2013	ML13249A594	2013/08/29 Turkey Point COL Hearing - RE: FPL NRC Electronic Reading Room DRAFT EMAIL TO PM's	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
08/31/2013	ML16172A124	USGS Integrating Seismic -Reflection and Sequence-Stratigraphic Methods to Characterize the Hydrogeology of the Floridan Aquifer System in Southeast Florida, 2013-TN4573.	Environmental Impact Statement Environmental Report	NRC/NRO		05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/06/2013	ML13249A297	09/19/2013 - Notice of Forthcoming Public Teleconference Meeting To Discuss Issues Related To Subsurface Investigation of Halocene Stratigraphy at Florida Power and Light's COL Application For Turkey Point, Units 6 and 7.	Meeting Notice	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200040
			Meeting Agenda			05200041
09/09/2013	ML13254A218	Proposed Turkey Points Units 6 and 7, Response to NRC Request for Additional Information Letter No. 76 (eRAI 7104) - Related to SRP Section 11.04 Solid Waste Management.	E-Mail	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/09/2013	ML13254A217	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter No. 77 (eRAI 7112) - Related to SRP Section 11.03 Gaseous Waste Management Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
09/12/2013	ML13276A261	2013/09/12 Turkey Point COL Hearing - RE: Turkey Point 6 & 7 RAI Response	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/12/2013	ML13253A222	10/24/2013-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200022
						05200023
						05200029
						05200030
						05200040
						05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/12/2013	ML13255A341	CANCELLED- 09/12/2013-Notice of Forthcoming Public Teleconference to Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200022
						05200023
						05200029
						05200030
						05200040
						05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/16/2013	ML13261A144	St. Lucie, Units 1 and 2, Turkey Point, Units 3 and 4, Turkey Point Units 6 and 7, Seabrook, Duane Arnold, Point Beach, Units 1 and 2, Official Service List Distribution for Safeguards Information.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRR	05000250
						05000251
						05000266
						05000301
						05000331
						05000335
						05000389
						05000443
						05200040
						05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/18/2013	ML13263A174	Proposed Turkey Point Units 6 and 7, Response to NRC Request for Additional Information Letter No. 075 (eRAI7080) Standard Review Plan Section 06.04 Control Room Habitability Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
09/20/2013	ML13276A262	2013/09/20 Turkey Point COL Hearing - Update on Forthcoming Turkey Point RAs on alternative sites (public)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
09/23/2013	ML13248A497	Audit Report For Staff Audit Re: Turkey Point Units 6 and 7 Subsurface Investigations August 22-23, 2013.	Audit Report Letter	NRC/NRO/DN RL/LB4	Florida Power & Light Co	05200040 05200041
09/25/2013	ML13276A265	2013/09/25 Turkey Point COL Hearing - FW: Official Service List Distribution for Safeguards Information	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/26/2013	ML13276A269	2013/09/26 Turkey Point COL Hearing - RE: EW-1 Sonic Logs Request (public)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
09/26/2013	ML13269A212	09/26/2013- CANCELLED-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018 05200019 05200022 05200023 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/02/2013	ML13276A524	2013/10/02 Turkey Point COL Hearing - FW: Proposed Agenda for Public meeting, 9/19	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/02/2013	ML13276A288	2013/10/02 Turkey Point COL Hearing - FW: Muck Testing - Photos for meeting today	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/02/2013	ML13276A554	2013/10/02 Turkey Point COL Hearing - FW: PTN 6&7 - Core Boring Activities - NRC Visit	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/02/2013	ML13276A283	2013/10/02 Turkey Point COL Hearing - FW: Muck Testing - Photos for meeting today - core photos	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/02/2013	ML13276A286	2013/10/02 Turkey Point COL Hearing - FW: Muck Testing - Photos for meeting today - core photos	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/02/2013	ML13276A558	2013/10/02 Turkey Point COL Hearing - FW: L-2013-275 - Response to NRC Request for Additional Information Letter No. 075 (eRAI 7080) Standard Review Plan Section 06.04 Control Room Habitability Systems	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/02/2013	ML13276A557	2013/10/02 Turkey Point COL Hearing - FW: Unit 3 & 4	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/02/2013	ML13276A273	2013/10/02 Turkey Point COL Hearing - FW: New GIS Maps and Data for Tech Reviewer	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/02/2013	ML13276A274	2013/10/02 Turkey Point COL Hearing - FW: Personnel on NRC Public teleconference	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/02/2013	ML13276A561	2013/10/02 Turkey Point COL Hearing - FW: L-2013-260 - Response to NRC RAI Letter No. 77 (eRAI 7112) - Related to SRP Section 11.03Gaseous Waste Management Systems	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/02/2013	ML13276A563	2013/10/02 Turkey Point COL Hearing - FW: L-2013-259 - Response to NRC RAI Letter No. 76 (eRAI 7104) - Related to SRP Section 11.04 Solid Waste Management	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/02/2013	ML13276A280	2013/10/02 Turkey Point COL Hearing - FW: Muck Testing - Photos for meeting today - core photos	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/03/2013	ML13207A396	Letter To Applicant: Turkey Point Units 6 and 7 ASE Chapter 14, "Initial Test Programs".	Letter	NRC/NRO/DN RL/LB4	Florida Power & Light Co	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/07/2013	ML13304C087	2013/10/07 Turkey Point COL Hearing - FW: Telecom to Discuss RAI 7269 -- Turkey Point Alternative Sites (public)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/07/2013	ML13304C085	2013/10/07 Turkey Point COL Hearing - RE: Telecom to Discuss RAI 7269 -- Turkey Point Alternative Sites	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
10/08/2013	ML13283A193	Proposed Turkey Point, Units 6 and 7 - Voluntary Submittal of Proposed Final Safety Analysis Report Changes in Section 3.5.1.5 - Missiles Generated by Events Near the Site.	Final Safety Analysis Report (FSAR) Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO NRC/RGN-II	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/09/2013	ML13280A543	10/09/2013 - Ltr to M.K. Nazar, FPF From: A. Williamson, NRC Subject: Environmental RAI Letter 131009 Related To Environmental SRP Section 9.3 Alternative Sites For The COL Application Review For Turkey Point, Units 6 and 7, RAI 7296.	Letter Request for Additional Information (RAI)	NRC/NRO/DN RL/EPB1	Florida Power & Light Co	05200040 05200041
10/09/2013	ML13281A899	10/10/2013- CANCELLED-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center COL Review Issues.	Meeting Notice	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018 05200019 05200022 05200023 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/10/2013	ML14328A522	SFWMD 2013 - TN3461 - 2013 Lec Plan.	Environmental Monitoring Report	State of FL, Water Management District	NRC/NRO	05200040 05200041
10/14/2013	ML13289A210	Proposed Turkey Point, Units 6 and 7 - Revised Schedule for Response to NRC Request for Additional Information Letter No. 072 (eRAI 6985) Related to SRP Section 11.2 Liquid Waste Management Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/15/2013	ML13290A140	Turkey Point Units 6 and 7 - Response to NRC Request for Additional Information Letter No. 079(eRAI 7215) Standard Review Plan Section 13.03-Emergency Planning.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/21/2013	ML13304C083	2013/10/21 Turkey Point COL Hearing - FW: FPL L-2013-260, Response to NRC RAI Letter 77, eRAI7112, Q.11.03-1	E-Mail	NRC/NRO/DS EA/RPAC	NRC/NRO/DNR L/LB4	05200040 05200041
10/22/2013	ML13304C081	2013/10/22 Turkey Point COL Hearing - Proposed meeting date for public meeting on alternative sites	E-Mail	NRC/NRO/DN RL/EPB1	NRC/NRO/DNR L/LB4	05200040 05200041
10/23/2013	ML13295A314	10/24/2013-Cancelled Notice of Forthcoming Public Teleconference to Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018 05200019 05200022 05200023 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/28/2013	ML13302C090	Turkey Point, Units 6 and 7, Enclosure 2 to L-2013-304, Supplement to RAI-6544, TPG-GW-GLR-001, Rev. 0.	- No Document Type Applies	Westinghouse Electric Co, LLC	NRC/NRO	05200040 05200041
10/28/2013	ML13302C089	Turkey Point, Units 6 & 7, Supplemental Response to NRC Request for Additional Information Letter No. 64 (eRAI 6544) Related to SRP Section 03.05.03 - Barrier Design Procedures.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/28/2013	ML13302C082	Supplemental Response to NRC Request for Additional Information Letter No. 58 (eRAI 6434) - Concerning Implementation of Fukushima Near-Term Task Force Recommendations.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/28/2013	ML13302C083	Enclosure 3 - AP1000 - Response to NRC Orders EA-12-051 and EA-12-063, and Background Information for Future Licensees on AP1000 Spent Fuel Pool Instrumentation.	Report, Technical	Florida Power & Light Co	NRC/NRO	05200040 05200041
11/01/2013	ML13340A809	2013/11/01 Turkey Point COL Hearing - FW: RAI 7112 Response Calc Pkg Available Now	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
11/01/2013	ML13301A630	11/13/13 - Notice of Forthcoming Meeting To Discuss The Alternative Sites Selection Analysis For Florida Power and Light's Turkey Point Units 6 And 7 Combined License Application.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/EPB1	NRC/NRO/DNR L/EPB1	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/04/2013	ML13340A808	2013/11/04 Turkey Point COL Hearing - FW: FPL L-2013-260, Response to NRC RAI Letter 77, eRAI7112, Q.11.03-1	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
11/05/2013	ML13311A105	Proposed Turkey Point, Unit 6 and 7, Supplemental Transmission Corridor Information for the Combined License Application Part 3 - Environmental Report.	Environmental Report Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
11/20/2013	ML13340A807	2013/11/20 Turkey Point COL Hearing - FW: Update of TP Units 6&7 DWI Preliminary Staff Comments on FPL Aug. 9 2013 Partial Response to NRC RAI Letter No. 72	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/20/2013	ML13340A806	2013/11/20 Turkey Point COL Hearing - FW: FPL L-2013-260, Response to NRC RAI Letter 77, eRAI7112, Q.11.03-1	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
11/22/2013	ML13353A577	Westinghouse Letter-Identification and Resolution of Passive Core Cooling System Condensate Return Design Issue For The AP1000 Plant.	Letter	Westinghouse Electric Co	NRC/NRO/DNR L/LB4	05200006 05200018 05200019 05200025 05200026 05200027 05200028 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/25/2013	ML13330B668	Proposed Turkey Point, Units 6 and 7 - Response to NRC Request for Additional Information Letter 131009 (eRAI 7269) Related to ESRP Section 9.3 Alternative Sites.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
11/26/2013	ML13333A171	Proposed Turkey Point, Units 6 and 7 - Revised Schedule for Response to NRC Request for Additional Information Letter No. 072 (eRAI 6985) Related to SRP Section 11.2 Liquid Waste Management Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/26/2013	ML13329A451	12/12/2013-Notice of Forthcoming Public Teleconference To Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200022
						05200023
						05200029
						05200030
						05200040
12/04/2013	ML13340A012	Proposed Turkey Point, Units 6 & 7 - Revised Response to NRC Request for Additional Information Letter No. 043 (eRAI 5875) SRP Section - 02.05.03 Surface Faulting.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/04/2013	ML13340A097	Proposed Turkey Point, Units 6 & 7, Revised Response to NRC Request for Additional Information Letter No. 041 (eRAI 6024) SRP Section: 02.05.01 - Basic Geologic and Seismic Information.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/04/2013	ML13340A113	Turkey Point Units 6 and 7 - Revised Response to NRC Request for Additional Information Letter No. 037 (eRAI 5896) SRP Section - 02.05.02 Vibratory Ground Motion.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/04/2013	ML13340A109	Proposed Turkey Point, Units 6 & 7, FPL Response to NRC RAI No. 02.05.01-17 (eRAI 6024). Attachment 15, Pages 1 to 112 of 112.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/04/2013	ML13340A108	Proposed Turkey Point, Unit 6 & 7, FPL Response to NRC RAI No. 02.05.01-17 (eRAI 6024). Attachment 15, Pages 51 to 95 of 112.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041
12/04/2013	ML13340A111	Proposed Turkey Point, Units 6 and 7, FPL Response to NRC RAI No. 02.05.01-18 (eRAI 6024), SRP Section: 02.05.01 - Basic Geologic and Seismic Information. Attachments 16 to 17.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041
12/04/2013	ML13340A115	Attachment 1: FPL Revised Response to NRC RAI No. 02.05.02-2 (eRAI 5896).	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/04/2013	ML13340A116	Attachment 1 Enclosure A: Turkey Point Units 6 and 7 - COL Application, SSHAC Caribbean GMPE Questionnaire and Attachment 2.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041
12/04/2013	ML13340A117	Attachment 2 Enclosure A: SSHAC Caribbean Questionnaire. Attachments 3, 4, 5 & 6 also enclosed.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041
12/04/2013	ML13340A099	Proposed Turkey Point, Units 6 & 7, FPL Revised Response to NRC RAI No. 02.05.01-1 (eRAI 6024), SRP Section: 02.02.01 - Basic Geologic and Seismic Information. Attachments 1 to 7.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/04/2013	ML13340A106	Proposed Turkey Point, Units 6 & 7, FPL Response to NRC RAI No.02.05.01-17 (eRAI 6024), SRP Section Section: 02.05.01 - Basic Geologic and Seismic Information. Attachment 15, Pages 1 to 50 of 112.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041
12/04/2013	ML13340A100	Proposed Turkey Point, Unit 6 & 7, FPL Revised Response to NRC RAI No. 02.05.01-8 (eRAI 6024), SRP Section: 02.05.01 - Basic Geologic and Seismic Information. Attachments 8 to 14.	Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/04/2013	ML13340A101	Proposed Turkey Point, Units 6 and 7, FPL Response to NRC RAI No. 02.05.01-21 (eRAI 6024), SRP Section: 02.05.01 - Basic Geologic and Seismic Information. Attachments 17, Enclosure A to 28.	Report, Technical	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/10/2013	ML15293A413	Comment (221) of Emily Northrop On Combined License Application for Turkey Point Nuclear Plant, Unit Nos. 6 and 7; Draft Environmental Impact Statement.	General FR Notice Comment Letter	- No Known Affiliation	NRC/ADM/DAS /RADB	05200040 05200041
12/11/2013	ML14328A486	USACE-2013- TN2847- USACE Jacksonville 2013 Okee Fish Weblink.	FACT Sheet	US Dept of the Army, Corps of Engineers, Jacksonville District	NRC/NRO	05200040 05200041
12/12/2013	ML13345A305	Enclosure/Handout - Public Meeting To Discuss The Alternative Sites Selection Analysis For FPL Turkey Point 6&7 Combined License Application.	- No Document Type Applies	NRC/NRO		05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/12/2013	ML13345A307	Enclosure 1 - Public Meeting To Discuss The Alternative Sites Selection Analysis For FPL Turkey Point Units 6 & 7 Combined License Application	Meeting Notice	NRC/NRO		05200040 05200041
12/13/2013	ML13343A323	11/13/2013 - Summary of Public Meeting Held to Discuss Alternative Sites Selection Analysis For Florida Power and Light's Turkey Point Units 6 and 7 Combined License Application.	Meeting Summary Memoranda	NRC/NRO/DN RL/EPB1	NRC/NRO/DNR L/EPB1	05200040 05200041
12/16/2013	ML13357A442	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan) - Part 5 Emergency Plan Supplement 1 - ETE	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A449	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan) - Part 5 Emergency Plan Supplement 7 - Florida Radiological Emergency Mgmt. Plan Annex A, Appendix II (Part C)	Emergency Preparedness-Emergency Plan	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A447	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan) - Part 5 Emergency Plan Supplement 7 - Florida Radiological Emergency Mgmt. Plan Annex A, Appendix II (Part A)	Emergency Preparedness-Emergency Plan	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A446	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan) - Part 5 Emergency Plan Supplement 6 - Florida Emergency Prep. Annex (Part B-Chapters 7-15)	Emergency Preparedness-Emergency Plan	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A443	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan) - Part 5 Emergency Plan Supplements 2 (Reg. Req Matrix), 3 (State & County Cert. Letters), 4 (Letters of Agreement), & 5 (Eval. Criteria Cross Ref.)	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A445	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan) - Part 5 Emergency Plan Supplement 6 - Florida Emergency Prep. Annex (Part A-Chapters 1-6)	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A450	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan) - Part 5 Emergency Plan Supplements 8 (Radiological Emergency Prep. Plan, Miami-Dade County) and 9 (Radiological Prep. Plan, Monroe County)	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A448	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan) - Part 5 Emergency Plan Supplement 7 - Florida Radiological Emergency Mgmt. Plan Annex A, Appendix II (Part B)	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A440	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan) - Part 5 Emergency Plan	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A633	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 44-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A627	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 39-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A536	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 18-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A690	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 4-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A587	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 13-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A430	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 7 - Environmental Impacts of Postulated Accidents Involving Radioactive Materials	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A550	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 26-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A420	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.6 - Geology	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A523	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 15-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A514	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 11-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A505	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 6-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A631	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 42-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A581	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 8-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A625	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 38-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A500	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 1-Final Data Report	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A562	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 37-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A601	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 25-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A417	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.4 - Ecology	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A549	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 25-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A713	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 23-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A646	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 56-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A561	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 36-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A708	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 19-Appendix E-Laboratory Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A426	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 4 - Environmental Impacts of Construction	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A638	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 48-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A566	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 41-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A595	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 20-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A501	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 2-Appendix A-Survey Report	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A594	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 19-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A431	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 8 - Need for Power	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A568	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 43-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A572	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 46-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A644	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 54-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A641	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 51-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A434	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER Chapter 10 - Environmental Consequences of the Proposed Action	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A591	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 17-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A647	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 57-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A636	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 46-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A518	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 14-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A712	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 22-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A570	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 44-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A704	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 16-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A696	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 8-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A701	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 13-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A695	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 7-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A586	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 12-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A692	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 5-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A617	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 36-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A552	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 28-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A504	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 5-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A590	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 16-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A602	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 26-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A589	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 15-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A422	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.8 - Related Federal Project Activities	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A527	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 16-Appendix B-Geotechnical Field Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A648	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 58-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A508	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 8-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A603	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 27-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A409	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.1 - Station Location	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A597	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 22-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A407	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 5	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A653	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 6-New Fuel Shipping Plan	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A642	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 52-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A579	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 6-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A403	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 1	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A709	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 20-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A503	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 4-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A705	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 17-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A588	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 14-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A564	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 39-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A506	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 7-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A557	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 33-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A688	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 2-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A516	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 13-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A585	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 11-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A643	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 53-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A560	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 35-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A408	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 6	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A703	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 15-Appendix E-Laboratory Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A714	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 4, Part 1-Appendix F-RCTS Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A622	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 37-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A511	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 10-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A427	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 5 - Environmental Impacts of Operation	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A406	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 4	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A711	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 21-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A706	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 18-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A583	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 10-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A404	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 2	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A576	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 4-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A542	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 20-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A400	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 1 - Introduction	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A629	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 40-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A577	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 5-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A700	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 12-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A510	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 9-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A649	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 59-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A651	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 61-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A401	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER Chapter 1 - Introduction - Appendix A - Consultation Letters and Responses (Part A)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A421	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.7 - Meteorology, Air Quality, and Noise	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A547	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 23-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

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12/16/2013	ML13357A402	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER Chapter 1 - Introduction - Appendix A - Consultation Letters and Responses (Part B)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A432	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 9 - Alternatives to the Proposed Action	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A502	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 3-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A499	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 1-FPL New Nuclear Projects Quality Assurance Program Description FPL-2 (QAPD)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A565	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 40-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A399	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Master Table of Contents	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A418	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics	Environmental Report	Florida Power & Light Co		
			License-Application for Combined License (COLA)		NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A650	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 60-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co		
			License-Application for Combined License (COLA)		NRC/Document Control Desk	05200040
					NRC/NRO	05200041

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12/16/2013	ML13357A693	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 6-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A609	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 33-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A553	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 29-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A698	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 10-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A613	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 35-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A571	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 45-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A600	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 24-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A634	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 45-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A715	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 4, Part 2-Appendix G-Groundwater Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A637	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 47-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A573	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 1-Appendix C- Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A606	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 30-Appendix D- Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A655	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosures Introduction	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A555	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 31-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A610	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 34-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A405	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 3	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A423	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 3 - Plant Description	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A608	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 32-Appendix D-Geophysical Test Data	Environmental Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A410	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.2 - Land	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A563	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 38-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A605	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 29-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A575	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 3-Appendix C-Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A554	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 30-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A654	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 7-Supplemental Information in Support of 10 CFR Part 70 Special Nuclear Material License Application	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A559	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 34-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A414	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Figures 32-68	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A551	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 27-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A567	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 42-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A604	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 28-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A697	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 9-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A546	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 22-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A413	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Figures 1-31	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A639	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 49-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A645	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 55-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A599	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 23-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A582	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 9-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A411	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Water	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A580	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 7-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A652	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 5-Special Nuclear Material (SNM) Material Control and Accounting Program Description	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A607	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 31-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A689	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 3-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A687	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 1-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A640	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 50-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

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12/16/2013	ML13357A593	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 18-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A632	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 43-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A702	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 14-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A416	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.3 - Figures 69-76	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

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12/16/2013	ML13357A574	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 2-Appendix C- Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A699	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 11-Appendix E- Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A556	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 32-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A428	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 6 - Environmental Measurements and Monitoring Programs	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A548	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 24-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A630	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 41-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A545	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 21-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A541	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 19-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A515	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 12-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A596	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 21-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A532	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 17-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A395	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 19 - Probabilistic Risk Assessment	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A391	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 15 - Accident Analyses	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A352	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2AA - Transducer Data	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A342	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.4 - Potential Dam Failures	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A394	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 18 - Human Factors Engineering	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A356	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 226-247	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A353	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2BB - Aquifer Pumping Test Results	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A363	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A357	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 248-253	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A340	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.2 - Floods	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A337	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.2 - Nearby Industrial, Transportation, and Military Facilities	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A354	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2CC - Groundwater Model Development and Analysis	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A371	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.2 - Vibratory Ground Motion	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A382	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 6 - Engineered Safety Features	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A385	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 9 - Auxiliary Systems	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A373	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.4 - Stability of Subsurface Materials and Foundations	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A386	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 10 - Steam and Power Conversion	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A380	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 4 - Reactor	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A365	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 229-252	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A345	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.7 - Ice Effects	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A384	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 8 - Electric Power	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A332	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Master Table of Contents	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A359	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.13 - Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A372	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.3 - Surface Faulting	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A367	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 279-303	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A375	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.5 - Stability of Slopes	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A387	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 11 - Radioactive Waste Management	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A370	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 323-389	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A362	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.0 - Geology, Seismology, and Geotechnical Engineering	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A360	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.14 - Technical Specification and Emergency Operation Requirements	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A348	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.10 - Flooding Protection Requirements	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A378	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Appendix 2.5AA - Potential for Carbonate Dissolution and Karst Development	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A355	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 201-225	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A379	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 3 - Design of Structures, Components, Equipment and Systems	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A333	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 1 - Introduction and General Description of the Plant	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A393	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 17 - Quality Assurance	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A366	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 253-278	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A383	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 7 - Instrumentation and Controls	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A364	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 201-228	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A334	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.0 - Site Characteristics	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A381	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 5 - Reactor Coolant System and Connected Systems	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A388	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 12 - Radiation Protection	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A389	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 13 - Conduct of Operations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A344	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.6 - Probable Maximum Tsunami Hazards	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A390	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 14 - Initial Test Program	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A338	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.3 - Meteorology	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A376	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.6 - Combined License Information	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A392	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 16 - Technical Specifications	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A351	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A346	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.8 - Cooling Water Canals and Reservoirs	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A349	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.11 - Low Water Considerations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A336	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.1 - Geography and Demography	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A361	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.15 - Combined License Information	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A369	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 304-322	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A347	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.9 - Channel Diversions	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A341	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.3 - Probable Maximum Flood on Streams and Rivers	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A343	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.5 - Probable Maximum Surge and Seiche Flooding	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/16/2013	ML13357A339	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.1 - Hydrologic Description	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A454	FPL - Turkey Point Units 6 & 7 COLA (Generic DCD Departures Report) - Part 7 Departures and Exemption Requests	Generic DCD Departures Report	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A472	FPL - Turkey Point Units 6 & 7 COLA (ITAAC) - Part 10 License Conditions (Including ITAAC)	Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/16/2013	ML13357A456	FPL - Turkey Point Units 6 & 7 COLA (Safeguards and Security Plans) - Part 8 Safeguards and Security Plans	Letter License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A664	Proposed Turkey Point Units 6 & 7, Combined License Application Submittal 12 and Annual Update of the COL Application - Revision 5 and Semi-Annual Update of Departures Report.	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/16/2013	ML13357A329	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information) - Part 1 - General and Financial Information	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

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12/16/2013	ML13357A461	FPL - Turkey Point Units 6 & 7 COLA (Other) - Part 9 Withheld Information Enclosure 3 - Turkey Point Response Plan, Miami-Dade County, Florida (Part B)	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A458	FPL - Turkey Point Units 6 & 7 COLA (Other) - Part 9 Withheld Information Enclosures 1 and 2 - Not Used	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
12/16/2013	ML13357A452	FPL - Turkey Point Units 6 & 7 COLA (Site Redress Plan) - Part 6 Limited Work Authorization and Site Redress Plan	Site Redress Plan	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041
12/16/2013	ML13357A438	FPL - Turkey Point Units 6 & 7 COLA (Technical Specifications) - Part 4 Technical Specifications	Technical Specifications	Florida Power & Light Co	NRC/Document Control Desk	05200040
			License-Application for Combined License (COLA)		NRC/NRO	05200041

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12/19/2013	ML14003A278	2013/12/19 Turkey Point COL Hearing - RE: Access to FPL electronic reading room	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
12/19/2013	ML14003A193	2013/12/19 Turkey Point COL Hearing - RE: Access to FPL electronic reading room	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
12/19/2013	ML14003A277	2013/12/19 Turkey Point COL Hearing - RE: Access to FPL electronic reading room	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
12/19/2013	ML14003A273	2013/12/19 Turkey Point COL Hearing - RE: Access to FPL electronic reading room	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
12/20/2013	ML14003A192	2013/12/20 Turkey Point COL Hearing - RE: Access to FPL electronic reading room	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
12/20/2013	ML14003A190	2013/12/20 Turkey Point COL Hearing - RE: Access to FPL electronic reading room	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/31/2013	ML14342A034	SFWMD 2013 - TN4034 - Audubon2013 So Florida Wading Birds.	Environmental Impact Statement	Univ Of Florida, Gainesville	NRC/NRO	05200040 05200041
12/31/2013	ML14342A040	Zhang and Sharfstein 2013 - TN2894 - SFWMD 2013 S Florida Env Rpt Chapter 8.	Environmental Impact Statement Environmental Report	State of FL	NRC/NRO	05200040 05200041
12/31/2013	ML14336A381	FNAI 2013 TN3066- FNAI 2014 St Lucie Aquatic TE.	Report, Technical	Florida Natural Areas Inventory	NRC/NRO	05200040 05200041
01/03/2014	ML14003A276	2014/01/03 Turkey Point COL Hearing - FW: West Consensus Corridor and RWTF location (public)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/07/2014	ML13351A277	12/12/2013 Summary of a Public Teleconference on December 12, 2013, With AP1000 Design Center Combined License Applicants To Discuss Application Review Issues.	Meeting Summary Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200022
						05200023
						05200029
						05200030
						05200040
						05200041
01/14/2014	ML14309A079	FWS 2014- TN2918 - USFWS 2013 Miami - Dade County List.	FACT Sheet	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041

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01/15/2014	ML14017A019	Turkey Point, Units 6 & 7, Response to NRC Request for Additional Information No.11.02-6-1(2)(3)(4) (eRAI 6985) L-2014-002, Page 1 through 123, Part 1 of 2.	- No Document Type Applies	Florida Power & Light Co	NRC/NRO	05200040
						05200041
01/15/2014	ML14017A020	Turkey Point, Units 6 & 7, Response to NRC Request for Additional Information No.11.02-6-1(2)(3)(4) (eRAI 6985) L-2014-002, Page 124 through End, Part 2 of 2.	- No Document Type Applies	Florida Power & Light Co	NRC/NRO	05200040
						05200041
01/15/2014	ML14017A018	Turkey Point, Units 6 & 7, Response to NRC Request for Additional Information Letter No. 072 (eRAI 6985) - SRP Section 11.02 - Liquid Waste Management Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/16/2014	ML14342A033	SAFMC-2014-TN2946-SAFMC 2014 EFH Mapper Weblink.	Environmental Impact Statement	South Atlantic Fishery Management Council	NRC/NRO	05200040 05200041
01/16/2014	ML14309A051	EPA - 2013- TN2956- EPA 2014 Daniel Shell Pit.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
01/16/2014	ML14309A054	EPA 2013- TN2960- EPA 2014 Florida Shell Mine.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
01/16/2014	ML14309A055	EPA 2013- TN2962- EPA 2014 Jay Rock Mine.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
01/17/2014	ML14309A052	EPA - 2013- TN2957- EPA 2014 Eagle Farm Mine.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/17/2014	ML14309A058	EPA 2014- TN2955- EPA 2014 Bonita.	FACT Sheet	US Dept of Energy (DOE) US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
01/17/2014	ML14309A053	EPA 2013- TN2958- EPA 2014 ER Jahna IND.	FACT Sheet Report, Miscellaneous	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
01/20/2014	ML14309A075	FWS - 2013- TN2992- USFWS 2014 Arthur r Marshall Loxahatchee.	FACT Sheet	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
01/21/2014	ML14328A515	SFWMD et al. 2011 - TN3087 - sfwmd March 2011 Lake Okeechobee Update.	- No Document Type Applies	State of FL, Water Management District	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/21/2014	ML14328A523	SFWMD 2014- TN2988-sfwmd 2014 Lake Okeechobee.	- No Document Type Applies	State of FL, Water Management District	NRC/NRO	05200040 05200041
01/22/2014	ML14309A060	EPA 2014- TN2963- EPA 2014 US sugar.	- No Document Type Applies	US Dept of Energy (DOE) US Environmental Protection Agency (EPA)	NRC/NRO/DNR L/EPB	05200040 05200041
01/22/2014	ML14342A022	FMNH-2014-TN3250-Sawfish data.	Environmental Impact Statement	Univ Of Florida, Gainesville	NRC/NRO	05200040 05200041
01/23/2014	ML14328A459	USDA 2014- TN3358-20140123_2047200838 7_37_Soil_Map_Glades (2).	Graphics incl Charts and Tables Map	US Dept of Agriculture, Natural Resources Conservation Service	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/27/2014	ML14328A502	USACE and SFWMD 2014- TN3013-CERP Project_ Indian River Lagoon - South.	- No Document Type Applies	State of FL, Water Management District US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041
01/27/2014	ML14328A498	USACE and SFWMD 2014- TN3009-CERP Project_ C-43 Basin Aquifer Storage and Recovery.	Environmental Impact Statement	State of FL, Water Management District US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/27/2014	ML14328A508	USACE and SFWMD 2014- TN3019-CERP Project_ PBC Agriculture Reserve Aquifer Storage and Recovery.	Environmental Monitoring Report	State of FL, Water Management District	NRC/NRO	
				US Dept of the Army, Corps of Engineers		05200040 05200041
01/27/2014	ML14328A506	USACE and SFWMD-2014-TN3017-CERP Project_ Modify Holey Land Wildlife Management Area Operation Plan.	Environmental Protection Plan FACT Sheet	State of FL, Water Management District	NRC/NRO	
				US Dept of the Army, Corps of Engineers		05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/27/2014	ML14328A507	USACE and SFWMD-2014-TN3018-CERP Project_ Modify Rotenberger Wildlife Management Area Operation Plan.	FACT Sheet	State of FL, Water Management District US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041
01/27/2014	ML14328A501	USACE and SFWMD - 2014 TN3012 - CERP Project Flows to Northwest NW and Central Water Conservation Areas.	FACT Sheet	State of FL, Water Management District US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/27/2014	ML14328A509	USACE and SFWMD-2014 - TN3020-CERP Project_Melaleuca Eradication and Other Exotic Plants.	FACT Sheet	State of FL, Water Management District US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041
01/27/2014	ML14328A500	USACE and SFWMD-2014- TN3011-CERP Project_ Everglades Agricultural Area Storage Reservoirs.	FACT Sheet	State of FL, Water Management District US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/29/2014	ML14328A454	USDA 2014- TN3349-20140129_20422108618_9_Soil_Map_Okeechobee2Vicinity.	Graphics incl Charts and Tables Map	US Dept of Agriculture, Natural Resources Conservation Service	NRC/NRO	05200040 05200041
01/29/2014	ML14031A356	Turkey Point, Units 6 and 7, Submittal of Fossil Unit 2 Synchronous Condenser Operation Fact Sheet.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
01/29/2014	ML14031A338	Turkey Point, Units 6 and 7, Roadmap of Changes in Combined License Application - Revision 5.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/29/2014	ML14328A456	USDA 2014- TN3353-20140129_2003580889 6_13_Soil_Map.	Map	US Dept of Agriculture, Natural Resources Conservation Service	NRC/NRO	05200040 05200041
01/29/2014	ML14328A455	USDA 2014- TN3350-20140129_2039250862 3_13_Soil_Map.	Map	US Dept of Agriculture, Natural Resources Conservation Service	NRC/NRO	05200040 05200041
01/30/2014	ML14328A511	USACE and SFWMD 2014- TN3045-CERP Project_ Acme Basin B Discharge.	- No Document Type Applies	State of FL, Water Management District US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/30/2014	ML14309A064	EPA 2014- TN3038-Florida Rock.	- No Document Type Applies	US Dept of Energy (DOE) US Environmental Protection Agency (EPA)	NRC/NRO/DNRL/EPB	05200040 05200041
01/30/2014	ML14328A513	USACE and SFWMD 2014- TN3047-CERP Project_ Strazzulla Wetlands.	- No Document Type Applies	State of FL, Water Management District US Dept of the Army, Corps of Engineers	NRC/NRO	05200040 05200041
01/30/2014	ML14342A035	SWAPBC-2014-TN3037-Solid Waste Authority of Palm Beach County's Renewable Energy.	Environmental Impact Statement	Palm Beach County, FL, Solid Waste Authority	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/30/2014	ML14309A062	EPA 2014- TN3031- ICIS Search Results Tom G Smith.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
01/30/2014	ML14309A057	EPA 2013- TN3070- AFS Search Results Twin Vee.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
01/30/2014	ML14309A063	EPA 2014- TN3032- ICIS Search Results _Ineos.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
01/30/2014	ML14309A065	EPA 2014- TN3043- ICIS Search Results Indrio Road.	FACT Sheet	US Dept of Energy (DOE) US Environmental Protection Agency (EPA)	NRC/NRO/DNR L/EPB	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/30/2014	ML14328A488	USACE-2014-TN3061-KISSIMMEE RIVER _ Restoration Project _ Jacksonville District _ Fact Sheet A.	FACT Sheet	US Dept of the Army, Corps of Engineers, Jacksonville District	NRC/NRO	05200040 05200041
01/30/2014	ML14309A068	EPA 2014- TN3063- ICIS Search Results Maverick Boat.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
01/30/2014	ML14309A070	EPA 2014- TN3071- ICIS Search Results Harbor Branch.	FACT Sheet	US Dept of Energy (DOE) US Environmental Protection Agency (EPA)	NRC/NRO/DNR L/EPB	05200040 05200041
01/30/2014	ML14309A069	EPA 2014- TN3068- ICIS Search Results Tropicana.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/30/2014	ML14309A067	EPA 2014- TN3062- ICIS Search Results Pratt - Whitney.	FACT Sheet	US Dept of Energy (DOE) US Environmental Protection Agency (EPA)	NRC/NRO/DNR L/EPB	05200040 05200041
01/30/2014	ML14309A056	EPA 2013- TN3069- AFS Search Results 52 Yachts.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
01/30/2014	ML14309A066	EPA 2014- TN3044- ICIS Search Results Hammond Sand Mine.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/30/2014	ML14035A450	Turkey Point, Units 6 and 7, Underground Injection Control (UIC) Program Performance Assessment Injection Well System Groundwater Modeling Electronic Files.	Letter License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
01/30/2014	ML14309A061	EPA 2014- TN3030- ICIS Search Results Vero Beach.	Report, Miscellaneous	US Dept of Energy (DOE)		
				US Environmental Protection Agency (EPA)	NRC/NRO/DNR L/EPB	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/01/2014	ML14216A601	TN1251 - Starr, R.C., T.S. Green, and L.C. Hull. 2001. Evaluation of Confining Layer Integrity Beneath the South District Wastewater Treatment Plant, Miami-Dade Water and Sewer Department, Dade County, Florida.	Report, Miscellaneous	Idaho National Engineering & Environmental Lab (INEEL) Miami Dade Water & Sewer-South	NRC/NRO/DNR L	05200040 05200041
02/03/2014	ML14328A477	USACE - 2010 - TN3555 - USACE 2010 SAJ 2000 02373 FEC Quarry Permit Only.	Letter	US Dept of the Army, Corps of Engineers, Jacksonville District	Cemex Materials of Florida NRC/NRO	05200040 05200041
02/05/2014	ML14065A252	2014/02/05 Turkey Point COL Hearing - Turkey Point Environmental: DRAFT RAI 7418 Postulated Accidents (public)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/05/2014	ML14328A458	USDA 2014- TN3355-20140205_1733420552 4_24_Soil_Map.	Graphics incl Charts and Tables Map	US Dept of Agriculture, Natural Resources Conservation Service	NRC/NRO	05200040 05200041
02/05/2014	ML14328A457	USDA 2014- TN3354-20140205_1741100555 6_11_Soil_MapStLucie Site.	Map	US Dept of Agriculture, Natural Resources Conservation Service	NRC/NRO	05200040 05200041
02/06/2014	ML14065A236	2014/02/06 Turkey Point COL Hearing - RE: 2013 Turkey Point Crocodile Report	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
02/06/2014	ML14065A248	2014/02/06 Turkey Point COL Hearing - FW: 2013 Turkey Point Crocodile Report (public)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/06/2014	ML14065A246	2014/02/06 Turkey Point COL Hearing - 2013 Turkey Point Crocodile Report	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
02/07/2014	ML14309A071	EPA 2014- TN3098- Envirofacts_Godfrey.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
02/10/2014	ML14065A230	2014/02/10 Turkey Point COL Hearing - ArcView for GIS	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
02/14/2014	ML14045A287	02/24/2014 Notice of Forthcoming Category 2 Public Teleconference to Discuss AP1000 Design Center Combined License Review Issues. Superseded by ML14050A328.	Meeting Agenda Meeting Notice	NRC/NRO		05200018 05200019 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/18/2014	ML14342A042	APAFR-2014-TN3195-Avon Park.	Environmental Impact Statement	US Dept of the Air Force, Avon Park Air Force Range, FL	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/19/2014	ML14065A229	2014/02/19 Turkey Point COL Hearing - RE: Status Update for the 20FEB14 PM Call	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
02/19/2014	ML14050A328	02/27/2014 Meeting Notice with Public to Discuss AP100 Design Center Combined License Review Issues. Supersedes ML14045A287.	Meeting Agenda Meeting Notice	NRC/NRO		05200018 05200019 05200025 05200026 05200027 05200028 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/20/2014	ML14309A282			US Dept of Commerce, National Oceanic & Atmospheric Admin (NOAA)		
		TN3201 - NOAA 2014 Florida Keys National Marine Sanctuary.	FACT Sheet	US Dept of Commerce, National Oceanic & Atmospheric Admin, National Ocean Service	NRC/NRO	05200040 05200041
02/24/2014	ML14063A251	Proposed Turkey Point, Units 6 and 7 - Updated MACCS2 Input/Output Files.	Letter		NRC/Document Control Desk	05200040
				Florida Power & Light Co	NRC/NRO	05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/24/2014	ML14055A353	03/13/2014 Notice of Forthcoming Category 2 Public Teleconference with Duke Energy to Discuss AP1000 Design Center Combined License Review Issues.				05200018
						05200019
						05200029
						05200030
			Meeting Agenda			05200040
			Meeting Notice	NRC/NRO		05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/04/2014	ML14122A371	2014/03/04 Turkey Point COL Hearing - FW: L-2013-275 - Response to NRC Request for Additional Information Letter No. 075 (eRAI 7080) Standard Review Plan Section 06.04 Control Room Habitability Systems	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
03/05/2014	ML14064A489	03/20/2014 Notice of Forthcoming Category 2 Public Teleconference with Duke Energy to Discuss AP1000 Design Center Combined License Review Issues.	Meeting Agenda Meeting Notice	NRC/NRO		05200018 05200019 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/06/2014	ML14069A224	Proposed Turkey Point Units 6 and 7, Supplemental Response to NRC Request for Additional Information Letter No. 77 (eRAI 7112) Related to SRP Section 11.03 Gaseous Waste Management Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
03/07/2014	ML14070A216	Turkey Point, Units 6 & 7, Review Schedule Information.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
03/10/2014	ML14309A072	EPA 2014- TN3295- EPA 2014 WQ Criteria.	FACT Sheet Report, Miscellaneous	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/14/2014	ML16034A365	Letter From Florida Power and Light to USACE-Jacksonville District - Miami Regulatory Office, FPL Turkey Point Units 6 and 7 Project, Application No. SAJ-2009-02417 (IP-MLC), dated March 14, 2014.	Letter	Florida Power & Light Co	NRC/NRO US Dept of the Army, Corps of Engineers, Jacksonville District	05200040 05200041
03/17/2014	ML14078A052	Turkey Point, Units 6 and 7 - Removal of FPL-Owned Fill Source from the Combined License Application Part 3 - Environmental Report.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/31/2014	ML14328A473	USCB 2011- TN3397- USCB_2011_OnTheMa p.	Map Report, Miscellaneous	US Dept of Commerce, Bureau of Census	NRC/NRO	05200040 05200041
03/31/2014	ML14085A431	03/20/2014 Summary of Public Teleconference with AP1000 Design Center COL Applicants to Discuss Application Review Issues.	Meeting Summary Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018 05200019 05200022 05200023 05200029 05200030 05200040 05200041
04/01/2014	ML14342A026	MHC 2014- TN4052 - Tech Memo Turkey Point DIW-1 Injection Test - Final-2.	Environmental Impact Statement Letter Report, Technical	McNabb Hydrogeologic Consulting, Inc	NRC/NRO State of FL, Dept of Environmental Protection	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/10/2014	ML14122A376	2014/04/10 Turkey Point COL Hearing - ORG CHARTS	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
04/10/2014	ML14122A379	2014/04/10 Turkey Point COL Hearing - RE: ORG CHARTS	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
04/10/2014	ML14122A382	2014/04/10 Turkey Point COL Hearing - Letter	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
04/14/2014	ML14122A383	2014/04/14 Turkey Point COL Hearing - RE: NRC/FPL clarification call on eRAI 6985 - tentative	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
04/15/2014	ML14132A340	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 6 of 14.	Report, Technical	In Situ Engineering	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/15/2014	ML14132A360	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 12 of 14.	Report, Technical	In Situ Engineering	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041
04/15/2014	ML14132A337	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 7 of 14.	Report, Technical	In Situ Engineering	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041
04/15/2014	ML14132A325	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 3 of 14.	Report, Technical	Geotechnics Kleinfelder, Inc	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/15/2014	ML14132A339	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 5 of 14.	Report, Technical	Geotechnics	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041
04/15/2014	ML14132A350	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 10 of 14.	Report, Technical	In Situ Engineering	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041
04/15/2014	ML14132A326	Enclosure 1 - Supplemental Field Investigation Data Report, Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 1 of 14.	Report, Technical	Paul C. Rizzo Associates, Inc	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/15/2014	ML14132A358	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 13 of 14.	Report, Technical	GEOVision Geophysical Services	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041
04/15/2014	ML14132A338	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 4 of 14.	Report, Technical	Geotechnics Kleinfelder, Inc	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041
04/15/2014	ML14132A347	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 8 of 14.	Report, Technical	In Situ Engineering	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/15/2014	ML14132A327	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 2 of 14.	Report, Technical	Kleinfelder, Inc Paul C. Rizzo Associates, Inc	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041
04/15/2014	ML14132A346	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 11 of 14.	Report, Technical	In Situ Engineering	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041
04/15/2014	ML14132A349	Enclosure 1 - Supplemental Field Investigation Data Report Turkey Point Nuclear Power Plant Units 6 & 7 Revision 2, April 15, 2014. Part 9 of 14.	Report, Technical	In Situ Engineering	NRC/NRO Paul C. Rizzo Associates, Inc	05200040 05200041
04/17/2014	ML14122A385	2014/04/17 Turkey Point COL Hearing - RE: NRC/FPL clarification call on eRAI 6985 - placeholder	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/17/2014	ML14065A577	Schedule Letter from NRC to Florida Power and Light Re: Turkey Point Units 6 and 7 Combined License Application Review Of Alternative Sites.	Letter Schedule and Calendars	NRC/NRO/DN RL	Florida Power & Light Co	05200040 05200041
04/18/2014	ML14122A485	2014/04/18 Turkey Point COL Hearing - Draft RAI 7467 related to SRP Section 02.01.03 Population Distribution for the Turkey Point Units 6 and 7 combined license application	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
04/18/2014	ML14122A486	2014/04/18 Turkey Point COL Hearing - Copy of Environmental Review Schedule letter (public)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/18/2014	ML14122A389	2014/04/18 Turkey Point COL Hearing - FW: FPL Letter L-2014-002 Dated 01-15-2014: NRC RAI Letter No. 072 (eRAI 6985) Response	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
04/21/2014	ML14112A370	Proposed Turkey Point, Units 6 and 7 - 10 CFR 50.46 Annual Report for the AP1000 Standard Plant Design.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
04/22/2014	ML14121A610	2014/04/22 Turkey Point COL Hearing - FW: L-2011-336 Dated September 1, 2011: Response to NRC Environmental RAI Letter 1104071 (RAI 5588) ESRP Section 9.3.1 - Alternative Site Selection Process	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
04/22/2014	ML14121A601	2014/04/22 Turkey Point COL Hearing - probable topic of clarification	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/22/2014	ML14113A411	Proposed Turkey Point Units 6 and 7, Supplemental Response to NRC Request for Additional Information Letter No. 72 (eRAI 6985) SRP Section 11.02 - Liquid Waste Management Systems.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
04/23/2014	ML14121A613	2014/04/23 Turkey Point COL Hearing - Proposed Turkey Point, Units 6 and 7 - 10 CFR 50.46 Annual Report for the AP1000 Standard Plant Design.	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/29/2014	ML14121A092	Turkey Point, Units 6 and 7, Revised Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006) - Standard Review Plant Section 02.05.04, Attachment 3 Page 31 of 47 through Attachment 9 Page 16 of 16.	- No Document Type Applies Drawing Graphics incl Charts and Tables Map	Florida Power & Light Co	NRC/NRO	05200040 05200041
04/29/2014	ML14121A088	Turkey Point, Units 6 and 7, Revised Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006) - Standard Review Plant Section 02.05.04, Attachment 10 Page 1 of 8 through Attachment 17 Page 6 of 26.	- No Document Type Applies Drawing Graphics incl Charts and Tables Map	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/29/2014	ML14121A090	Turkey Point, Units 6 and 7, Revised Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006) - Standard Review Plant Section 02.05.04, Attachment 17 Page 7 of 26 through End.	- No Document Type Applies Drawing Graphics incl Charts and Tables Map	Florida Power & Light Co	NRC/NRO	05200040 05200041
04/29/2014	ML14121A091	Turkey Point, Units 6 and 7, Revised Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006) - Standard Review Plant Section 02.05.04, Cover Letter through Attachment 3 Page 30 of 47.	Drawing Graphics incl Charts and Tables Letter Map Photograph	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/29/2014	ML14121A623	2014/04/29 Turkey Point COL Hearing - FW: L-2014-111 Revised Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006) - Standard Review Plan Section 02.05.04 - Stability of Subsurface Materials and Foundations	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
04/29/2014	ML14121A620	2014/04/29 Turkey Point COL Hearing - FW: L-2014-112 - Revised Response to NRC Request for Additional Information Letter No. 044 (eRAI 6184) - Standard Review Plan Section 02.05.04 -Stability of Subsurface Materials and Foundations	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/29/2014	ML14121A626	2014/04/29 Turkey Point COL Hearing - FW: L-2014-111 Revised Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006) - Standard Review Plan Section 02.05.04 - Stability of Subsurface Materials and Foundations - Email 1 of 2	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
04/29/2014	ML14122A365	2014/04/29 Turkey Point COL Hearing - FW: L-2014-111 Revised Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006) - Standard Review Plan Section 02.05.04 - Stability of Subsurface Materials and Foundations - Email 2 of 2	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/29/2014	ML14120A351	Turkey Point, Units 6 and 7, Revised Response to NRC Request for Additional Information Letter No. 044 (eRAI 6184) - Standard Review Plan Section 02.05.04 - Stability of Subsurface Materials and Foundations.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
04/30/2014	ML14122A484	2014/04/30 Turkey Point COL Hearing - FW: FPL Letter L-2014-102 Dated 04-22-2014: NRC RAI Letter No. 072 (eRAI 6985) Supplemental Response	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
04/30/2014	ML14324A480	DOE EIA - 2014 - TN3822-140814-DOE-EIA AEO 2014 Table 74 - FRCC Generating Capacity and Generation.	FACT Sheet Report, Technical	US Dept of Energy, Energy Information Administration (EIA)	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/30/2014	ML14132A324	Turkey Point, Units 6 & 7 - Submittal of the Supplemental Field Investigation Data Report and the Surficial Muck Deposits Field and Laboratory Investigation Data Report.	Letter	Florida Power & Light Co	NRC/Document Control Desk	05200040
					NRC/NRO	05200041
04/30/2014	ML14324A481	DOE EIA 2014-TN3823-140814-DOE-EIA AEO 2014 Table 99 - FRCC Renewable Generating Capacity and Generation.	Report, Technical	US Dept of Energy, Energy Information Administration (EIA)	NRC/NRO	05200040
						05200041
04/30/2014	ML14336A345	FPL 2014 - TN3360 - FPL 2014 TYP.	Report, Technical	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/01/2014	ML14121A616	2014/05/01 Turkey Point COL Hearing - FW: Proposed Turkey Point, Units 6 and 7 - 10 CFR 50.46 Annual Report for the AP1000 Standard Plant Design. <a e.>	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
05/01/2014	ML14121A614	2014/05/01 Turkey Point COL Hearing - FW: Proposed Turkey Point, Units 6 and 7 - 10 CFR 50.46 Annual Report for the AP1000 Standard Plant Design. <a e.>	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
05/06/2014	ML14015A353	Turkey Point, Units 6 and 7 Combined License Application - Advanced Safety Evaluation Without Open Items For Chapter 10, "Steam and Power Conversion."	Letter	NRC/NRO/DN RL/LB4	Florida Power & Light Co	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/06/2014	ML14059A365	Letter To Applicant-Turkey Point, Units 6 and 7 ASE Without Open Items For Chapter 5, "Reactor Coolant System and Connected Systems."	Letter	NRC/NRO/DN RL/LB4	Florida Power & Light Co	05200040 05200041
05/06/2014	ML12262A056	Turkey Point ASE Chapter 10 - Steam and Power Conversion.	NRO Safety Evaluation Report (SER)-Delayed	NRC/NRO/DN RL/LB4		05200040 05200041
05/07/2014	ML14129A091	Proposed Turkey Point Units 6 and 7, Clarification of Forthcoming Submittals of FSAR Section 2.5.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
05/07/2014	ML14216A492	TN1231 - Florida Power and Light Co., Turkey Point, Units 6 & 7, 2010 Project, Amendment to Site Certification Application (PA03-45A3); FPLNNP-10-0125.	Letter Report, Miscellaneous	Florida Power & Light Co	NRC/NRO/DNR L State of FL, Dept of Environmental Protection	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/09/2014	ML15243A423	2014/05/09 Turkey Point COL Hearing - FPL Letter L-2014-130 Dated 05-9-2014: NRC RAI Letter No. 064 (eRAI 6544) Voluntary Submittal	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
05/09/2014	ML14132A211	Turkey Point, Units 6 and 7, Voluntary Submittal to NRC Request for Additional Information Letter No. 64 (eRAI 6544) Related to SRP Section 03.05.03 - Barrier Design Procedures.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/16/2014	ML14140A424	Turkey Point, Units 6 & 7, Submittal of Marked-up Version of Part 2, Chapter 2, Section 2.5, Attachment Page 863 of 1314 through Attachment Page 1084 of 1314.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040 05200041
05/16/2014	ML14140A425	Turkey Point, Units 6 & 7, Submittal of Marked-up Version of Part 2, Chapter 2, Section 2.5, Attachment Page 1085 of 1314 through Attachment Page 1199 of 1314.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040 05200041
05/16/2014	ML14140A421	Turkey Point, Units 6 & 7, Submittal of Marked-up Version of Part 2, Chapter 2, Section 2.5, Attachment Page 634 of 1314 through Attachment Page 578 of 1314.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/16/2014	ML14140A417	Turkey Point, Units 6 & 7, Submittal of Marked-up Version of Part 2, Chapter 2, Section 2.5, Attachment Page 452 of 1314 through Attachment Page 519 of 1314.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040 05200041
05/16/2014	ML14140A416	Turkey Point, Units 6 & 7, Submittal of Marked-up Version of Part 2, Chapter 2, Section 2.5, Attachment Page 277 of 1314 through Attachment Page 451 of 1314.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040 05200041
05/16/2014	ML14140A420	Turkey Point, Units 6 & 7, Submittal of Marked-up Version of Part 2, Chapter 2, Section 2.5, Attachment Page 579 of 1314 through Attachment Page 633 of 1314.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/16/2014	ML14140A423	Turkey Point, Units 6 & 7, Submittal of Marked-up Version of Part 2, Chapter 2, Section 2.5, Attachment Page 1200 of 1314 through Attachment Page 1314 of 1314.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040 05200041
05/16/2014	ML14140A422	Turkey Point, Units 6 & 7, Submittal of Marked-up Version of Part 2, Chapter 2, Section 2.5, Attachment Page 520 of 1314 through Attachment Page 578 of 1314.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040 05200041
05/16/2014	ML14140A418	Turkey Point, Units 6 & 7, Submittal of Marked-up Version of Part 2, Chapter 2, Section 2.5, Attachment Page 1 of 1314 through Attachment Page 276 of 1314.	Final Safety Analysis Report (FSAR) Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/16/2014	ML14135A335	05/01/2014-Summary of Public Meeting For Levy COL, Units 1 and 2.	Meeting Summary	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018
						05200019
						05200029
						05200030
						05200040
						05200041
05/21/2014	ML14156A540	2014/05/21 Turkey Point COL Hearing - REQUEST FOR ADDITIONAL INFORMATION LETTER NO.80 RELATED TO SRP SECTION 02.01.03 POPULATION DISTRIBUTION FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COL	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/21/2014	ML14141A201	2014/05/21 Turkey Point RAI for SER - REQUEST FOR ADDITIONAL INFORMATION LETTER NO.80 RELATED TO SRP SECTION 02.01.03 POPULATION DISTRIBUTION FOR THE TURKEY POINT NUCLEAR PLANT UNITS 6 AND 7 COL	E-Mail Request for Additional Information (RAI)	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
05/31/2014	ML14342A030	NPS-2014-TN4073-BISC-Fishery-Management-Plan-Final-Environmental-Impact-Statement.	Environmental Impact Statement	US Dept of Interior, National Park Service	NRC/NRO	05200040 05200041
05/31/2014	ML16167A507	U.S. Department of Agriculture Census of Agriculture Florida State and County Data, 2012-TN4523.	Environmental Monitoring Report	US Dept of Agriculture, National Agricultural Statistics Service	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/03/2014	ML14328A524	SFWMD-2014-TN3554-SFWMD 2014_MiningPermitSearch.	FACT Sheet	State of FL, Water Management District	NRC/NRO	05200040 05200041
06/03/2014	ML15036A339	TN3558 - Florida Department of Transportation (FDOT). 2013. Florida Traffic Online Identify Information.	FACT Sheet	State of FL, Dept of Transportation	NRC/NRO/DNR L/EPB	05200040 05200041
06/03/2014	ML14150A120	05/22/2014 Summary of Public Teleconference With AP1000 Design Center Combined License Applicants To Discuss Application Review Issues.	Meeting Summary Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018 05200019 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/05/2014	ML14156A541	2014/06/05 Turkey Point COL Hearing - FW: Turkey Point Units 6 & 7 COLA - ASE Without Open Items For Chp. 5, "Reactor Coolant System" and Chp. 10, "Steam and Power Conversion"	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
06/10/2014	ML14203A605	Letter to D.W. Kinard to R.E. Crabtree Transmitting the Biological Opinion for the Regional General Permit SAJ-82 (SAJ-2007-1590).	Environmental Report Letter	US Dept of Commerce, National Marine Fisheries Service	NRC/NRO US Dept of the Army, Corps of Engineers, Jacksonville District	05200040 05200041
07/10/2014	ML14342A015	EAF 2014 - TN3659 - Everglades Alligator Farm.	Environmental Impact Statement FACT Sheet	Everglades Alligator Farm	NRC/NRO	05200040 05200041
07/22/2014	ML14274A081	LTR-14-0412-1 - 7/22/14 - Memo to: Jennifer L. Dixon-Herrity, Branch Chief, NRC/NRO/DNRL/EPB .	Meeting Summary Memoranda	NRC/NRO/DNRL/EPB	NRC/NRO/DNR L/EPB	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/01/2014	ML14232A050	Turkey Point, Units 6 & 7 - Combined License Application Environmental Report Supplement, Report 09387652, Assessment of Certain Potential Construction Noise and Vibration Impacts on Threatened and Endangered Aquatic Species.	Environmental Report	Golder Associates, Inc	Florida Power & Light Co NRC/NRO	05200040 05200041
08/04/2014	ML14216A531	TN1245 - EPA (U.S. Environmental Protection Agency) 2012, "Currently Designated Nonattainment Areas for All Criteria Pollutants," Washington, D.C.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO/DNR L	05200040 05200041
08/08/2014	ML14223B029	Turkey Point, Units 6 and 7, Revised Pages for FPL Submittal Letter L-2014-152.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
08/11/2014	ML14225A250	Attachment 1: COLA Revision 5 Highlighted Pages for Subsection 2.5.1 RAIs. Page 201 - Page 270.	Final Safety Analysis Report (FSAR)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/11/2014	ML14225A082	Proposed Turkey Point, Units 6 and 7, Attachment 2, Mark-ups for the Associated COLA Revisions for 2.5.2 RAIs.	Graphics incl Charts and Tables Map Report, Miscellaneous	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/11/2014	ML14225A078	Proposed Turkey Point, Unit 6 & 7, Marked-up Revised Response to NRC RAI No. 02-05-01-17 (eRAI 6024).	Graphics incl Charts and Tables Map Report, Technical	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/13/2014	ML14240A493	2014/08/13 Turkey Point COL Hearing - RE: Turkey Point	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
09/08/2014	ML14309A091	FWS 2014 - TN3764 - USFWS Miami Dade County List 8 Sep 2014.	- No Document Type Applies	US Dept of Interior, Fish & Wildlife Service	NRC/NRO	05200040 05200041
09/22/2014	ML14265A493	APOG (AP1 000 Utilities') Comments on AP1000 Standard Technical Specification (STS) Generic Technical Specification Travelers (GTSTs).	Letter	APOG	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/25/2014	ML14272A588	2014/09/25 Turkey Point COL Hearing - SCA Modification Petition 2 of 2 - Additional Consumptive Use	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
10/16/2014	ML14289A431	TN1500 - EPA (U.S. Environmental Protection Agency). 2007. The U.S. Inventory of Greenhouse Gas Emissions and Sinks: Fast Facts and Reference Tables and Conversions. EPA 430-F-07-004, Washington, D.C.	FACT Sheet	US Environmental Protection Agency (EPA)	NRC/NRO	05200040 05200041
10/23/2014	ML14300A049	Proposed Turkey Point Units 6 and 7, Radwaste Building Safety Classification Demonstration.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/28/2014	ML14301A026	TN1574 - USGS (U.S. Geologic Survey), 2006, "National Elevation Dataset," Washington, D.C.	FACT Sheet	US Dept of Interior, Geological Survey (USGS)	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/29/2014	ML14311A345	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 15-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A401	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-1262 to A-1411(App C-Geotechnics Lab Testing Results)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A259	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 3	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

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10/29/2014	ML14311A566	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 11-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A526	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 44-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A364	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 33-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/29/2014	ML14311A262	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 6	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A417	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-1997 to A-2008(App G-Geovision Final Report)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A329	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 2-Appendix A-Survey Report	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/29/2014	ML14311A379	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 46-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A282	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 8 - Need for Power	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A469	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 7-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A284	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER Chapter 10 - Environmental Consequences of the Proposed Action	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/29/2014	ML14311A581	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 22-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A465	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 5-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A517	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 38-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/29/2014	ML14311A544	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 59-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A346	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 16-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A261	FPL - Turkey Point Units 6 & 7 COLA (Environmental Report) - Part 3 - ER - Chapter 2 - Environmental Description - Section 2.5 - Socioeconomics - Appendix A - Part 5	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/29/2014	ML14311A553	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 4-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A477	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 10-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A504	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 29-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/29/2014	ML14311A380	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 5-Special Nuclear Material (SNM) Material Control and Accounting Program Description	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A354	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 24-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A230	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 4 - Reactor	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/29/2014	ML14311A213	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 229-252	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A200	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2BB - Aquifer Pumping Test Results	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A239	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 12 - Radiation Protection	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/29/2014	ML14311A180	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.1 - Hydrologic Description	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/29/2014	ML14311A715	Turkey Point Units 6 & 7 Combined License Application Submittal 13 for Annual Update (Revision 6) and Semi-Annual Update of Departure Report.	Letter License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
10/30/2014	ML14304A372	2014/10/30 Turkey Point COL Hearing - FW: Rep's from NPS at next week's audit (public) < a e>	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/30/2014	ML14303A693	2014/10/30 Turkey Point COL Hearing - FW: FPL Letter L-2014-282 Signed 10-03-2014: NRC RAI Letter No. 037 (eRAI 5896) Voluntary Revised Response	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
11/04/2014	ML14295A403	TN2972 Florida State Parks 2014 Highlands Hammock.	Environmental Impact Statement FACT Sheet	State of FL, Park Service	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/05/2014	ML14309A059	EPA 2014- TN2961- EPA 2014 harper bros.	- No Document Type Applies	US Dept of Energy (DOE) US Environmental Protection Agency (EPA)	NRC/NRO/DNR L/EPB	05200040 05200041
11/05/2014	ML14309A040	BEA-2012- TN1569- RimslIGuide_w_cover.	Report, Technical	US Dept of Commerce, Bureau of Economic Analysis	NRC/NRO/DNR L/EPB	05200040 05200041
11/14/2014	ML14338A437	BLS- 2012 - TN4084 Quarterly Census Employment Wages.	FACT Sheet	US Dept of Labor, Bureau of Labor Statistics	NRC/NRO	05200040 05200041
11/20/2014	ML14324A479	DOE EIA 2014- TN3813-140814-DOE- EIA Florida Electricity Profile 2012-Generation by Source.	Report, Technical	US Dept of Energy, Energy Information Administration (EIA)	NRC/NRO/DNR L/EPB	05200040 05200041
11/24/2014	ML14328A448	USGS - 2014 - TN3575 - Turkey Point - Water Resources NWIS.	FACT Sheet	US Dept of Interior, Geological Survey (USGS)	NRC/NRO	05200040 05200041
11/24/2014	ML14328A472	USCB 2011 - TN3396 - USCB 2011 General Housing.	FACT Sheet	US Dept of Commerce,	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
			Report, Miscellaneous	Bureau of Census		
11/24/2014	ML14328A447	TN1576 - USGS - Global Positioning System.	FACT Sheet Report, Miscellaneous	US Dept of Interior, Geological Survey (USGS)	NRC/NRO	05200040 05200041
12/02/2014	ML14336A329	FPL 2007 - TN3854 - Screening Report to State 09467-07.	Report, Technical	Florida Power & Light Co	NRC/NRO	05200040 05200041
12/03/2014	ML14323A073	11/06/2014 - Levy Combined License Units 1 and 2, Summary of Public Teleconference.	Meeting Summary Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200040 05200041
12/09/2014	ML14342A037	TLF and FPL 2014 - TN3755 - Barley Barber Swamp.	Environmental Impact Statement FACT Sheet	Florida Power & Light Co	NRC/NRO	05200040 05200041
12/11/2014	ML14345A285	TN4122-PNNL-2012Call Record-30May2012_Turkey Point.	Environmental Impact Statement	Pacific Northwest National Lab	NRC/NRO	05200040 05200041
12/11/2014	ML14345A286	TN4123 - DOE EIA 2011 - DOE EIA 2011 Renewable Energy Generation by Fuel - Florida.	Environmental Impact Statement	- No Known Affiliation	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/18/2014	ML14356A279	Proposed Turkey Point Units 6 & 7, Combined License Application, Potential Changes to AP1000 Standard Design.	Letter	Florida Power & Light Co	NRC/NRO/DNR L	05200040 05200041
01/05/2015	ML15006A006	2015/01/05 Turkey Point COL Hearing - FW: L-2013-047 RAI Ltr 58 eRAI 6434 Response 01.05-1-Fukushima Near Term Task Force EMAIL 1 OF	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
02/23/2015	ML15062A306	2015/02/23 Turkey Point COL Hearing - FW: Turkey Point Chapter 19: request for reading room access to the calc of SMA on liquefaction and bearing	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
03/02/2015	ML15062A318	2015/03/02 Turkey Point COL Hearing - Public Meeting on March 12, 2015 related to Section 2.5 on Turkey Point Unit 6 and 7 COLA	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
03/03/2015	ML15062A313	2015/03/03 Turkey Point COL Hearing - RE: Posting Date of Draft Turkey Point 6 & 7 in Federal Register	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/04/2015	ML15089A059	2015/03/04 Turkey Point COL Hearing - FW: Posting Date of Draft Turkey Point 6 & 7 in Federal Register	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
03/16/2015	ML15065A322	Letter to Muscogee Creek Nation - Notification of the Issuance of the Draft Environmental Impact Statement for the Environmental Review of the Turkey Point, Units 6 And 7 Combined License Application.	Letter	NRC/NRO/DN RL/EPB	Muscogee (Creek) Nation	05200040 05200041
03/16/2015	ML15065A305	Letter to Miccosukee Tribe - Notification Of The Issuance Of The Draft Environmental Impact Statement For The Environmental Review Of The Turkey Point, Units 6 And 7 Combined License Application.	Letter	NRC/NRO/DN RL/EPB	Miccosukee Tribe of Indians of Florida	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/16/2015	ML15065A365	Letter to Seminole Nation Oklahoma - Notification Of The Issuance Of The Draft Environmental Impact Statement For The Environmental Review Of The Turkey Point, Units 6 And 7 Combined License Application.	Letter	NRC/NRO/DN RL/EPB	Seminole Nation of Oklahoma	05200040 05200041
03/20/2015	ML15089A112	2015/03/20 Turkey Point COL Hearing - RE: Forthcoming Public Meeting To Discuss The Draft Environmental Impact Statement For Florida Power And Light's Turkey Point Units 6 And 7 Combined Licenses Application	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
03/30/2015	ML15089A533	2015/03/30 Turkey Point COL Hearing - FW: L-2015-056: Voluntary Revised Response to NRC Request for Additional Information Letter No. 041 (eRAI 6024) SRP Section: 02.05.01 -Basic Geologic and Seismic Information	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/15/2015	ML15110A088	Press Release-II-15-026: UPDATE: NRC Schedules Meetings to Receive Public Comments on Draft Environmental Impact Statement for Proposed Turkey Point Nuclear Units 6 and 7.	Press Release	NRC/OPA/RGN-II/FO		05200040 05200041
04/27/2015	ML15119A011	Proposed Turkey Point, Units 6 and 7 - Correction of Evacuation Time Estimate - Revision 4 Figure H-23 Error.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
04/29/2015	ML15121A794	Proposed Turkey Point, Units 6 and 7 - Response to NRC Request for Additional Information Letter No. 082 (eRAI 7811), SRP Section 02.05.04 - Stability of Subsurface Materials and Foundations.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/09/2015	ML15189A290	2015/06/09 Turkey Point COL Hearing - FW: FPL/NRC Public meeting - RAI 2.5.4-26, Draft ITAAC for Stability Under Presence of Voids of Constrained Size	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
06/16/2015	ML15189A283	2015/06/16 Turkey Point COL Hearing - FW: Draft ITAACs for RAIs 2.5.4 - 31, 32, & 33	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
06/17/2015	ML15189A469	2015/06/17 Turkey Point COL Hearing - FW: TPNPP Reading Room	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
06/24/2015	ML15096A363	Letter to Applicant - Possible Impact on Safety Review Schedule of Turkey Point, Units 6 and 7 Combined License Application.	Letter	NRC/NRO	Florida Power & Light Co	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/01/2015	ML15183A001	2015/07/01 Turkey Point COL Hearing - FW: RE: Draft ITAACs for 7/2/15 11 am FPL/NRC Public Call	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/02/2015	ML15183A308	2015/07/02 Turkey Point COL Hearing - TurkeyPoint COL RAI 02 05 04-26 ITAAC Table Draft B	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/02/2015	ML15189A265	2015/07/02 Turkey Point COL Hearing - TurkeyPoint COL RAI 02 05 04-31 and RAI 02 05 04-33 Combined Draft ITAAC	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/06/2015	ML15189A466	2015/07/06 Turkey Point COL Hearing - FW: 2.5.1 - 34 Supporting information update	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/06/2015	ML15189A281	2015/07/06 Turkey Point COL Hearing - FW: REQUEST FOR ADDITIONAL INFORMATION LTR.NO 85 RELATED TO SRP SECTION 2.5.1. BASIC GEOLOGICAL AND SEISMIC INFORMATION FOR TURKEY POINT UNIT 6 AND 7 COL APPLICATION < a e>	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/07/2015	ML15223A012	2015/07/07 Turkey Point COL Hearing - [External_Sender] FW: Draft Grouting Sensitivity Summary Posted to Reading Room	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
07/13/2015	ML15223A005	2015/07/13 Turkey Point COL Hearing - [External_Sender] FW: NOTES for G. Eberli AAPG Presentation on 6/2/2015	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/13/2015	ML15196A048	Voluntary Revised Response to NRC Request for Additional Information Letter No. 082 (eRAI 7811) - Standard Review Plan Section 02.05.04 - Stability of Subsurface Materials.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
07/15/2015	ML15198A060	Turkey Point, Units 6 and 7 - Response to NRC Request for Additional Information Letter No. 085 (eRAI 7950) SRP Section 02.05.01 - Basic Geologic and Seismic Information.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
07/16/2015	ML15222A552	2015/07/16 Turkey Point COL Hearing - [External_Sender] ITAAC	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/17/2015	ML15222B317	2015/07/17 Turkey Point COL Hearing - Re: FPL Letter L-2015-157 Dated 07-17-2015: Docket ID NRC-2009-0337 / NUREG-2176 Turkey Point Units 6 & 7 COLA DEIS Comments	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
07/17/2015	ML15222B321	2015/07/17 Turkey Point COL Hearing - [External_Sender] APOG/NRC Public Meeting - 7/2/2015	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
07/17/2015	ML15272A460	Letter from Stan Austin, Department Of Interior, National Park Service regarding Comments on the Draft Environmental Impact Statement for Combined Licenses for Turkey Point Units 6 and 7, dated July 17, 2015.	Letter	US Dept of Interior, National Park Service	NRC/ADM/DAS /RADB US Dept of the Army, Corps of Engineers, Jacksonville District	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/20/2015	ML15160A607	Letter - Turkey Point, Units 6 And 7 Combined License Application Advanced Safety Evaluation With No Open Items For Chapter 12, Radiation Protection.	Letter	NRC/NRO/DN RL/LB1	Florida Power & Light Co	05200040 05200041
07/21/2015	ML15222B319	2015/07/21 Turkey Point COL Hearing - [External_Sender] NRC/FPL Public Meeting on FSAR 2.5 Issues - 7/9/2015	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
07/30/2015	ML15212A766	Turkey Point, Units 6 and 7 - Voluntary Response for FPL COL Application, Part 2, FSAR Chapter 3, Subsection 3.7.2.8 - Interaction of Seismic Category II and Nonseismic Structures with Seismic Category I Structures, Systems, or Components.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/10/2015	ML15222A436	2015/08/10 Turkey Point COL Hearing - FW: ASER FSAR CHAPTER REVIEW STATUS MATRIX - 8/3/15 <a e>	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
08/26/2015	ML15243A426	2015/08/26 Turkey Point COL Hearing - Revised writeup	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
08/27/2015	ML15243A430	2015/08/27 Turkey Point COL Hearing - [External_Sender] RE: Revised write-up	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
08/28/2015	ML15243A425	2015/08/28 Turkey Point COL Hearing - [External_Sender] RE: Revised write-up	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
08/31/2015	ML15243A507	2015/08/31 Turkey Point COL Hearing - FW: Revised Turkey Point ITAAC on grouting	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/31/2015	ML15225A435	07/16/2015- Summary of Meeting with Members of the AP1000 Design Center to Discuss AP1000 Licensing and Technical Issues.	Meeting Summary Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018 05200019 05200029 05200030 05200040 05200041
09/08/2015	ML15266A036	2015/09/08 Turkey Point COL Hearing - [External_Sender] RE: RE: Current Org Chart	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
09/14/2015	ML15266A043	2015/09/14 Turkey Point COL Hearing - [External_Sender] NRC/FPL additional Clarification call for Hurricane Missiles RAI 6544	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
09/21/2015	ML15266A038	2015/09/21 Turkey Point COL Hearing - [External_Sender] RE: Proposed ITAAC for meeting on Sept 22, 2015	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/21/2015	ML15264A881	2015/09/21 Turkey Point RAI for SER - Turkey Point Grout ITAAC	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
09/24/2015	ML15307A802	2015/09/24 Turkey Point COL Hearing - Question about report SFWMD report	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
09/29/2015	ML15259A111	09/10/2015-Meeting Summary With Members of the AP1000 Design Center to Discuss AP1000 Licensing and Technical Issues.	Meeting Agenda Meeting Summary Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200018 05200019 05200029 05200030 05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A356	FPL - Turkey Point Units 6 & 7 COLA (Emergency Plan) - Part 5 Emergency Plan Supplements 8 (Radiological Emergency Prep. Plan, Miami-Dade County) and 9 (Radiological Prep. Plan, Monroe County)	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A569	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 11-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A661	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 60-Appendix D- Geophysical Test Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A525	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 8- Supplemental Field Investigation Data Report-Pages A-2060 to A-2070(App G-Geovision Final Report)	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A571	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 13-Appendix D- Geophysical Test Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A517	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 8- Supplemental Field Investigation Data Report-Pages A-1955 to A-1974(App G-Geovision Final Report)	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A600	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 31-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A605	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 35-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A639	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 52-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A656	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 58-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A519	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 8- Supplemental Field Investigation Data Report-Pages A-1986 to A-1996(App G-Geovision Final Report)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A584	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 17-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A594	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 26-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A471	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 40-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A681	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 7- Appendix E- Laboratory Test Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A466	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 36-Appendix B- Geotechnical Field Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A448	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 19-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A598	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 29-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A645	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 54-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A464	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 34-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A533	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 9-Surficial Muck Deposits Field and Laboratory Investigation Data Report-Pages 33-51(Figure 2-4 to App 2 Page 3)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A468	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 38-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A522	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 8- Supplemental Field Investigation Data Report-Pages A-2023 to A-2035(App G-Geovision Final Report)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A658	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 59-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A590	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 22-Appendix D- Geophysical Test Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A486	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 8- Supplemental Field Investigation Data Report-Pages A-1 to A-61(App A- Boring Logs)	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A446	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 17-Appendix B- Geotechnical Field Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

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10/14/2015	ML15301A563	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 5- Appendix D- Geophysical Test Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A691	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 17-Appendix E- Laboratory Test Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

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10/14/2015	ML15301A699	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 4, Part 2- Appendix G- Groundwater Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A444	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 15-Appendix B- Geotechnical Field Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A602	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 33-Appendix D- Geophysical Test Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A529	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 8- Supplemental Field Investigation Data Report-Pages A-2097 to A-2110(App G-Geovision Final Report)	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A562	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 4-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A587	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 19-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A439	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 11-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A447	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 18-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A456	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 27-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A680	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 6-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A622	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 43-Appendix D- Geophysical Test Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A540	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 9- Surficial Muck Deposits Field and Laboratory Investigation Data Report-Pages 62-125(App 2 Page 14 to App 3 Page 57)	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A570	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 12-Appendix D- Geophysical Test Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A429	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 7- Appendix B- Geotechnical Field Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A510	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 8- Supplemental Field Investigation Data Report-Pages A-1412 to A-1513(App C-Geotechnics Lab Testing Results)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A618	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 39-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A687	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 13-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A633	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 50-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A581	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point- Vol. 2, Part 16-Appendix D- Geophysical Test Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A430	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2- Final Data Report- Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 8- Appendix B- Geotechnical Field Data	Environmental Report License- Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A461	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 32-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A613	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 37-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A682	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 8-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A449	FPL - Turkey Point Units 6 & 7 COLA (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 20-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A272	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 1 - Introduction and General Description of the Plant	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A291	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2AA - Transducer Data	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A300	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.14 - Technical Specification and Emergency Operation Requirements	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A284	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.7 - Ice Effects	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A288	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.10 - Flooding Protection Requirements	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A336	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 17 - Quality Assurance	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A296	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Figures 201-225	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A281	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.4 - Potential Dam Failures	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A322	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 4 - Reactor	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A328	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 10 - Steam and Power Conversion	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A305	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 201-228	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A314	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.3 - Surface Faulting	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A283	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.6 - Probable Maximum Tsunami Hazards	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A315	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.4 - Stability of Subsurface Materials and Foundations	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A324	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 6 - Engineered Safety Features	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/14/2015	ML15301A278	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.2 - Floods	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A304	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A286	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.8 - Cooling Water Canals and Reservoirs	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

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10/14/2015	ML15301A292	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2BB - Aquifer Pumping Test Results	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A287	FPL - Turkey Point Units 6 & 7 COLA (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.9 - Channel Diversions	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
10/14/2015	ML15301A268	FPL - Turkey Point Units 6 & 7 COLA (General and Admin Information) - Part 1 - General and Financial Information	License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
10/27/2015	ML15307A781	2015/10/27 Turkey Point COL Hearing - RE: This Week's Draft RAI Clarification Calls	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
10/30/2015	ML15307A779	2015/10/30 Turkey Point COL Hearing - FW: RE: Update RAI's for TP	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
11/09/2015	ML15243A420	Audit Plan for Turkey Point, Units 6 and 7 Combined License Application Final Safety Analysis Report, Chapter 2.5.	Memoranda	NRC/NRO/DN RL/LB4	NRC/NRO/DNR L/LB4	05200040 05200041
11/17/2015	ML15364A417	Turkey Point, Units 6 and 7 - South Florida Water Management District, Groundwater, Surface Water, and Ecological Monitoring Plan, Exhibit B. Part 2 of 2	Environmental Monitoring Report	South Florida Water Management District	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
11/18/2015	ML15324A106	Turkey Point, Units 6 and 7 - Observations on the Draft Environmental Impact Statement (DEIS) Comments Submitted to the NRC and/or U.S. Army Corps of Engineers by Other Parties.	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
12/09/2015	ML15365A571	2015/12/09 Turkey Point COL Hearing - [External_Sender] Received RAI response letter Dated December 9	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
12/10/2015	ML16167A503	Turkey Point, Units 6 & 7 - Conference Call Regarding Crocodile Status Between NRC and Dr. Mazzotti, 2015-TN4446.	Note to File incl Telcon Record, Verbal Comm	Pacific Northwest National Lab	NRC/NRO	05200040 05200041
12/11/2015	ML15365A570	2015/12/11 Turkey Point COL Hearing - [External_Sender] Draft License Conditions Comparison between PTN 6 & 7 and VC Summer	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
12/22/2015	ML15365A588	2015/12/22 Turkey Point COL Hearing - RE: RE: Draft Met/Air RAI for discussion (public)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
12/29/2015	ML15365A582	2015/12/29 Turkey Point COL Hearing - RE: RE: Call with FPL to discuss Draft RAI on Unit 5	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
01/04/2016	ML16035A074	2016/01/04 Turkey Point COL Hearing - [External_Sender] PTN 6& 7 Tour - 1/12/2016	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
01/05/2016	ML16035A069	2016/01/05 Turkey Point COL Hearing - [External_Sender] RE: PTN 6& 7 Tour - 1/12/2016	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
01/07/2016	ML16035A058	2016/01/07 Turkey Point COL Hearing - FW: RE: 010715 DRAFT Turkey Point Units 6 and 7 RAI for RadHealth .docx	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
01/12/2016	ML16012A409	Turkey Point Environmental Review for Units 6 and 7, Supplemental Site Audit Plan, January 2016.	Audit Plan Environmental Report	NRC/NRO/DN RL/LB1		05200040 05200041
01/25/2016	ML16028A121	Turkey Point, Units 6 and 7 - Supplemental Response to NRC Environmental Request for Additional Information Letter 150211 (eRAI 8380) Related to Hydrology/Ground Water.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
01/28/2016	ML16216A228	Florida Power & Light Company Turkey Point Plant 2015 Annual American Crocodile Report for the U.S. Fish & Wildlife Endangered Species Permit, 2016-TN4606.	Annual Report Letter	Florida Power & Light Co	NRC/NRO US Dept of Interior, Fish & Wildlife Service	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
02/12/2016	ML16049A095	Turkey Point, Units 6 and 7 - Supplemental to NRC Request for Additional Information Letter No. 64 (eRAI 6544) Related to SRP Section 03.05.03 - Barrier Design Procedures.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
02/22/2016	ML16061A223	Turkey Point, Units 6 and 7 - Response to NRC Environmental Request for Additional Information Letter 160302 (eRAI 8506) Related to Radioactive Waste Management Systems.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/07/2016	ML16095A045	2016/03/07 Turkey Point COL Hearing - [External_Sender] RE: FPL Letter L-2016-036 Dated 07MAR16: Native Data Table Files for the Partial Response to NRC RAI Letter 150211 (eRAI 8380)	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
03/07/2016	ML16095A051	2016/03/07 Turkey Point COL Hearing - RE: RE: FPL Letter L-2016-036 Dated 07MAR16: Native Data Table Files for the Partial Response to NRC RAI Letter 150211 (eRAI 8380)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
03/07/2016	ML16095A043	2016/03/07 Turkey Point COL Hearing - [External_Sender] RE: FPL Letter L-2016-036 Dated 07MAR16: Native Data Table Files for the Partial Response to NRC RAI Letter 150211 (eRAI 8380)	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/07/2016	ML16095A048	2016/03/07 Turkey Point COL Hearing - RE: FPL Letter L-2016-036 Dated 07MAR16: Native Data Table Files for the Partial Response to NRC RAI Letter 150211 (eRAI 8380)	E-Mail	NRC/NRO	NRC/NRO/DNR L/LB4	05200040 05200041
03/07/2016	ML16071A034	Table 2.1-1 Statistical Summary of Automated Groundwater Specific Conductance (uS/cm) Data.	Environmental Monitoring Report Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/NRO	05200040 05200041
03/07/2016	ML16071A024	FPL Turkey Point Uprate Monitoring Project March 2015 Semiannual Sampling Event, SDG: Qtr. 1 2015 GW.	Environmental Monitoring Report Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/07/2016	ML16071A030	FPL Turkey Point Uprate Monitoring Project June 2015 Quarterly Sampling Event, SDG: Qtr. 2 2015 SW.	Environmental Monitoring Report Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/NRO	05200040 05200041
03/07/2016	ML16071A037	Table 2.2-2. Statistical Summary of Automated Surface Water Temperature (C) Data.	Environmental Monitoring Report Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/NRO	05200040 05200041
03/07/2016	ML16071A038	Table 2.2-1. Statistical Summary of Automated Surface Water Specific Conductance (s/cm) Data.	Environmental Monitoring Report Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
03/07/2016	ML16071A005	Turkey Point, Units 6 and 7 - Native Data Table Files for the Partial Response to NRC Environmental Request for Additional Information Letter 150211 (eRAI 8380) Related to Hydrology/Ground Water.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
03/09/2016	ML16095A039	2016/03/09 Turkey Point COL Hearing - [External_Sender] RE: Miami Dade County Report on Biscayne Bay Water Quality Observations	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
03/24/2016	ML16095A054	2016/03/24 Turkey Point COL Hearing - [External_Sender] Escorted access for upcoming NRC Audit	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/04/2016	ML16095A127	Letter From Florida Power and Light Company regarding Turkey Point Units 6 and 7, Observations on the Seminole Tribe of Florida Letter dated October 3, 2015.	Letter	Florida Power & Light Co	NRC/NRO US Dept of the Army, Corps of Engineers, Jacksonville District	05200040 05200041
04/13/2016	ML16126A535	2016/04/13 Turkey Point COL Hearing - [External_Sender] RE: NRC/FPL Clarification for RAI 2.5.4-16	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
04/14/2016	ML16126A455	2016/04/14 Turkey Point COL Hearing - FW: RE: NRC/FPL Clarification for RAI 2.5.4-16	E-Mail	NRC	NRC/NRO/DNR L/LB4	05200040 05200041
04/21/2016	ML16126A348	2016/04/21 Turkey Point COL Hearing - Additional Tour Participants for Next Week	E-Mail	NRC	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
04/25/2016	ML16216A215	Turkey Point Power Plant - Warning Letter #WL16-000151WI3SED from Florida Dept of Environmental Protection.	Letter	State of FL, Dept of Environmental Protection	Florida Power & Light Co NRC/NRO	05200040 05200041
04/26/2016	ML16126A339	2016/04/26 Turkey Point COL Hearing - [External_Sender] Third District Court of Appeal on Site Certification for PTN 6 & 7.	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
04/29/2016	ML16126A333	2016/04/29 Turkey Point COL Hearing - [External_Sender] L-2016-083- Voluntary Submittal of Exemption Request and Design Change Description for Departure from AP1000 DCD Revision 19 to Address Compliance With IEEE 603-1991	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/01/2016	ML16216A207	U.S. Department of Energy Table 58.2 FRCC Renewable Energy Generation by Fuel Report Annual Energy Outlook 2016, 2016-TN4623	Report, Miscellaneous	US Dept of Energy (DOE)	NRC/NRO	05200040 05200041
05/03/2016	ML16155A277	2016/05/03 Turkey Point COL Hearing - RE: FPL 3&4 NOV and Warning Letters	E-Mail	NRC	NRC/NRO/DNR L/LB4	05200040 05200041
05/06/2016	ML16155A182	2016/05/06 Turkey Point COL Hearing - [External_Sender] L-2016-101 Signed 05-06-2016 Main Control Room Habitability Analysis	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
05/06/2016	ML16155A185	2016/05/06 Turkey Point COL Hearing - [External_Sender] L-2016-108 Signed 05-06-2016 Voluntary Revised Response to NRC Request for Additional Information Letter No. 040 (eRAI 6006)	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/11/2016	ML16155A269	2016/05/11 Turkey Point COL Hearing - [External_Sender] RE: Insurance and other financial related documents for Turkey Point unit 6 and 7 application	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
05/11/2016	ML16155A270	2016/05/11 Turkey Point COL Hearing - Insurance and other financial related documents for Turkey Point unit 6 and 7 application	E-Mail	NRC	NRC/NRO/DNR L/LB4	05200040 05200041
05/12/2016	ML16216A217	Florida Department of Health Food and Waterborne Disease Program Annual Report, 2016-TN4604.	Report, Miscellaneous	State of FL, Dept of Health	NRC/NRO	05200040 05200041
05/16/2016	ML16140A087	Turkey Point, Units 6 and 7 - Voluntary Submittal of Exemption Request and Design Change Description for Departure from AP1000 DCD Revision 19 to Address Main	Letter	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Control Room Dose Analysis.				
05/17/2016	ML16062A205	Memorandum to ACRS: Turkey Point, Units 6 and 7 ASE Without Open Items for Chapter 20, "Requirements Resulting From Fukushima Near-Term Task Force Recommendations".	Memoranda	NRC/NRO/DN RL	NRC/ACRS	05200040 05200041
05/19/2016	ML16155A172	2016/05/19 Turkey Point COL Hearing - [External_Sender] RE: FAST-41 COVERED PROJECT MESSAGE - TURKEY POINT COLA	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
05/23/2016	ML16216A229	Florida Power & Light Company, Supplemental Information in Support of the May 16, 2016 Submittal to Miami-Dade County RER-DERM.	Letter	Florida Power & Light Co	Miami-Dade County, FL, Dept of Environmental Resources Management NRC/NRO	05200040 05200041
05/25/2016	ML16155A187	2016/05/25 Turkey Point COL Hearing - RE: FPL - MDC DERM CA Progress	E-Mail	NRC	NRC/NRO/DNR L/LB4	05200040 05200041
05/31/2016	ML16216A209	DOE EIA 2016-TN4620-160526-AEO 2016 Early Release Table 8 - Electrical Generation.	Report, Miscellaneous	US Dept of Energy, Energy Information Administration (EIA)	NRC/NRO	05200040 05200041
06/01/2016	ML16216A232	Florida Power & Light Company Turkey Point Units 6 & 7 Summary of project Mitigation and Conservation Commitments Rev. 1, 2016-TN4715.	Environmental Report	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/02/2016	ML16155A186	2016/06/02 Turkey Point COL Hearing - [External_Sender] ENR article	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
06/03/2016	ML16155A271	2016/06/03 Turkey Point COL Hearing - FW: Insurance and other financial related documents for Turkey Point unit 6 and 7 application < a e>	E-Mail	NRC	NRC/NRO/DNR L/LB4	05200040 05200041
06/03/2016	ML16155A183	2016/06/03 Turkey Point COL Hearing - FW: [External_Sender] L-2016-101 Signed 05-06-2016 Main Control Room Habitability Analysis < a e>	E-Mail	NRC	NRC/NRO/DNR L/LB4	05200040 05200041
06/08/2016	ML16160A490	2016/06/08 Turkey Point COL Hearing - FW: RE: FAST-41 COVERED PROJECT MESSAGE - TURKEY POINT COLA	E-Mail	NRC	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
06/09/2016	ML16161B275	2016/06/09 Turkey Point COL Hearing - email transmitting proprietary and non proprietary information	E-Mail	NRC	NRC/NRO/DNR L/LB4	05200040 05200041
06/10/2016	ML16183A326	2016/06/10 Turkey Point COL Hearing - [External_Sender] Chap. 8 vs Bulletin 2012-01	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
06/15/2016	ML16167A508	U.S. Department of Agriculture Commercial Red Meat Production by State and U.S., 2013-TN4525.	Environmental Monitoring Report	US Dept of Agriculture, National Agricultural Statistics Service	NRC/NRO	05200040 05200041
06/21/2016	ML16183A302	2016/06/21 Turkey Point COL Hearing - [External_Sender] ISG-11 Departures	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
06/28/2016	ML16183A301	2016/06/28 Turkey Point COL Hearing - [External_Sender] RE: list of mitigation and conservation commitments for units 6 and 7	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/12/2016	ML16189A334	Memorandum to ACRS - Turkey Point Units 6 and 7 - Chapter 13 - Conduct of Operations.	Memoranda	NRC/NRO/DN RL	NRC/ACRS	05200040 05200041
07/12/2016	ML15096A428	Turkey Point Chapter 09 ASE.	NRO Safety Evaluation Report (SER)-Delayed	NRC/NRO/DN RL/LB4		05200040 05200041
07/12/2016	ML16159A234	Turkey Point, Units 6 and 7, ASE Chapter 07 Instrumentation and Controls.	Safety Evaluation	NRC/NRO/DN RL/LB4		05200040 05200041
07/12/2016	ML16166A272	Turkey Point, Units 1 and 2, ASE Chapter 15.	Safety Evaluation	NRC/NRO/DN RL/LB4		05200040 05200041
07/13/2016	ML16169A216	Letter to Applicant RE: Turkey Point Units 6 and 7 ASE Chapter 3, "Design of Structures, Components, Equipment and Systems."	Letter	NRC/NRO/DN RL/LB4	Florida Power & Light Co	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/13/2016	ML15096A264	Turkey Point, Units 6 and 7, Chapter 03 ASE, Design of Structures, Components, Equipment and Systems.	Safety Evaluation	NRC/NRO		05200040 05200041
07/14/2016	ML16137A450	Letter to Applicant - Turkey Point, Units 6 and 7 ASE Without Open Items for Chapter 21, "Design Changes Proposed In Accordance With ISG-11".	Letter	NRC/NRO/DN RL/LB4	Florida Power & Light Co	05200040 05200041
07/14/2016	ML16137A375	Memorandum to ACRS - Turkey Point, Units 6 and 7 ASE Without Open Items for Chapter 21, "Design Changes Proposed In Accordance With ISG-11".	Memoranda	NRC/NRO/DN RL	NRC/ACRS	05200040 05200041
07/14/2016	ML16188A298	Memorandum to ACRS - Turkey Point Units 6 and 7 - Chapter 1 - Introduction.	Memoranda	NRC/NRO/DN RL	NRC/ACRS	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
07/14/2016	ML15096A254	Turkey Point, Units 6 and 7, Chapter 02 ASE.	Safety Evaluation	NRC/NRO/DN RL/LB4		05200040 05200041
07/21/2016	ML16214A360	2016/07/21 Turkey Point COL Hearing - [External_Sender] PTN 6 & 7 ACRS Day 2 Presentation	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
07/29/2016	ML16214A353	2016/07/29 Turkey Point COL Hearing - [External_Sender] RE: PTN 6 & 7 ACRS Day 2 Presentation Updated	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
07/29/2016	ML16214A358	2016/07/29 Turkey Point COL Hearing - [External_Sender] RE: PTN 6 & 7 ACRS Day 1 Presentation Updated	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/02/2016	ML16266A253	U. S. Army Corps of Engineers - Seminole Tribe of Florida Tribal Historic Preservation Office Proposed Turkey Point Cultural Resources Assessment Survey Work Plan August 2016, 2016-TN4727.	Letter	Seminole Tribe of Florida	US Dept of the Army, Corps of Engineers, Jacksonville District	05200040 05200041
08/09/2016	ML16238A236	2016/08/09 Turkey Point COL Hearing - [External_Sender] PTN 6&7 ACRS Subcommittee Slides - Day 2	E-Mail	- No Known Affiliation	NRC/NRO/DNR L/LB4	05200040 05200041
08/15/2016	ML16229A448	Turkey Point, Units 6 & 7 - Voluntary Response to NRC RIS 2016-08.	Letter Response to Request for Additional Information (RAI)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
08/18/2016	ML16211A146	Agenda - AP1000 Subcommittee Meeting, August 18-19, 2016.	Meeting Agenda	NRC/ACRS		05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A357	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Emergency Plan) - Part 5 Emergency Plan Supplement 6 - Florida Emergency Prep. Annex (Part A-Chapters 1-6)	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A369	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Emergency Plan) - Part 5 Emergency Plan Supplement 7 - Florida Radiological Emergency Mgmt. Plan Annex A, Appendix II (Part B)	Emergency Preparedness-Emergency Plan License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A627	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 27-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A742	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 6-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A668	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-201 to A-225(App B-Kleinfelder RCTS Testing Results)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A597	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 6-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A657	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 5-Special Nuclear Material (SNM) Material Control and Accounting	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
		Program Description				
08/26/2016	ML16250A686	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-1845 to A-1894(App G- Geovision Final Report)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A644	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 38-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A714	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-2060 to A-2070(App G- Geovision Final Report)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A752	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 15-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A824	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 20-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A596	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 5-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A628	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 28-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A747	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 10-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A758	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 20-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A679	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-962 to A-1136(App C-Geotechnics Lab Testing Results)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A637	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 32-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A760	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 22-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A790	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 51-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A688	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-1895 to A-1914(App G-Geovision Final Report)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A829	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 23-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A649	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 43-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A661	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages 1-31(Cover through Figure)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A785	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 46-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A589	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 1-FPL New Nuclear Projects Quality Assurance Program Description FPL-2 (QAPD)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A646	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 40-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A805	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 4-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A831	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 4, Part 1-Appendix F-RCTS Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A700	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-1955 to A-1974(App G-Geovision Final Report)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A669	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-226 to A-234(App B-Kleinfelder RCTS Testing Results)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A771	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 33-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A763	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 25-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A736	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 2-Appendix C-Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A735	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 1-Appendix C-Cone Penetrometer Test Results	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A794	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 55-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A720	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-2124 to A-2219(App G- Geovision Final Report to App H-Survey Final Report)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A768	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 30-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A590	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 1-Final Data Report	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A726	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 9-Surficial Muck Deposits Field and Laboratory Investigation Data Report-Pages 126-229(App 3 Pages 58-161)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A798	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 59-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A759	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 21-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A663	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-1 to A-61(App A-Boring Logs)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A626	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 26-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A706	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-1986 to A-1996(App G-Geovision Final Report)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A659	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 6-New Fuel Shipping Plan	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A776	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 37-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A748	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 11-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A591	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 2-Appendix A-Survey Report	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A802	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 1-Appendix E-Laboratory Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A621	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 23-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A607	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 1, Part 14-Appendix B-Geotechnical Field Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A765	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 27-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A664	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 8-Supplemental Field Investigation Data Report-Pages A-62 to A-168(App A to App B-Kleinfelder RCTS Testing Results)	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A822	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 3, Part 18-Appendix E-LaboratoryTest Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A797	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 58-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A786	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Enclosures) - Part 11 Enclosure 2-Final Data Report-Geotechnical Exploration and Testing-Turkey Point-Vol. 2, Part 47-Appendix D-Geophysical Test Data	Environmental Report License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A268	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Master Table of Contents	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A292	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2BB - Aquifer Pumping Test Results	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A306	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 229-252	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A300	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.14 - Technical Specification and Emergency Operation Requirements	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A285	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.8 - Cooling Water Canals and Reservoirs	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A330	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 6 - Engineered Safety Features	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A325	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 3 - Design of Structures, Components, Equipment and Systems - Sections 3.1-3KK PartA (3KKCover-3KKAppA)	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A282	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.6 - Probable Maximum Tsunami Hazards	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A305	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 201-228	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A315	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information - Figures 368-395	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A271	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.0 - Site Characteristics	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A329	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 5 - Reactor Coolant System and Connected Systems	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A303	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.5.1 - Basic Geologic and Seismic Information	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A273	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.2 - Nearby Industrial, Transportation, and Military Facilities	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A295	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 2 - Site Characteristics - Section 2.4.12 - Groundwater - Appendix 2CC - Groundwater Model Development and Analysis	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041
08/26/2016	ML16250A346	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Final Safety Analysis Report) - Part 2 - FSAR - Chapter 19 - Probabilistic Risk Assessment	Final Safety Analysis Report (FSAR) License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16251A127	Florida Power & Light Company Proposed Turkey Point Units 6 and 7 Combined License Application Submittal 16 of the Annual Update of the COL Application, Rev 8 and the Semi-Annual Update of the Departures Report.	Letter License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
08/26/2016	ML16250A413	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Site Redress Plan) - Part 6 Limited Work Authorization and Site Redress Plan	License-Application for Combined License (COLA) Site Redress Plan	Florida Power & Light Co	NRC/NRO	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
08/26/2016	ML16250A350	FPL - Turkey Point Units 6 & 7 COLA Rev. 8 (Technical Specifications) - Part 4 Technical Specifications	License-Application for Combined License (COLA) Technical Specifications	Florida Power & Light Co	NRC/NRO	05200040 05200041
09/16/2016	ML16263A284	Florida Power & Light Company Proposed Turkey Point Units 6 and 7 Roadmap of Changes in Combined License Application - Revision 8.	Letter License-Application for Combined License (COLA)	Florida Power & Light Co	NRC/Document Control Desk NRC/NRO	05200040 05200041
09/28/2016	ML16237A312	Letter to US Fish and Wildlife Service Transmitting Supplemental Information and Requesting Initiation of Formal Consultation Regarding the Proposed Turkey Point Units 6 and 7.	Letter	NRC/NRO/DN RL/EPB	State of FL, Fish & Wildlife Research Institute	05200040 05200041

Document Date	Accession Number	Document Title	Document Type	Author Affiliation	Addressee Affiliation	Docket Number
09/28/2016	ML16237A313	U.S. Fish and Wildlife Service Transmitting Supplemental Information and Requesting Initiation of Formal Consultation Regarding the Proposed Turkey Point Units 6 and 7: Enclosure 1 Updated Biological Assessment Determinations, August 2016.	Report, Miscellaneous	NRC/NRO/DN RL/EPB	US Dept of Interior, Fish & Wildlife Service	05200040 05200041

Appendix C Electronic Request for Additional Information Database

Throughout the course of the review of the Turkey Point Units 6 and 7 combined license (COL) application, the staff requested additional information (RAIs) of Florida Power & Light Company (FPL). The following is a list of these RAIs and the responses.

As noted in Section 1.2.3 of this report, a design-centered review approach (DCRA) was used in the review of the Turkey Point Units 6 and 7 COL application. The first COL application submitted for NRC staff review in a design center is designated as the reference COL (RCOL), and the subsequent applications in the design center are designated as subsequent COL (SCOL) applications. The Bellefonte Nuclear Plant (BLN) Units 3 and 4 COL application was originally designated as the RCOL application for the AP1000 design center, and the staff issued a safety evaluation report (SER) with open items that documented its review of both standard and site-specific information (for all chapters except Sections 3.7, 3.8, 13.6, 13.7, and 13.8 and Appendix 19A). The RCOL for the AP1000 COL design center switched from the Bellefonte COL application to the Vogtle COL application after the issuance of the Bellefonte SER with open items. The LNP COL application has been designated as an SCOL. Therefore, in addition to the list of RAIs that follows that are based on site-specific information, FPL had to endorse RAI responses from the RCOLs (both Bellefonte and Vogtle) that were determined to be standard to the AP1000 COL design center. The staff verified that the Turkey Point Units 6 and 7 COL FSAR, Revision 8, was appropriately revised in accordance with these endorsements. The endorsement of these standard RAIs can be found in the following letters:

- Endorsement of Bellefonte R-COLA Standard Content Requests for Additional Information dated October 5, 2009, ADAMS accession number ML092810319. This letter provides endorsement of standard responses that were provided in a Tennessee Valley Authority (TVA) letter dated October 24, 2008.
- Endorsement of Bellefonte R-COLA Standard Content Requests for Additional Information dated November 3, 2010, ADAMS accession number ML103090385. This letter provides endorsement of standard responses that were provided in a TVA letter dated August 16, 2010.
- Endorsement of Bellefonte R-COLA Standard Content Requests for Additional Information dated January 26, 2010, ADAMS accession number ML100280942. This letter provides endorsement of standard responses that were provided in a TVA letter dated November 16, 2009.
- Endorsement of Bellefonte R-COLA Standard Content Requests for Additional Information dated October 12, 2009, ADAMS accession number ML092870439. This letter provides endorsement of standard responses that were provided in a TVA letter dated April 15, 2009.
- Endorsement of Vogtle Electric Generating Plant – Units 3 and 4 AP1000 R-COLA Standard Content and Submittals, dated April 20, 2011, ADAMS accession number ML11111A127, and September 14, 2011, ADAMS accession number ML11259A054. These letters provide endorsement of standard responses that were provided in an Southern Nuclear Operating Company (SNC) letter dated March 31, 2011.

- Endorsement of Vogtle Electric Generating Plant Units 3 and 4 AP1000 R-COLA Standard Content Safety Evaluation Report Open Items dated February 22, 2010, ADAMS Accession No. ML100560114. This letter provides endorsement of standard responses that were provided in a SNC letter dated November 20, 2009.
- Endorsement of Vogtle Electric Generating Plant Units 3 and 4 AP1000 R-COLA Standard Content Submittals dated November 15, 2010, ADAMS Accession No. ML103210407. This letter provides endorsement of standard responses that were provided in a SNC letter dated August 23, 2010.
- Endorsement of Supplement 2 to Voluntary Submittal of Exemption Request and Design Change Description for Departure from AP1000 DCD Revision 19 to Address Containment Condensate Return Cooling Design dated May 9, 2016, ADAMS Accession No. ML16132A293. This letter provides a request from FPL for exemption and associated design change description to address a design change to the AP1000 DCD Revision 19.

The following notes pertain to the table on the proceeding following pages:

- The request for additional information (RAI) question numbers were assigned based on the section of the Standard Review Plan (SRP) that was associated with the question (e.g., question 02.01.02-1 was generated based on the staff's review of the application against Section 2.1.2 of the SRP).
- The applicant's responses to security-related and sensitive information questions (e.g., physical security) are not publically available.

FSER Appendix C Report

Application Title: Turkey Point Units 6 and 7 - Dockets 52-040 and 52-041

Question No.	NRC Letter No.	System RAI No.	SRP Section Title	RAI Issued Date	RAI Accession Number	Response Date	Response Accession Number
01.05-1	58	6434	Other Regulatory Considerations	5/1/12	ML12122A973	2/12/2013	ML13044A570
01.05-1	58	6434	Other Regulatory Considerations	5/1/12	ML12122A973	3/31/2015	ML15092A222
01.05-2	58	6434	Other Regulatory Considerations	5/1/12	ML12122A973	6/29/2012	ML121850685
01.05-2	58	6434	Other Regulatory Considerations	5/1/12	ML12122A973	10/29/2015	ML15306A169
01.05-3	58	6434	Other Regulatory Considerations	5/1/12	ML12122A973	10/28/2013	ML121850685
01.05-3	58	6434	Other Regulatory Considerations	5/1/12	ML12122A973	6/29/2012	ML13302C082
01.05-3	58	6434	Other Regulatory Considerations	5/1/12	ML12122A973	3/10/2016	ML16074A384
01.05-3	58	6434	Other Regulatory Considerations	5/1/12	ML12122A973	3/10/2016	ML16074A384
01.05-4	58	6434	Other Regulatory Considerations	5/1/12	ML12122A973	6/29/2012	ML121850685
01-1	57	6367	Introduction and Interfaces	4/2/12	ML12093A372	5/16/2012	ML12138A201
01-2	57	6367	Introduction and Interfaces	4/2/12	ML12093A372	5/16/2012	ML12138A201
02.01.02-1	66	6905	Exclusion Area Authority and Control	11/20/12	ML12325A184	1/4/2013	ML13008A235
02.01.03-1	46	6077	Population Distribution	12/19/11	ML11354A419	1/18/2012	ML12019A254

02.01.03-2	55	6079	Population Distribution	3/28/12	ML12088A414	4/25/2012	ML121170467
02.01.03-3	080	7467	Population Distribution	5/20/14	ML14141A201	6/18/2014	ML14170A894
02.01.03-3	080	7467	Population Distribution	5/20/14	ML14141A201	6/18/2014	ML14336A347
02.02.03-1	26	5653	Evaluation of Potential Accidents	7/5/11	ML11186A908	12/14/2011	ML11350A197
02.02.03-2	27	5655	Evaluation of Potential Accidents	7/5/11	ML11186A956	8/4/2011	ML11217A224
02.02.03-3	27	5655	Evaluation of Potential Accidents	7/5/11	ML11186A956	8/4/2011	ML11217A224
02.03.01-1	13	5308	Regional Climatology	1/10/11	ML110110682	2/9/2011	ML110410567
02.03.01-2	34	5908	Regional Climatology	8/15/11	ML11227A004	9/30/2011	ML11276A100
02.03.01-3	56	6251	Regional Climatology	3/29/12	ML12089A471	5/14/2012	ML12136A550
02.03.02-1	14	5309	Local Meteorology	1/11/11	ML110110720	2/9/2011	ML110410565
02.03.02-2	14	5309	Local Meteorology	1/11/11	ML110110720	2/9/2011	ML110410565
02.03.03-1	15	5310	Onsite Meteorological Measurements Programs	1/11/11	ML110110722	2/9/2011	ML110410437
02.03.05-1	16	5311	Long-Term Atmospheric Dispersion Estimates for Routine Releases	1/11/11	ML110110758	2/9/2011	ML110410444
02.04.02-1	2	4806	Floods	8/2/10	ML102140370	9/1/2010	ML102450485
02.04.02-2	2	4806	Floods	8/2/10	ML102140370	9/17/2010	ML102640041
02.04.02-3	2	4806	Floods	8/2/10	ML102140370	9/1/2010	ML102450485
02.04.03-1	3	4808	Probable Maximum Flood (PMF) on Streams and Rivers	8/3/10	ML102150153	9/2/2010	ML102500206
02.04.05-1	10	5233	Probable Maximum Surge and Seiche Flooding	12/2/10	ML103370087	3/22/2011	ML110840025
02.04.05-2	10	5233	Probable Maximum Surge and Seiche Flooding	12/2/10	ML103370087	2/28/2011	ML110610686
02.04.05-3	10	5233	Probable Maximum Surge and Seiche Flooding	12/2/10	ML103370087	4/6/2011	ML110980613
02.04.05-4	36	5860	Probable Maximum Surge and Seiche Flooding	9/21/11	ML11272A198	11/16/2011	ML11321A317
02.04.05-5	36	5860	Probable Maximum Surge and Seiche Flooding	9/21/11	ML11272A198	11/4/2011	ML11312A049
02.04.05-6	36	5860	Probable Maximum Surge and Seiche Flooding	9/21/11	ML11272A198	10/21/2011	ML11298A089
02.04.06-1	4	4809	Probable Maximum Tsunami Flooding	8/3/10	ML102150446	9/2/2010	ML102500207
02.04.06-2	4	4809	Probable Maximum Tsunami Flooding	8/3/10	ML102150446	9/22/2010	ML102670160
02.04.06-3	4	4809	Probable Maximum Tsunami Flooding	8/3/10	ML102150446	9/2/2010	ML102500207
02.04.06-4	30	5818	Probable Maximum Tsunami Flooding	7/18/11	ML11199A015	10/11/2011	ML11286A088
02.04.06-4	30	5818	Probable Maximum Tsunami Flooding	7/18/11	ML11199A015	10/11/2011	ML11286A088
02.04.06-5	30	5818	Probable Maximum Tsunami Flooding	7/18/11	ML11199A015	10/28/2011	ML11304A201
02.04.06-6	30	5818	Probable Maximum Tsunami Flooding	7/18/11	ML11199A015	10/11/2011	ML11286A088
02.04.06-7	47	6225	Probable Maximum Tsunami Flooding	12/21/11	ML12014A120	3/21/2013	ML13100A104
02.04.06-8	47	6225	Probable Maximum Tsunami Flooding	12/21/11	ML12014A120	7/26/2012	ML122120129
02.04.12-1	11	5190	Groundwater	12/16/10	ML103500342	5/5/2011	ML11129A058
02.04.12-2	11	5190	Groundwater	12/16/10	ML103500342	5/5/2011	ML11129A058
02.04.12-3	11	5190	Groundwater	12/16/10	ML103500342	5/5/2011	ML11129A058
02.04.12-4	11	5190	Groundwater	12/16/10	ML103500342	5/5/2011	ML11129A058
02.04.12-5	21	5643	Groundwater	4/28/11	ML11133A391	6/27/2011	ML11180A062
02.04.12-6	21	5643	Groundwater	4/28/11	ML11133A391	6/27/2011	ML11180A062
02.05.01-1	41	6024	Basic Geologic and Seismic Information	10/20/11	ML11293A202	10/3/2014	ML14282A073

02.05.01-31	41	6024	Basic Geologic and Seismic Information	10/20/11	ML11293A202	10/3/2014	ML14282A079
02.05.01-32	41	6024	Basic Geologic and Seismic Information	10/20/11	ML11293A202	10/3/2014	ML14282A079
02.05.01-33	41	6024	Basic Geologic and Seismic Information	10/20/11	ML11293A202	10/3/2014	ML14282A079
02.05.01-34	81	7804	Basic Geologic and Seismic Information	2/18/15	ML15050A155	7/15/2015	ML15198A059
02.05.01-35	81	7804	Basic Geologic and Seismic Information	2/18/15	ML15050A155	6/8/2015	ML15160A574
02.05.01-36	81	7804	Basic Geologic and Seismic Information	2/18/15	ML15050A155	5/19/2015	ML15156A616
02.05.01-37	81	7804	Basic Geologic and Seismic Information	2/18/15	ML15050A155	5/19/2015	ML15142A463
02.05.01-38	85	7950	Basic Geologic and Seismic Information	6/16/15	ML15167A417	7/15/2015	ML15198A060
02.05.01-39	85	7950	Basic Geologic and Seismic Information	6/16/15	ML15167A417	7/15/2015	ML15198A060
02.05.02-1	19	5691	Vibratory Ground Motion	4/25/11	ML11115A094	10/3/2014	ML14287A287
02.05.02-2	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A015
02.05.02-3	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A015
02.05.02-4	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A014
02.05.02-4	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	3/16/2015	ML15077A177
02.05.02-5	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A014
02.05.02-6	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A014
02.05.02-7	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A014
02.05.02-8	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A014
02.05.02-9	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A014
02.05.02-10	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A014
02.05.02-11	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A014
02.05.02-12	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A014
02.05.02-13	37	5896	Vibratory Ground Motion	9/29/11	ML11272A198	10/3/2014	ML14282A014
02.05.03-1	43	5875	Surface Faulting	10/27/11	ML11300A083	10/3/2014	ML14281A177
02.05.03-2	43	5875	Surface Faulting	10/27/11	ML11300A083	10/3/2014	ML14281A177
02.05.03-3	43	5875	Surface Faulting	10/27/11	ML11300A083	10/3/2014	ML14281A177
02.05.03-4	43	5875	Surface Faulting	10/27/11	ML11300A083	10/3/2014	ML14281A177
02.05.04-1	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A310
02.05.04-2	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A310
02.05.04-3	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A310
02.05.04-3	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-4	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-5	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-6	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-7	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-8	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-9	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311

02.05.04-10	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-11	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-12	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-13	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-14	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-15	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-16	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A311
02.05.04-16	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	5/6/2016	ML16131A673
02.05.04-17	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A312
02.05.04-18	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A312
02.05.04-19	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A312
02.05.04-20	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A312
02.05.04-21	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A312
02.05.04-22	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A312
02.05.04-23	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	10/3/2014	ML14283A312
02.05.04-24	40	6006	Stability of Subsurface Materials and Foundations	10/18/11	ML11291A220	12/2/2011	ML11340A003
02.05.04-25	44	6184	Stability of Subsurface Materials and Foundations	12/2/11	ML11336A250	10/3/2014	ML14281A178
02.05.04-26	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	7/15/2015	ML15198A063
02.05.04-26	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	10/29/2015	ML15306A111
02.05.04-26	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	10/29/2015	ML15306A111
02.05.04-27	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	4/29/2015	ML15198A063
02.05.04-27	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	7/15/2015	ML15121A794
02.05.04-28	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	4/10/2015	ML15103A544
02.05.04-29	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	4/17/2015	ML15110A446
02.05.04-30	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	4/17/2015	ML15110A446
02.05.04-31	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	4/10/2015	ML15103A544
02.05.04-31	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	7/13/2015	ML15196A048
02.05.04-32	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	4/17/2015	ML15196A048
02.05.04-32	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	7/13/2015	ML15110A446

02.05.04-33	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	4/27/2015	ML15119A013
02.05.04-33	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	7/13/2015	ML15196A048
02.05.04-34	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	3/20/2015	ML15082A390
02.05.04-35	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	4/27/2015	ML15119A013
02.05.04-36	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	4/29/2015	ML15121A794
02.05.04-37	082	7811	Stability of Subsurface Materials and Foundations	2/18/15	ML15050A156	4/10/2015	ML15103A544
03.03.01-1	1	4759	Wind Loading	7/29/10	ML102100598	8/30/2010	ML102440243
03.05.01.06-1	25	5414	Aircraft Hazards	6/29/11	ML11186A912	8/24/2011	ML11238A048
03.05.03-1	64	6544	Barrier Design Procedures	7/11/12	ML12193A564	9/19/2012	ML12265A065
03.05.03-1	64	6544	Barrier Design Procedures	7/11/12	ML12193A564	10/28/2013	ML14132A211
03.05.03-1	64	6544	Barrier Design Procedures	7/11/12	ML12193A564	5/9/2014	ML13302C089
03.05.03-1	64	6544	Barrier Design Procedures	7/11/12	ML12193A564	10/29/2015	ML15306A153
03.05.03-1	64	6544	Barrier Design Procedures	7/11/12	ML12193A564	2/12/2016	ML16049A087
03.05.03-1	64	6544	Barrier Design Procedures	7/11/12	ML12193A564	10/29/2015	ML15306A115
03.07.01-1	7	4975	Seismic Design Parameters	9/23/10	ML102670065	10/27/2010	ML103010279
03.07.01-1	7	4975	Seismic Design Parameters	9/23/10	ML102670065	4/2/2015	ML15100A010
03.07.01-2	7	4975	Seismic Design Parameters	9/23/10	ML102670065	12/11/2014	ML14349A373
03.07.01-3	7	4975	Seismic Design Parameters	9/23/10	ML102670065	12/11/2014	ML14349A373
03.07.01-4	7	4975	Seismic Design Parameters	9/23/10	ML102670065	12/11/2014	ML14349A373
03.07.01-5	7	4975	Seismic Design Parameters	9/23/10	ML102670065	12/11/2014	ML14349A373
03.07.01-6	7	4975	Seismic Design Parameters	9/23/10	ML102670065	10/27/2010	ML15100A010
03.07.01-6	7	4975	Seismic Design Parameters	9/23/10	ML102670065	4/2/2015	ML103010279
03.07.01-7	7	4975	Seismic Design Parameters	9/23/10	ML102670065	10/27/2010	ML103010279
03.07.01-7	7	4975	Seismic Design Parameters	9/23/10	ML102670065	4/2/2015	ML15100A010
03.07.01-8	7	4975	Seismic Design Parameters	9/23/10	ML102670065	10/27/2010	ML103010279
03.07.01-9	7	4975	Seismic Design Parameters	9/23/10	ML102670065	10/27/2010	ML103010279
03.07.01-10	7	4975	Seismic Design Parameters	9/23/10	ML102670065	10/27/2010	ML103010279
03.07.01-10	7	4975	Seismic Design Parameters	9/23/10	ML102670065	12/11/2014	ML14349A373
03.07.01-11	7	4975	Seismic Design Parameters	9/23/10	ML102670065	10/27/2010	ML103010279
03.07.01-12	7	4975	Seismic Design Parameters	9/23/10	ML102670065	10/27/2010	ML103010279
03.07.01-13	7	4975	Seismic Design Parameters	9/23/10	ML102670065	10/27/2010	ML103010279
03.07.01-13	7	4975	Seismic Design Parameters	9/23/10	ML102670065	4/2/2015	ML15100A010
03.07.01-14	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	2/12/2013	ML15097A353
03.07.01-14	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	4/2/2015	ML13044A572
03.07.01-15	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	3/7/2013	ML13070A340
03.07.01-15	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	4/2/2015	ML15097A353
03.07.01-15	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	7/17/2015	ML15201A539
03.07.01-16	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	2/12/2013	ML15097A353
03.07.01-16	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	4/2/2015	ML13044A572
03.07.01-17	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	7/30/2012	ML12214A592
03.07.01-18	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	2/12/2013	ML13044A572
03.07.01-18	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	4/2/2015	ML15097A353
03.07.01-19	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	12/11/2014	ML14349A372
03.07.01-20	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	7/30/2012	ML14282A015
03.07.01-20	61	6432	Seismic Design Parameters	5/17/12	ML12138A466	10/3/2014	ML12214A592

03.08.05-1	62	6433	Foundations	5/21/12	ML12142A019	12/11/2014	ML14349A370
03.08.05-2	62	6433	Foundations	5/21/12	ML12142A019	12/11/2014	ML14349A370
03.08.05-3	083	7815	Foundations	3/17/15	ML15076A504	4/29/2015	ML15121A792
03.08.05-4	083	7815	Foundations	3/17/15	ML15076A504	4/16/2015	ML15110A419
06.02.02-1	48	6258	Containment Heat Removal Systems	1/27/12	ML12027A058	2/27/2012	ML12060A101
06.04-1	54	6340	Control Room Habitability System	3/28/12	ML12088A413	8/23/2012	ML12237A286
06.04-2	075	7080	Control Room Habitability System	7/2/13	ML13183A290	9/18/2012	ML13263A174
07.05-1	12	5191	Information Systems Important to Safety	12/16/10	ML103500402	3/18/2011	ML110800598
08.02-1	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.02-2	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.02-3	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.02-4	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.02-5	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.02-6	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.02-7	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.02-8	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.02-9	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.02-10	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.02-11	38	5993	Offsite Power System	9/29/11	ML11276A137	10/31/2011	ML11306A138
08.03.01-1	39	5995	AC Power Systems (Onsite)	9/29/11	ML11276A136	10/31/2011	ML11306A139
08.03.01-2	39	5995	AC Power Systems (Onsite)	9/29/11	ML11276A136	10/31/2011	ML11306A139
08-1	065	6750	3 Branch Technical Position - Stability of Offsite Power Systems	9/26/12	ML12270A416	12/4/2012	ML12342A232
08-1	065	6750	3 Branch Technical Position - Stability of Offsite Power Systems	9/26/12	ML12270A416	3/30/2015	ML15091A388
09.02.01-1	28	5399	Station Service Water System	7/6/11	ML11187A283	8/17/2011	ML11231A983
09.02.01-2	29	5491	Station Service Water System	7/6/11	ML11187A325	8/17/2011	ML11234A011
09.02.01-3	29	5491	Station Service Water System	7/6/11	ML11187A325	8/17/2011	ML11234A011
09.02.01-4	29	5491	Station Service Water System	7/6/11	ML11187A325	8/17/2011	ML11234A011
09.02.01-5	29	5491	Station Service Water System	7/6/11	ML11187A325	8/17/2011	ML11234A011
09.02.01-6	53	6346	Station Service Water System	3/28/12	ML12089A104	5/14/2012	ML12136A549
09.02.01-7	53	6346	Station Service Water System	3/28/12	ML12089A104	5/14/2012	ML12136A549
09.02.02-1	22	5403	Reactor Auxiliary Cooling Water Systems	5/18/11	ML11138A325	6/24/2011	ML11178A231
09.02.02-2	23	5492	Reactor Auxiliary Cooling Water Systems	5/19/11	ML11139A328	6/24/2011	ML11178A232
09.02.04-1	9	5112	Potable and Sanitary Water Systems	10/7/10	ML102800203	11/5/2010	ML103130132
09.02.04-2	9	5112	Potable and Sanitary Water Systems	10/7/10	ML102800203	11/5/2010	ML103130132
09.02.04-3	068	6916	Potable and Sanitary Water Systems	12/4/12	ML12339A487	2/12/2013	ML13044A571
09.03.03-1	8	5080	Equipment and Floor Drainage System	10/7/10	ML102800197	11/5/2010	ML103130131
09.05.01-1	18	5351	Fire Protection Program	2/4/11	ML110350651	3/2/2011	ML110660151
09.05.02-1	17	5192	Communications Systems	2/4/11	ML110350651	3/3/2011	ML110660200
09.05.02-2	17	5192	Communications Systems	2/4/11	ML110350651	3/3/2011	ML110660200
10.04.05-1	24	5405	Circulating Water System	5/19/11	ML11139A468	8/3/2011	ML11216A202
10.04.05-2	078	7129	Circulating Water System	7/23/13	ML13204A334	8/16/2013	ML13231A153
11.02-1	63	5695	Liquid Waste Management System	5/21/12	ML12142A044	7/13/2012	ML12199A149
11.02-2	63	5695	Liquid Waste Management System	5/21/12	ML12142A044	7/13/2012	ML12199A149
11.02-2	63	5695	Liquid Waste Management System	5/21/12	ML12142A044	4/7/2015	ML15098A463
11.02-3	63	5695	Liquid Waste Management System	5/21/12	ML12142A044	7/13/2012	ML12199A149
11.02-4	63	5695	Liquid Waste Management System	5/21/12	ML12142A044	7/13/2012	ML12199A149
11.02-5	71	6919	Liquid Waste Management System	2/19/13	ML13051A299	4/3/2013	ML13095A125

11.02-6	72	6985	Liquid Waste Management System	2/20/13	ML13051A779	9/23/2014	ML14269A066
11.02-6	72	6985	Liquid Waste Management System	2/20/13	ML13051A779	9/9/2014	ML14255A016
11.02-6	72	6985	Liquid Waste Management System	2/20/13	ML13051A779	6/4/2014	ML14156A393
11.02-6	72	6985	Liquid Waste Management System	2/20/13	ML13051A779	1/15/2014	ML14017A018
11.02-6	72	6985	Liquid Waste Management System	2/20/13	ML13051A779	1/15/2014	ML14017A019
11.02-6	72	6985	Liquid Waste Management System	2/20/13	ML13051A779	1/15/2014	ML14017A020
11.02-6	72	6985	Liquid Waste Management System	2/20/13	ML13051A779	4/22/2014	ML14113A411
11.02-6	72	6985	Liquid Waste Management System	2/20/13	ML13051A779	8/9/2013	ML13225A029
11.02-7	073	7097	Liquid Waste Management System	6/13/13	ML13164A335	7/31/2013	ML13214A038
11.02-8	084	7908	Liquid Waste Management System	6/4/15	ML15156A623	6/23/2015	ML15175A415
11.03-1	077	7112	Gaseous Waste Management System	8/7/13	ML13210A400	9/9/2013	ML13254A217
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13.06-11	5	4899	Physical Security	9/8/10	ML102510672	10/8/2010	ML102860672
13.06-12	5	4899	Physical Security	9/8/10	ML102510672	10/8/2010	ML102860672
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13.06-18	5	4899	Physical Security	9/8/10	ML102510672	10/8/2010	ML102860672
13.06-19	5	4899	Physical Security	9/8/10	ML102510672	10/8/2010	ML102860672
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APPENDIX E. PRINCIPAL CONTRIBUTORS

Name	Responsibility
Ahn, Hosung	Hydrology
Andrukat, Dennis	Fire Protection
Arora, Surinder	Project Management
Barnhurst, Daniel	Hydrology
Barss, Daniel	Emergency Preparedness
Bowers, Anthony	Emergency Preparedness
Brown, David	Health Physics
Budzynski, John	Reactor Systems
Candelario, Luisette	Geotechnical Engineering
Carlson, Donald	Project Management
Chalk, Wayne	Fitness for Duty
Chien, Nan	Ventilation Systems
Chuang, Tze-Jer	Structural Engineering
Cicotte, George	Radioactive Waste Management/Process & Effluent Monitoring Systems
Clark, Phyllis	Project Management
Coflin, Monika	Cyber Security
Comar, Manny	Project Management
Curran, Gordon	Plant Systems
Dehmel, Jean-Claude	Health Physics
Dittman, Bernad	Instrumentation & Controls
Downey, Steven	Materials Engineering
Drucker, David	Project Management
Eudy, Michael	Project Management
Fitzpatrick, Robert	Electrical Engineering, Electrical Engineering and Equipment Qualification
Frost, John	Physical Security, Physical Security ITAAC
Galletta, Thomas	Project Management
Giacinto, Joseph	Hydrology
Gleaves, William	Project Management
Goel, Raj	Containment Systems
Gran, Zachary	Health Physics
Habib, Donald	Project Management
Haque, Mohammad	Hydrology

Name	Responsibility
Harris, Larry	Material Control and Accounting Fuel Cycles and Transportation
Hart, Michelle	Accident Analysis
Harvey, Brad	Meteorology
Haque, Mohammad	Hydrology
Hearn, Peter	Project Management
Heeszel, David	Seismology
Hernandez, Raul	Plant Systems
Hinson, Charles	Health Physics
Hoellman, Jordan	Project Management
Honcharik, John	Component Integrity Performance Testing; Materials
Hsii, Yi-Hsiung (Gene)	Reactor Systems
Hughes, Brian	Project Management
Jenkins, Joel	Materials Engineering
Jones, Henry	Hydrology
Kang, Peter	Electrical Engineering and Equipment Qualification
Kellum, Jim	Organizational, Training, and Administrative Procedures
Law, Yiu Kui	Mechanical Engineering
Le, Hien	Technical Specifications
Le, Tuan	Engineering Mechanics
Li, Chang-Yang	Plant Systems
Lintz, Mark	Operator Training
Lois, Kosmas	Financial Analysis
Ma, John	Structural Engineering
Makar, Gregory	Materials Engineering
Mazza, Jan	Project Management
Mills, Daniel	Nuclear Systems
Minarik, Anthony	Project Management, Reactor Systems
Misenhimer, David	Project Management
Morton, Wendell	Emergency Communications
Murray, Ruthanne	Insurance and Indemnity
Musico, Bruce	Emergency Preparedness
Neuhausen, Alissa	Structural Engineering
Nolan, Ryan	Plant Systems
Pal, Amar	Electrical Engineering
Patel, Pravin	Structural Engineering

Name	Responsibility
Patterson, Malcolm	Probabilistic Risk Assessment (PRA)/Severe Accidents
Pelton, Richard	Human Performance
Peng, Shie-Jeng	Containment Systems
Pieringer, Paul	Human Factors
Plaza-Toledo, Meralis	Geology
Quinlan, Kevin	Meteorology
Ray, Sheila	Electrical Engineering, Electrical Engineering, and Equipment Qualification
Redden, Adrienne	Licensing
Reddy, Devender	Plant Systems
Reyes-Maldonado, Ruth	Project Management
Roach, Edward	Health Physics
Roche-Rivera, Robert	Structural Engineering
Rodriguez, Ricardo	Geotechnical Engineering
Rosselle, Charles	Project Management
Rycyna, John	Cyber Security
Santos, Cayetano	Project Management
Sastre-Fuentes, Eduardo	Chemical Engineering
Scarbrough, Thomas	Component Integrity Performance Testing
Schleicher, Lisa	Seismology and Project Management
Schroer, Suzanne	Probabilistic Risk Assessment (PRA)/Severe Accidents
Scully, Derek	Technical Specifications
Seber, Dogan	Seismology
See, Kenneth	Hydrology
Simpson, Jo Ann	Budget
Sisk, David	Site Hazards
Smith, Shelly	Scheduling
Stieve, Alice	Geology
Strnisha, James	Component Integrity
Stubbs, Angelo	Plant Systems
Stutzcage, Edward	Health Physics
Sweat, Tarico	Plant Systems
Tai, Tom	Project Management
Takacs, Michael	Project Management
Talbot, Frank	Initial Test Program
Tammara, Rao	Site Hazards

Name	Responsibility
Tardiff, Albert	Physical Protection of Special Nuclear Material of Low Strategic Significance
Tegeler, Bret	Structural Engineering
Thomas, Vaughn	Structural Engineering
Thompson, Jenise-Marie	Geosciences and Geotechnical Engineering
Tiruneh, Nebiyu	Hydrology
Tjader, Theodore	Technical Specifications
Truong, Tung	Instrumentation & Controls
Valentin-Olmeda, Milton	Structural Engineering
Van Wert Christopher	Reactor Systems
Vega, Frankie	Geotechnical Engineering
Vera, Marieliz	Structural Engineering
Vettori, Robert	Fire Protection
Vokoun, Patricia	Project Management
Wagage, Hanry	Containment Systems
Wheeler, Larry	Plant Systems
Williams, Stephen	Health Physics
Williamson, Alicia	Project Management
Wilson, Jerry	Project Management
Wilson, Joshua	Plant Systems
Wray, Barry	Material Control and Accounting Fuel Cycles and Transportation
Wu, Cheng-lh	Engineering Mechanics
Xi, Zuhan	Geotechnical Engineering

APPENDIX F

REPORT BY THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

September 16, 2016

The Honorable Stephen G. Burns
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: REPORT ON THE SAFETY ASPECTS OF THE FLORIDA POWER & LIGHT
COMPANY'S COMBINED LICENSE APPLICATION FOR TURKEY POINT
UNITS 6 AND 7

Dear Chairman Burns,

During the 636th meeting of the Advisory Committee on Reactor Safeguards (ACRS), September 8-10, 2016, we reviewed the Florida Power & Light Company (FPL or applicant) combined license application (COLA) for Turkey Point Units 6 and 7 and the NRC staff's advanced safety evaluation (ASE). FPL proposes to construct and operate two Westinghouse AP1000 reactors at their owned and controlled 9400-acre Turkey Point plant property, located in Miami-Dade County, Florida, approximately 25 miles south of Miami. Currently, the Turkey Point plant property includes five operating electric generating units: two oil/gas-fired units (Units 1 and 2), one gas-fired combined cycle unit (Unit 5), and two nuclear power units (Units 3 and 4). Both Units 3 and 4 are Westinghouse-designed pressurized water reactors. They entered commercial operation in 1972 and 1973, respectively.

Our AP1000 Subcommittee held a two-day meeting on August 18-19, 2016, to review the plant-specific information in the COLA and the staff's ASE. During this review, we had the benefit of discussions with representatives of the staff, FPL and its vendors, and input from members of the public. We also had the benefit of the referenced documents. This report fulfills the requirement of 10 CFR 52.87 that the ACRS report on those portions of the application which concern safety.

CONCLUSIONS AND RECOMMENDATION

1. There is reasonable assurance that Turkey Point Units 6 and 7 can be built and operated without undue risk to the health and safety of the public. The FPL COLA for these units should be approved.
2. The following proposed site-specific departures from the AP1000 design control document (DCD) should be approved.
 - a. Consolidation of the Technical Support Center (TSC) to provide support to Turkey Point Units 3, 4, 6, and 7.

- b. Meteorological exceedances for the operating basis wind speed and for the maximum safety and maximum normal wet bulb air temperatures.
 - c. Exclusion area boundary minimum distance.
- 3. Staff should consider if existing guidance for estimating future sea level rise and guidance for location of the TSC should be updated to reflect changing circumstances.

BACKGROUND

By letter, dated June 30, 2009, FPL submitted a COLA to the NRC for Turkey Point Units 6 and 7, in accordance with the requirements of 10 CFR Part 52. In the application, FPL stated that these units would be two Westinghouse AP1000 advanced pressurized water reactors and they would be located at the existing Turkey Point site. The COLA incorporates the Westinghouse AP1000 certified design, the standard content material from the AP1000 reference combined license application (RCOLA), and the FPL site-specific information.

The design centered review approach is described in Regulatory Issue Summary 2006-06. The design centered review approach is Commission policy intended to promote standardization of COLAs beyond the scope of information included in the design certification. Specifically, this policy allows the staff to perform one technical review for each issue outside the scope of the design certification and it allows the decision based on this review to support multiple COLAs.

The first COLA submitted for NRC staff review is designated in a design center as the RCOLA, and the subsequent applications which reference the RCOLA are designated as subsequent combined license applications (SCOLAs). The Turkey Point Units 6 and 7 COLA is the fourth SCOLA referencing the AP1000 DCD and Vogtle RCOLA. It includes the same five AP1000 departure requests we first reviewed under the Levy docket and addressed in our letter report to the Commission, dated April 18, 2016.

FPL has organized and annotated its SCOLA to identify: a) sections that incorporate by reference the AP1000 DCD, b) sections that are standard for COLAs in the AP1000 RCOLA, and c) sections that are site-specific and thus only apply to Turkey Point Units 6 and 7.

DISCUSSION

Population Density

Regulatory Guide 4.7 includes a criterion for satisfying 10 CFR 100.21, relative to siting in an area of low population density. The guidance also includes provisions for determining site acceptability when the criterion is exceeded, provided that population density is not well in excess of the criterion. The low population density criterion is that within about five years of plant site approval, the population density, including weighted transient population, averaged over any radial distance out to 20 miles (cumulative population at a distance divided by the circular area at that distance), does not exceed 500 persons per square mile. Based on FPL's projection, this criterion is exceeded from 5 to 20 miles by about one-third.

Accordingly, FPL implemented the guidance provisions for determining site acceptability. This requires consideration of alternative sites with lower nearby population densities, while giving attention to safety, environmental, economic, and other factors. FPL found that the Turkey Point site offered advantages related to grid reliability, land availability, and existing nuclear plant and emergency planning infrastructure. Staff review concluded that regulatory guidance concerning population density had been met.

FPL stated that the exceedance of 500 persons per square mile by one-third was not considered to be well in excess of the low population density criterion, and it noted that Turkey Point meets all regulatory requirements and guidance for the exclusion area, low population zone, distance to the nearest population center, and for emergency planning. We agree that the exceedance of the 500 persons per square mile guidance is acceptable, particularly given that all other population-related siting requirements and guidance are met, and that consideration was given to alternative siting in accordance with 10 CFR 100.21(h).

Sea Level Rise

Regulatory Guide 1.59 includes guidance for establishing the plant flooding design basis. For coastal sites, this requires determination of the sea level before any rise resulting from an event such as a hurricane or tsunami. NUREG/CR-7046 recommends a method for estimating the long-term rise in sea level, using applicable gage station data. Following this guidance, and extrapolating for an assumed plant life of 60 years, FPL established an event antecedent sea level one foot above the current level. This higher sea level then became the basis for additions due to tide, local sea anomalies, and external events applicable to the site.

As discussed in Section 2.4.5.4.4 of its ASE, the staff referred to the possibility of an accelerating rise in sea level during the plant life which might not be shown in the historical data. FPL noted that they had followed the applicable guidance and recommendations, and that margins existed not only in the one foot sea level rise they had established based on historical data, but also in the additions to this element of antecedent level such as the tide level assumed.

The rise in sea level over time is monitored and widely publicized, so that the potential for an accelerating rise resulting in an increase above the one foot allowance used by FPL can be recognized well before it occurs. If necessary due to accelerating rates of sea level rise, measures could be taken at the time they are apparent to ensure that the safety design basis of the plant is maintained. We expect that the Turkey Point Units 6 and 7 licensing basis will be explicit concerning the assumed sea level rise of one foot, and that the licensee will remain aware of recorded sea level rise so as to recognize the potential exceedance during the plant life.

Regarding forecasts of potential sea level rise acceleration, including those made by government agencies, the staff should review regulatory guidance generically to determine if such forecasts should be addressed in establishing an antecedent sea level for siting purposes, or whether continued reliance on extrapolation of historical data remains sufficient.

Flooding Evaluations

The coastal location of the site requires the determination of probable maximum flooding levels to consider hurricane storm surge with wave run up, tsunami, and local precipitation events. FPL determined the highest water elevation in the power block area due to a probable maximum local precipitation event to be 24.5 feet, and due to a probable maximum hurricane, with storm surge, to be 24.8 feet. The U.S. Army Corps of Engineers performed an independent study of the site for a storm with an annual frequency of 1×10^{-7} which yielded a result within 0.1 feet of this level.

On August 16, 1992, Hurricane Andrew caused severe flooding in the State of Florida. During Hurricane Andrew, rainfall totals of more than seven inches were recorded in southeastern Florida and the peak storm surge on the southeast Florida coast occurred near the time of high astronomical tide. FPL stated that the highest storm level in Biscayne Bay of 15.4 feet was observed during Hurricane Andrew approximately 10 miles from the site. FPL stated that the level was lower than this at the Turkey Point site.

FPL considered the historical record, geological evidence, and physical data to evaluate the probable maximum tsunami elevation at the site. The staff also performed an independent tsunami modeling assessment resulting in a surface water elevation of 14.1 feet, which is in good agreement with the applicant's value of 14.0 feet.

The plant design grade level for safety-related structures is 26 feet, which is above the highest water levels calculated for the potential events that could affect the site, and therefore is considered acceptable.

Deep Well Injection

FPL proposes to dispose of Turkey Point Units 6 and 7 liquid radioactive waste by first combining it with other sources of plant liquid waste to achieve the dilution required for release in compliance with 10 CFR Part 20, Appendix B. The combined waste stream is then pumped into a saline underground aquifer using deep well injection, which is an established means widely used in the region for disposal of other forms of liquid waste. Disposal of liquid radioactive waste by discharge to an underground aquifer is an alternative to its release into surface waters. Accordingly, approval of the disposal procedure is required in accordance with 10 CFR 20.2002.

The deep well injection is into the saline aquifer more than 3,000 feet below the ground surface. This aquifer is separated from a brackish aquifer above by intermediate confining strata. The injection system design includes monthly sampling of separate monitoring wells to detect any leakage from the injection wells at depths above the saline aquifer.

Although the discharged waste is expected to remain in the saline aquifer, FPL analyzed the consequences of saline aquifer intrusion by the drilling of a well into the aquifer to withdraw water for agricultural use. Independently, the staff analyzed a scenario involving the full breach

of the confining strata above the saline aquifer, allowing waste to enter the higher zone at the nearest offsite location where a well is assumed to be withdrawing water. Both analyses used conservative assumptions relative to radioactive decay and further dilution of the radioactive waste, and relative to the resulting dose to the maximally exposed individual. The results comply with 10 CFR Part 50, Appendix I, and confirm that doses are below the design objectives.

In summary, the liquid radioactive waste release complies with requirements applicable to discharge to surface waters, although it will be discharged instead into an underground aquifer where it is expected to remain. If it were not to remain in the aquifer, either due to intrusion or to confinement failure, the consequences would remain below requirements applicable to a surface discharge. The applicant complied with the requirements of 10 CFR 20.2002 for seeking approval of this alternate method of radioactive waste disposal.

Consolidated Technical Support Center and Emergency Operations Facility

An emergency response facility departure from the AP1000 DCD provides for a common TSC for Units 3, 4, 6, and 7. The TSC is located in the Turkey Point Nuclear Training Building, which is outside of the protected areas between the control rooms for Units 3 and 4 and the control rooms for Units 6 and 7. This is estimated to increase the travel time between the TSC and the control room from two minutes for the single-unit TSC location for the AP1000 design to about 10 to 15 minutes for the common TSC location. This increase is considered acceptable based on the communications and data links that are provided and on the expected benefits of maintaining a single TSC.

Guidance concerning location of the TSC is included in NUREG-0696. Among other things, the guidance suggests a walking time from the TSC to the control room of two minutes. The standard review plan allows improvement in communication technology to increase this walking time significantly, as has been reflected in several licensing actions recently. The benefits of a consolidated TSC at a multi-unit site, using current communication technology appear to warrant updating NUREG-0696, and we recommend that the staff consider doing so.

The applicant is also seeking approval for the emergency operations facility (EOF) to be located in Miami, Florida, approximately 26 miles from the site, in an existing FPL General Office building which is currently supporting Turkey Point Units 3 and 4. The staff has proposed several inspections, tests, analyses, and acceptance criteria (ITAAC) to demonstrate the ability of the EOF to support an emergency condition at the Turkey Point site. Demonstration of compliance with these ITAAC will be completed prior to fuel loading. The distance from the Turkey Point site to the common EOF is not excessive.

Meteorological Departures

FPL determined that meteorological conditions at the site exceed those included in the AP1000 DCD for three parameters. The 50-year return period, 3-second gust at Turkey Point is 150 mph, which exceeds the DCD value of 145 mph. The maximum safety and normal wet bulb temperatures of approximately 87.4°F and 81.5°F, respectively, exceed the DCD values of 86.1°F and 80.1°F. These relatively small, site-specific meteorological exceedances were evaluated by FPL and the staff and found not to affect design functions or analysis methods of any structures, systems or components.

Exclusion Area Boundary Distance Departure

The AP1000 DCD requires a distance from the plant to the exclusion area boundary of 0.5 miles. The minimum distance for Turkey Point Units 6 and 7 is 0.27 miles, and this shorter distance has been reflected in the calculation of accident doses at the boundary. As discussed in Section 2.3.4.6 of the ASE, using atmospheric dispersion parameters appropriate to the shorter distance, the results are found to be acceptable.

SUMMARY

The applicant and the staff have addressed the plant-specific requirements necessary for approval of the SCOLA. This includes DCD departures concerning the site-specific meteorology, exclusion area boundary minimum distance and the location of the TSC. The SCOLA for Turkey Point Units 6 and 7 should be approved.

Sincerely,

/RA/

Dennis C. Bley
Chairman

REFERENCES

1. Florida Power & Light Company, "Application for Combined License for Turkey Point Units 6 and 7," June 30, 2009 (ML091830589).
2. U.S. Nuclear Regulatory Commission, Regulatory Issue Summary 2006-06, "New Reactor Standardization Needed to Support the Design-Centered Licensing Review Approach," May 31, 2006 (ML053540251).
3. Advisory Committee on Reactor Safeguards, "Exemptions to the AP1000 Certified Design Included in the Levy Nuclear Plant Units 1 and 2 Combined License Application," April 18, 2016 (ML16102A149).
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ASE Chapter	Issuance Date	ML#s
1	7-14-2016	ML14349A710
2	7-14-2016	ML15096A254
3	7-12-2016	ML15096A264
4	7-12-2016	ML12202A833
5	7-12-2016	ML16159A198
6	7-12-2016	ML16117A527
7	7-12-2016	ML16159A234
8	7-12-2016	ML15096A344
9	7-12-2016	ML15096A428
10	7-12-2016	ML12262A056
11	5-17-2016	ML15096A457
12	7-12-2016	ML16161A380
13	7-12-2016	ML16061A443
14	7-12-2016	ML16161A384
15	7-12-2016	ML16166A272
16	7-12-2016	ML16161A359
17	7-12-2016	ML12262A238
18	7-12-2016	ML12262A247
19	7-14-2016	ML12262A277
19.A	7-14-2016	ML12262A286
20	5-17-2016	ML16062A258
21	7-14-2016	ML16137A481



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

April 18, 2016

The Honorable Stephen G. Burns
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

**SUBJECT: EXEMPTIONS TO THE AP1000 CERTIFIED DESIGN INCLUDED IN THE LEVY
NUCLEAR PLANT UNITS 1 AND 2 COMBINED LICENSE APPLICATION**

Dear Chairman Burns,

During the 633rd meeting of the Advisory Committee on Reactor Safeguards (ACRS), April 7-9, 2016, we reviewed five exemption requests for the Westinghouse Electric Company (WEC) AP1000 certified design which Duke Energy Florida, LLC (Duke Energy) has included in the combined license application (COLA) for the Levy Nuclear Plant (Levy) Units 1 and 2. We also reviewed the NRC staff's related Advanced Safety Evaluation Report (ASER), Chapter 21. The exemptions include changes that are grouped into six departures from the AP1000 Design Control Document (DCD), Revision 19. Our AP1000 Subcommittee held a meeting on April 5, 2016, to review the departures and the staff's ASER. The Subcommittee also met with Duke Energy, WEC, and the staff on April 9 and September 17, 2014, to review the development of the changes that are needed to achieve the intended design functions for passive residual heat removal (PRHR). These changes are included in the exemption concerning condensate return and PRHR.

During the meeting, we had the benefit of discussions with representatives of the staff, Duke Energy, and WEC, and we had input from members of the public. We also had the benefit of the referenced documents. This report fulfills the requirement of 10 CFR 52.87 that the ACRS report on those portions of the application which concern safety.

CONCLUSIONS AND RECOMMENDATION

1. Five exemptions to the AP1000 certified design have been included in the Levy combined license application. The five exemptions are needed to enable the certified design to perform intended functions and should be approved.
2. The causes for the exemptions have been identified and addressed for the AP1000 certification.
3. Generic lessons learned, relative to the reactor design process leading to certification, should be identified and further evaluated.

BACKGROUND

By letter dated July 28, 2008, Progress Energy Florida, Inc., now Duke Energy, submitted a COLA for Levy Units 1 and 2 to the NRC. On December 7, 2011, we issued a letter report to the Commission recommending approval following implementation of the stated recommendations. Subsequently, changes needed to achieve the intended design functions for PRHR were identified. Development of these changes was undertaken by WEC, with oversight from Duke Energy, and these changes are now required to be included in the COLA, pursuant to Interim Staff Guidance DC/COL-ISG-011. These departures are common to all COLAs referencing the AP1000 design, and similar changes will be necessary for AP1000 combined license holders.

Ongoing detailed design of the AP1000 units, and investigation into the extent of the condition that created the need for the PRHR-related changes, identified other needed changes requiring approval of exemptions in four additional areas. Duke Energy noted the areas requiring departures from the certified AP1000 design during our review of its William States Lee III Nuclear Station (Lee) Units 1 and 2 COLA in 2015. These were listed as follows in our letter, dated December 14, 2015, concerning the Lee COLA:

- Condensate return and PRHR
- Main control room operator dose
- Main control room heat load
- Plant monitoring system flux doubling to comply with IEEE 603
- Hydrogen vent in containment

DISCUSSION

The five exemptions and associated departures from the AP1000 certified design are needed to implement intended functions of the certified design. Each is distinct and separate from the others. The changes will be made for the common purpose of correcting errors and omissions in the certified design, which have been identified during licensing and detailed design development subsequent to certification. Therefore, we also reviewed elements that are common to the departures; in particular, the implementation of the quality assurance program requirements in 10 CFR Part 50, Appendix B during design. Finally, we also reviewed the staff's assessment of the effect of the departures on the previously completed probabilistic risk assessment.

Condensate Return and Passive Residual Heat Removal

The AP1000 design provides for closed-loop cooldown and passive heat removal under accident conditions not involving loss of coolant. Reactor coolant circulates naturally through a PRHR heat exchanger located within the in-containment refueling water storage tank (IRWST). The PRHR heat exchanger converts IRWST water to steam, and the subsequent condensation of this steam on the containment vessel interior surface passively transfers residual heat by conduction through the containment wall to the outside air. This closed-loop cooling requires that sufficient condensed water be returned to the IRWST to ensure the inventory needed to maintain the cooldown status and to continue the PRHR process for as long as necessary.

Features in the containment that are required to direct condensate back to the IRWST are described in AP1000 DCD, Revision 19. The rate of condensation varies with time, and the return of condensate to the IRWST is subject to some loss. A constant loss rate of 10 percent was assumed in the DCD analysis. Based on this assumption, DCD, Revision 19 states that (a) acceptance criteria associated with the Chapter 15 design basis safety analyses remain satisfied indefinitely, and (b) cooldown to 420°F can be achieved in 36 hours and maintained indefinitely, based on Chapter 19 assumptions and acceptance criteria.

Duke Energy has proposed for its Levy COLA an exemption seeking approval of two departures that concern cases (a) and (b) above. These departures involve physical changes in containment to increase condensate return. Downspouts, collection points, and connecting piping have been added to the polar crane girder and the internal stiffener, and many attachment plates on the containment inner surface have been eliminated. Additional testing was performed to estimate better the condensate collection on surfaces and losses at discontinuities such as attachment plates and to provide an improved basis for the estimation of condensate losses.

Based on testing and the additional features provided to return sufficient condensate back to the IRWST, a loss rate of 18 percent of the water that condenses on the containment vessel inner surface has now been assumed for cases (a) and (b) above. Water that condenses on other surfaces within containment is assumed to be entirely lost to the IRWST.

Analyses by WEC and the staff of PRHR performance were extensive. WEC used WGOTHIC and LOFTRAN with some confirmatory analyses using RELAP. Adiabatic and heat-loss models of the reactor coolant system, and the potential loss of subcooling in the reactor coolant system on heat transfer in the PRHR heat exchanger, were examined. The staff's confirmatory calculations used MELCOR and RELAP, and their results agreed well with the WEC calculations. The analyses included both the most limiting Chapter 15 non-loss-of-coolant-accident transient that credits the PRHR heat exchanger, which is the loss of normal feedwater coincident with the loss of AC power to the plant auxiliaries, and the safe shutdown analysis in Chapter 19. Based on these analyses, the duration for case (a) was extended to 72 hours, and the duration for case (b) was revised from an indefinite period to at least 14 days. Also, criteria for activation of the backup automatic depressurization system in order to establish open loop PRHR were updated.

Main Control Room Operator Dose

WEC identified several discrepancies in the certified design analyses supporting the determination of main control room (MCR) operator dose following a design basis accident (DBA). Specifically, (1) the analyses did not account for the direct dose from the MCR emergency ventilation system filter, (2) the normal ventilation system radiation monitor setpoints were not based upon all DBA release scenarios, and (3) the methodology used to estimate MCR dose contribution from direct radiation and skyshine was not up-to-date.

This exemption includes changes which add shielding for the ventilation filter, reduce the allowable secondary coolant iodine activity, update the radiation dose analyses, and revise the normal ventilation system radiation monitor logic and setpoints. The result of the changes provides a revised MCR dose for the DBA, which slightly increases the margin to the 5 rem limit.

Main Control Room Heat Load

Duke Energy identified that heat sources in the MCR had increased with detailed design development and now exceed those assumed in the certified design. Also, the design had not considered an event in which the MCR could be isolated and dependent on the emergency ventilation system, while offsite power remained available and powering certain MCR equipment. This event results in significantly higher heat loads than are considered in the certified design.

The exemption includes changes that add automatic, two-stage de-energization of select non-safety MCR heat loads. This load shed retains power for plant controls and parameter indications at the operators' normal work stations. Also, changes were made to establish limits, with surveillance requirements, for the initial MCR conditions and to ensure operation of the electrical load shedding functions.

With these changes, analysis projects that operators may remain in the MCR indefinitely, consistent with NUREG-0700 limits, following its isolation and resulting dependence on the emergency ventilation system.

Plant Monitoring System Compliance with IEEE 603

The source range neutron flux logic is a control system feature of the plant monitoring system that isolates dilute water sources to the reactor coolant system, in order to protect against inadvertent criticality due to boron dilution during shutdown conditions. Under some plant conditions, it is necessary to manually block or bypass the operation of this feature.

Operating bypasses are addressed in IEEE Standard 603-1991, and this standard is applicable to COLAs referencing the AP1000 certified design. WEC identified that, due to an omission, the certified design did not meet the requirements of the standard because this protection function could be blocked and would not be reset automatically when plant conditions require it. The exemption includes a change that will revise the plant monitoring system logic to comply with the standard and with regulatory requirements.

Hydrogen Vent Inspection, Tests, Analyses, and Acceptance Criteria (ITAAC)

WEC identified that changes in structural details internal to the containment have occurred which are inconsistent with the certified design ITAAC for one of the compartments, relative to the venting of any hydrogen accumulation in the compartment following a severe accident. The

departure change to the ITAAC recognizes the possibility of a standing hydrogen flame that is closer to the containment boundary than allowed by the current ITAAC. Although the possible standing flame is closer to the containment boundary, results from analyses indicate that the higher temperatures would not compromise the structural integrity of the containment wall or of the equipment hatch cover and seals, and therefore, is acceptable.

NRC Staff Review

On March 7, 2016, the ASER for the five exemptions included in the Levy COLA was transmitted to the ACRS for review. It documents the staff's very thorough and technically complete review of the changes as they were developed over the past three years. The staff has identified that each of the exemptions is necessary in order to perform the intended functions, and therefore, meet the underlying purposes of the AP1000 certification rule.

The concluding statement in ASER Section 21.0 is "The staff finds that the cumulative risk impact of these design changes and departures is negligible." The changes are necessary to perform the intended functions that were the basis for the DCD risk calculation. However, the risk has not been calculated for the condition without the changes. While it is clear that there has been no increase in risk, it should not be concluded that the actual reduction in risk achieved by these changes is negligible.

Design Certification Quality Assurance Program

Detailed development of a certified design, involving the increasing engagement of combined license holders and applicants, should be expected to identify needed design and analysis changes. However, there are lessons to be learned from the Levy COLA experience.

Following initial discussions with our Subcommittee in 2014, WEC, Duke Energy, and the staff performed thorough evaluations, including the quality assurance program implementation. The results were reflected in the April 2016 Committee presentations. We conclude that the causes of the errors and omissions that made these exemptions necessary were addressed and programmatic changes applicable to the AP1000 certification were made where necessary.

We recommend that staff evaluate on a generic basis whether there are any lessons learned, relative to ongoing and future oversight of the quality assurance program implementation during development of designs seeking certification under 10 CFR Part 52. Prospective combined license applicants may not be in a position to provide such oversight during this phase, and they may find it difficult to do so following certification when customer oversight can be more effective. We would appreciate the opportunity to meet with the staff on this generic matter at an appropriate time.

Conclusion

The five exemptions, which include six departures from the AP1000 certified design that will be included in the Levy Units 1 and 2 COLA, effectively address errors and omissions in the current certification and should be approved. As indicated in our letter on the Lee Units 1 and 2 COLA, dated December 14, 2015, other combined license applicants referencing the AP1000 certified design will also include the exemptions in accordance with the design centered review approach described in that letter. Current combined license holders will submit license amendments to incorporate these, or similar, changes.

Sincerely,

/RA/

Dennis C. Bley
Chairman

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2. Duke Energy Florida, Levy Nuclear Plant, Units 1 and 2, "Revised Partial Response to Request for Additional Information Letter No. 121 Related to SRP Section 6.2.5, Combustible Gas Control in Containment," January 6, 2016 (ML16008A082).
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11. Westinghouse Electric Company, "Westinghouse AP1000 Design Control Document Revision 19," June 13, 2011 (ML11171A500).
12. IEEE Standard 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Stations," June 27, 1991.

November 10, 2016

Mr. Mano K. Nazar, President
and Chief Nuclear Officer
Florida Power and Light Company
Mail Stop NNP/JB
700 Universe Blvd
Juno Beach, FL 33408-0420

SUBJECT: FINAL SAFETY EVALUATION REPORT FOR THE TURKEY POINT
UNITS 6 AND 7 COMBINED LICENSE APPLICATION

Dear Mr. Nazar:

This letter is to inform you that the U.S. Nuclear Regulatory Commission (NRC) has completed the final safety evaluation report (FSER) for the Turkey Point Units 6 and 7 combined license (COL) application initially submitted by Florida Power & Light Company (FPL) on June 30, 2009.

The enclosed FSER is being provided to FPL for your information and will be submitted to the Commission in preparation for the mandatory (uncontested) hearing. The FSER has also been placed in the NRC's public document room and has been made publicly available in the Agencywide Documents Access and Management System (Accession Number ML16277A469) and on the public website. The NRC staff's issuance of this FSER does not constitute a commitment to issue the COL, or in any way affect the authority of the Commission in any mandatory hearing proceeding pursuant to Subpart C of Title 10 of the *Code of Federal Regulations*, Part 52.

Sincerely,

/RA Anna Bradford for:/

Francis M. Akstulewicz, Director
Division of New Reactor Licensing
Office of New Reactors

Docket Nos.: 52-040 and 52-041

Enclosure:
Final Safety Evaluation Report

cc w/o enclosure: See next page

November 10, 2016

Mr. Mano K. Nazar, President
and Chief Nuclear Officer
Florida Power and Light Company
Mail Stop NNP/JB
700 Universe Blvd
Juno Beach, FL 33408-0420

**SUBJECT: FINAL SAFETY EVALUATION REPORT FOR THE TURKEY POINT
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ADAMS Accession No: ML16277A469

via email

NRO-008

OFFICE	PM:NRO/DNRL/LB4	LA:NRO/DNRL/LB4	BC:NRO/DNRL/LB4	DD:NRO/DSRA	DD:NRO/DEIA
NAME	MComar	RButler	JDixon-Herrity	JMonninger	MMayfield*
DATE	11/ /2016	11/09/2016	11/ /2016	10/24/2016*	10/26/2016
OFFICE	DD:NRO/DCIP	DD:NRO/DSEA	DD:NRR/DIRS	DD/NRR/DE	DD: NRO/PMDA
NAME	MCheek*	SFlanders*	CMiller*	JLubinski*	FMiller*
DATE	10/20/2016	10/21/2016	10/13/2016	10/18/2016	10/20/2016
OFFICE	DD:NSIR/DPR	DD:NSIR/CSD	DD:NSIR/DSP	DD:NMSS/MSTR	DD:NMSS/FCSE
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OFFICE	OGC	D:NRO/DNRL			
NAME	BWeisman*	FAkstulewicz- ABradford for:			
DATE	11/08/2016	11/10/2016			

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COL - Turkey Point Mailing List
cc:

(Revised 08/24/2015)

Mr. Steve Franzone
Florida Power & Light Company
Turkey Point Nuclear Plant
700 Universe Blvd.
Juno Beach, FL 33408

Mr. William Maher
Florida Power & Light Company
Turkey Point Nuclear Plant
700 Universe Blvd.
Juno Beach, FL 33408

Mano K. Nazar
President and Chief Nuclear Officer
Nuclear Division
Florida Power & Light Company
Mail Stop NNP/JB
700 Universe Blvd
Juno Beach, FL 33408-0420

Thomas Saporito
P.O. Box 8413
Jupiter, FL 33468-8413

COL - Turkey Point Mailing List

Email

alliance4cleanfl@aol.com (Bob Krasowski)
APH@NEI.org (Adrian Heymer)
awc@nei.org (Anne W. Cottingham)
Bill.Jacobs@gdsassociates.com (Bill Jacobs)
billn@fcan.org (Bill Newton)
bwtamia@bellsouth.net (Barry White)
collinlj@westinghouse.com (Leslie Collins)
CumminWE@Westinghouse.com (Edward W. Cummins)
cwaltman@roe.com (C. Waltman)
david.lewis@pillsburylaw.com (David Lewis)
delongra@westinghouse.com (Rich DeLong)
ed.burns@earthlink.net (Ed Burns)
George.Madden@fpl.com (George Madden)
jerald.head@ge.com (Jerald G. Head)
john.elnitsky@pgnmail.com (John Elnitsky)
john.oneill@pillsburylaw.com (John O'Neill)
Joseph_Hegner@dom.com (Joseph Hegner)
KSutton@morganlewis.com (Kathryn M. Sutton)
kwaugh@impact-net.org (Kenneth O. Waugh)
lchandler@morganlewis.com (Lawrence J. Chandler)
magolds@emory.edu (Mindy Goldstein)
marvlewis@juno.com (M. Lewis)
MCCRAS@miamidade.gov (Sean McCrackine)
media@nei.org (Scott Peterson)
michael.lepre@pillsburylaw.com (Michael Lepre)
Mike.Halpin@dep.state.fl.us (Mike Halpin)
MSF@nei.org (Marvin Fertel)
nirsnet@nirs.org (Michael Mariotte)
Nuclaw@mindspring.com (Robert Temple)
patriciaL.campbell@ge.com (Patricia L. Campbell)
Paul.Jacobs@fpl.com (Paul Jacobs)
Paul@beyondnuclear.org (Paul Gunter)
pbessette@morganlewis.com (Paul Bessette)
Raymond.Burski@fpl.com (Raymond Burski)
Richard.Orthen@fpl.com (Richard Orthen)
RJB@NEI.org (Russell Bell)
russpa@westinghouse.com (Paul Russ)
sabinski@suddenlink.net (Steve A. Bennett)
sara@cleanenergy.org (Sara Barczak)
sfrantz@morganlewis.com (Stephen P. Frantz)
stephan.moen@ge.com (Stephan Moen)
Steve.Franzone@fpl.com (Steve Franzzone)
steven.hamrick@fpl.com (Steven Hamrick)

COL - Turkey Point Mailing List

toner-irene@monroecounty-fl.gov (Irene Toner)
Vanessa.quinn@dhs.gov (Vanessa Quinn)
Wanda.K.Marshall@dom.com (Wanda K. Marshall)
weave1dw@westinghouse.com (Doug Weaver)
William.Blair@FPL.com (William Blair)
william.maher@fpl.com (William Maher)