NEXTera ENERGY DUANE ARNOLD

August 5, 2011

NG-11-0267
10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Duane Arnold Energy Center
Docket 50-331
Renewed Op. License No. DPR-49

Transition to 10 CFR 50.48(c) - NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition) (TSCR-128)

In accordance with the 10 CFR 50.90, "Application of License or Construction Permit," NextEra Energy Duane Arnold, LLC (hereafter, NextEra Energy Duane Arnold), requests an amendment to Renewed Facility Operating License No. DPR-49.

Implementation of the regulatory actions presented in the enclosure to this License Amendment Request (LAR) will enable NextEra Energy Duane Arnold to adopt a new fire protection licensing basis which complies with the requirements in 10 CFR 50.48(a) and (c) and the guidance in Revision 1 of Regulatory Guide (RG) 1.205.

As documented in this request, NextEra Energy Duane Arnold has met all of the regulatory requirements for the transition of its fire protection licensing basis. This license amendment does not present a significant hazards consideration and the criteria have been met for categorical exclusion from the need for an environmental assessment.

Information associated with NextEra Energy Duane Arnold's transition is provided in the enclosed Transition Report, including the technical and regulatory justifications required to support this LAR. Major topics in this Transition Report are presented as Attachments A through W, summarized as follows:

Security-Related Information – Withhold From Public Disclosure Under 10 CFR 2.390. Attachments C, D, G, S, and W of the Enclosure to this letter contain security-related information. Upon removal of Attachments C, D, G, S, and W of the enclosure, this letter is uncontrolled.

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- o Attachment A - NEI 04-02 Table B-1 - Transition of Fundamental FP Program and Design Elements (NFPA 805 Chapter 3)
- o Attachment B - NEI 04-02 Table B-2 - Nuclear Safety Capability Assessment - Methodology Review
- o Attachment C - NEI 04-02 Table B-3 - Fire Area Transition - Security Related Information
- o Attachment D - NEI 04-02 Table F-1 Non-Power Operational Modes Transition - Security Related Information
- o Attachment E - NEI 04-02 Table G-1 - Radioactive Release Transition
- o Attachment F - Fire-Induced Multiple Spurious Operations Resolution
- o Attachment G - Operator Manual Actions - Security Related Information
- o Attachment H - NFPA-805 Frequently Asked Question Summary Table
- o Attachment I - Definition of Power Block
- o Attachment J - Fire Modeling V & V
- o Attachment K - Existing Licensing Action Transition
- o Attachment L - NFPA 805 Chapter 3 Requirements for Approval (10 CFR 50.48(c)(2)(vii))
- o Attachment M - License Condition Changes
- o Attachment N - Technical Specification Changes
- o Attachment O - Orders and Exemptions
- o Attachment P - Risk-Informed, Performance-Based Alternatives to NFPA 805
- o Attachment Q - No Significant Hazards Evaluations
- o Attachment R - Environmental Considerations Evaluation
- o Attachment S - Plant Modifications and Items to be Completed During Implementation - Security Related Information
- o Attachment T - Clarification of Prior NRC Approvals
- o Attachment U - Internal Events PRA Quality
- o Attachment V - Fire PRA Quality
- o Attachment W - Fire PRA Insights - Security Related Information

In accordance with the guidance in Regulatory Position C.2.2.4.2 of Regulatory Guide 1.205, Revision 1, the total risk change associated with pre-transition fire protection program variances meeting the NFPA 805 performance-based approach (via the risk evaluation process) was evaluated. Upon completion of the plant modifications, as referenced in the Transition Report Section 4.8.2, the total change in risk associated with NextEra Energy Duane Arnold's transition to NFPA 805 will be consistent with the acceptance guidelines in Regulatory Guide 1.174.

The Transition Report Section 5.4 contains NextEra Energy Duane Arnold's proposed implementation schedule for transitioning to the new fire protection licensing basis. The Licensee Commitments, identified in Table S-1 and S-2 of Attachment S of the enclosed Transition Report, are proposed to support approval of the LAR and may change during the NRC review period.

NextEra Energy Duane Arnold requests that Attachments C, D, G, S and W to the enclosure, which contain sensitive security-related information, be withheld from public disclosure in accordance with 10 CFR 2.390.

In accordance with 10 CFR 50.91(b), NextEra Energy Duane Arnold is providing the state of Iowa designated official with a copy of the proposed license amendment.

If you have any questions, please contact Steve Catron at (319) 851-7234.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 5, 2011.

Dean Curtland for

Peter Wells
Vice President, Duane Arnold Energy Center
NextEra Energy Duane Arnold, LLC

Enclosure: NextEra Energy Duane Arnold's Transition Report

cc: NRC Regional Administrator
NRC Resident Inspector
NRC Project Manager
M. Rasmusson (State of Iowa)

NFPA 805
License Amendment Request

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NextEra Energy Duane Arnold, LLC
Duane Arnold Energy Center

Transition to 10 CFR 50.48(c) - NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition

Transition Report

July 2011

TABLE OF CONTENTS

EXECUTIVE SUMMARY

NextEra Energy Duane Arnold, LLC will transition the Duane Arnold Energy Center fire protection program to a new risk-informed, performance-based alternative per 10 CFR 50.48(c) which incorporates by reference NFPA 805. The licensing basis per 10 CFR 50.48(b) and 10 CFR 50, Appendix R will be superseded. The voluntary adoption of 10 CFR 50.48(c) by Duane Arnold Energy Center does not eliminate the need to comply with 10 CFR 50.48(a) and 10 CFR 50, Appendix A, GDC 3, Fire Protection. Compliance with the new regulation establishes compliance with these sections.

NextEra Energy Duane Arnold, LLC submitted a revised letter of intent to the NRC on July 11, 2006 for Duane Arnold Energy Center to adopt NFPA 805 in accordance with 10 CFR 50.48(c) (Duane Arnold Energy Center had been included in the Nuclear Management Company's letter of intent dated November 30, 2005). By letter dated October, 30, 2006, the NRC granted a three year enforcement discretion period. In accordance with COMSECY-08-022, NextEra Energy Duane Arnold, LLC, requested on January 30, 2009 that the due date for the 10 CFR 50.48(c) License Amendment Request be extended to 6 months past the date of the safety evaluation approving the second pilot plant. The NRC granted the enforcement discretion extension on June 22, 2009. In accordance with SECY-11-061, NextEra Energy Duane Arnold, LLC, requested on June 23, 2011 that the due date for the 10 CFR 50.48(c) license amendment request (LAR) be extended to September 30, 2011. The enforcement discretion period will continue until the NRC issues a License Amendment.

This submittal reflects the final dispositions of the pilot plant requests for additional information, and the generic NFPA 805 License Amendment Request template developed by the Nuclear Energy Institute NFPA 805 Task Force.

The transition process consisted of a review and update of Duane Arnold Energy Center documentation, including the development of a Fire Probabilistic Risk Assessment Model using NUREG/CR 6850 as guidance. This Transition Report summarizes the transition process and results. This Transition Report contains information:

- Required by 10 CFR 50.48(c)
- Recommended by guidance document Nuclear Energy Institute 04-02 Revision 2 and appropriate Frequently Asked Questions
- Recommended by guidance document Regulatory Guide 1.205 Revision 1

Section 4 of the Transition Report provides a summary of compliance with the following NFPA 805 requirements:

- Fundamental Fire Protection Program Elements and Minimum Design Requirements
- Nuclear Safety Performance Criteria, including:
  - Non-Power Operational Modes
  - Fire Risk Evaluations
- Radioactive Release Performance Criteria
- Monitoring Program

- Program Documentation, Configuration Control, and Quality Assurance

Section 5 of the Transition Report provides regulatory evaluations and associated attachments, including:

- Changes to License Condition
- Changes to Technical Specifications, Orders, and Exemptions
- Determination of No Significant Hazards and evaluation of Environmental Considerations

The attachments to the Transition Report include detail to support the transition process and results.

Attachment H contains the approved Frequently Asked Questions not yet incorporated into the endorsed revision of NEI 04-02. These Frequently Asked Questions have been used to clarify the guidance in Regulatory Guide 1.205, NEI 04-02, and the requirements of NFPA 805 and in the preparation of this License Amendment Request.

ACRONYM LIST

AC	alternating current
ACUBE	Advanced Cutset Upper Bound Estimator
ADAMS	Agencywide Documents Access and Management System
ADS	automatic depressurization system
AFP	Area Fire Plan
AHJ	Authority Having Jurisdiction
ANS	American Nuclear Society
ANSI	American National Standards Institute
APCSB	Auxiliary Power Conversion Systems Branch
ARP	Annunciator Response Procedure
ASEP	Accident Sequence Evaluation Program
ASC	alternate shutdown capability
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BA	buffer area (fire area)
BKR	breaker
BTP	Branch Technical Position
BTU	British thermal unit
BWR	boiling water reactor
BWROG	Boiling Water Reactor Owners Group
CAFTA	Computer Aided Fault Tree Analysis
CAS	Central Alarm Station
CB	control building (fire area)
CCDP	conditional core damage probability
CC	capability category

ACRONYM LIST

CCF	common cause failure
CDF	core damage frequency
CFAST	Consolidated Fire and Smoke Transport
CFR	Code of Federal Regulations
CLB	current licensing basis
CLERP	conditional large early release probability
CO2	carbon dioxide
CPS	common power supply
CR	control room
CRD	control rod drive
CS	core spray
CSR	cable spreading room
CST	condensate storage tank
CT	current transformer
DAEC	Duane Arnold Energy Center
DBA	design basis accident
DBD	design basis document
DC	direct current
DID	defense-in-depth
Div	division
DH	decay heat
DG	diesel generator
DRY	drywell (fire area)
DW	drywell
ECCS	emergency core cooling system

ACRONYM LIST

EDG	emergency diesel generator
EEEE	existing engineering equivalency evaluation
EL	elevation
EPRI	Electrical Power Research Institute
ERFBS	electrical raceway fire barrier system
ESW	emergency service water
EX	exterior (fire area)
EXC	excluding
°F	degrees Fahrenheit
F&O	fact and observation
FA	fire area
FAQ	frequently asked question
FBIM	fire barrier implementation matrix
FHA	fire hazards analysis
FIF	fire ignition frequency
FM	Factory Mutual
FP	fire protection
FPIE	full power internal events
FPL	Florida Power & Light
FPRA	fire probabilistic risk assessment
FR	Federal Register
FRACQA	Functional Responsibilities, Administrative Controls, and Quality Assurance
FRE	fire risk evaluation
FSAR	Final Safety Analysis Report
FSS	fire scenario selection

ACRONYM LIST

ft	feet
gal	gallon
GDC	General Design Criterion
GE	General Electric
GET	general employee training
GL	U.S. NRC Generic Letter
GPM	gallons per minute
GSW	general service water
HEP	human error probability
HFE	human failure event
HLR	high level requirement
HPCI	high pressure core injection
HRA	human reliability analysis
HRE	higher risk evolution
HRR	heat release rate
HSS	high safety significant
HVAC	heating, ventilation, and air conditioning
HX	heat exchanger
IE	initiating event
IEEE	Institute of Electrical and Electronic Engineers
IELP	Iowa Electric Light and Power Company
IN	U.S. NRC Information Notice
IPCEA	Insulated Power Cable Engineers Association
IPEEE	Individual Plant Examination of External Events
IPLD	integrated plan logic diagram

ACRONYM LIST

IS	Intake structure
ISDS	ignition source data sheet
ISFSI	Independent Spent Fuel Storage Installation
ISLOCA	interfacing system loss of coolant accident
KSF	key safety function
KV	kilovolt
KW	kilowatt
L	liter
LA	licensing action
LAR	license amendment request
LERF	large early release frequency
LLC	Limited Liability Company
LLRW	low level radwaste
LLRPSF	Low Level Radwaste Processing and Storage Facility
LOCA	loss of coolant accident
LOOP	loss of offsite power
LOSP	loss of offsite power
LPCI	low pressure coolant injection
m	meter
MCA	multi-compartment analysis
MCC	motor control center
MCR	main control room
MFW	main feedwater
MG	motor generator
MHIF	multiple high impedance fault

ACRONYM LIST

min	minute
MOV	motor operated valve
MSIV	main steam isolation valve
MSO	multiple spurious operation
MVSG	medium voltage switchgear
N/A	not applicable
NEI	Nuclear Energy Institute
NEIL	Nuclear Electric Insurance Limited
NIST	National Institute of Standards and Technology
NFPA	National Fire Protection Association
NMC	Nuclear Management Company, LLC
NPO	non-power operational
NPP	nuclear power plant
NPSH	net positive suction head
NRC	U.S. Nuclear Regulatory Commission
NSCA	nuclear safety capability assessment
NSEL	nuclear safety equipment list
NUREG	document prepared by the NRC staff
NUREG/CR	document prepared by NRC contractors
OMA	operator manual action
OOS	out of service
OPEX	operating experience
OS&Y	outside screw and yoke
P&ID	piping and instrumentation diagram
PA	public address

ACRONYM LIST

PAU	physical analysis unit
PB	performance based
PC	primary containment
PH	pumphouse
PI	project instruction
PORV	power operated relief valve
POS	plant operating state
PPE	personal protective equipment
PR	peer review
PRA	probabilistic risk assessment
PRM	plant response model
PSA	probabilistic safety assessment
PSF	performance shaping factor
PWR	pressurized water reactor
RAW	risk achievement worth
RB	reactor building
RBCCW	reactor building closed cooling water
RCA	radiologically controlled area
RCIC	reactor core isolation cooling
RCS	reactor coolant system
RG	U.S. NRC Regulatory Guide
RHR	residual heat removal
RHRSW	residual heat removal service water
RI-PB	risk-informed, performance-based
RIS	Regulatory Information Summary

ACRONYM LIST

RPS	reactor protection system
RPV	reactor pressure vessel
RRW	risk reduction worth
RSP	remote shutdown panel
RW	river water
RWCU	reactor water cleanup
SAR	safety analysis report
SBO	station blackout
SBDG	standby diesel generator
SCBA	self-contained breathing apparatus
SCP	Security Control Point
SDC	shutdown cooling
SE	safety evaluation
SER	safety evaluation report
SFP	spent fuel pool
SFPE	Society of Fire Protection Engineers
SGTS	standby gas treatment system
SLD	shutdown login diagram
SP	special publication
sq ft	square feet
SR	supporting requirement
SRV	safety relief valve
SSA	safe shutdown analysis
SSC	structures systems, and components
SSD	safe shutdown

ACRONYM LIST

SSE	safe shutdown earthquake
SSEL	safe shutdown equipment list
SSLD	safe shutdown logic diagram
SUT	startup transformer
SW	service water
SWGR	switchgear
TB	turbine building
TD	turbine driven
T-H	thermal-hydraulic
TM	testing & maintenance
TSC	technical support center
UAM	unreviewed analysis method (for Fire PRA)
UFSAR	Updated Final Safety Analysis Report
UL	Underwriters Laboratory
VAC	volts alternating current
V&V	verification and validation
VDC	volts - direct current
VFDR	variance from deterministic requirement
yr	year
ZOI	zone of influence

1.0 INTRODUCTION

The Nuclear Regulatory Commission (NRC) has promulgated an alternative rule for fire protection requirements at nuclear power plants, 10 CFR 50.48(c), National Fire Protection Association Standard 805 (NFPA 805). NextEra Energy Duane Arnold, LLC[1] is implementing the Nuclear Energy Institute methodology NEI 04-02, Guidance for Implementing a Risk-informed, Performance-based Fire Protection Program under 10 CFR 50.48(c) (NEI 04-02), to transition Duane Arnold Energy Center (DAEC) from its current fire protection licensing basis to the new requirements as outlined in NFPA 805. This report describes the transition methodology utilized and documents how DAEC complies with the new requirements.

1.1 Background

1.1.1 NFPA 805 – Requirements and Guidance

On July 16, 2004 the NRC amended 10 CFR 50.48, Fire Protection, to add a new subsection, 10 CFR 50.48(c), which establishes new Risk-Informed, Performance-Based (RI-PB) fire protection requirements. 10 CFR 50.48(c) incorporates by reference, with exceptions, the National Fire Protection Association's NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants – 2001 Edition, as a voluntary alternative to 10 CFR 50.48 Section (b), Appendix R, and Section (f), Decommissioning.

As stated in 10 CFR 50.48(c)(3)(i), any licensee's adoption of a RI-PB program that complies with the rule is voluntary. This rule may be adopted as an acceptable alternative method for complying with either 10 CFR 50.48(b), for plants licensed to operate before January 1, 1979, or the fire protection license conditions for plants licensed to operate after January 1, 1979, or 10 CFR 50.48(f), plants shutdown in accordance with 10 CFR 50.82(a)(1).

NEI developed NEI 04-02 to assist licensees in adopting NFPA 805 and making the transition from their current fire protection licensing basis to one based on NFPA 805. The NRC issued Regulatory Guide (RG) 1.205, Risk-Informed, Performance-Based Fire Protection for Existing Light Water Nuclear Power Plants, which endorses NEI 04-02, with exceptions, in December 2009.[2]

A depiction of the primary document relationships is shown in Figure 1-1:

1 NextEra Energy Duane Arnold, LLC has operated under the following: FPL Energy Duane Arnold, LLC, Nuclear Management Company, LLC, and Iowa Electric Light and Power Company. NextEra Energy Duane Arnold, LLC will be used throughout the document.

2 Where referred to in this document NEI 04-02 is Revision 2 and RG 1.205 is Revision 1.

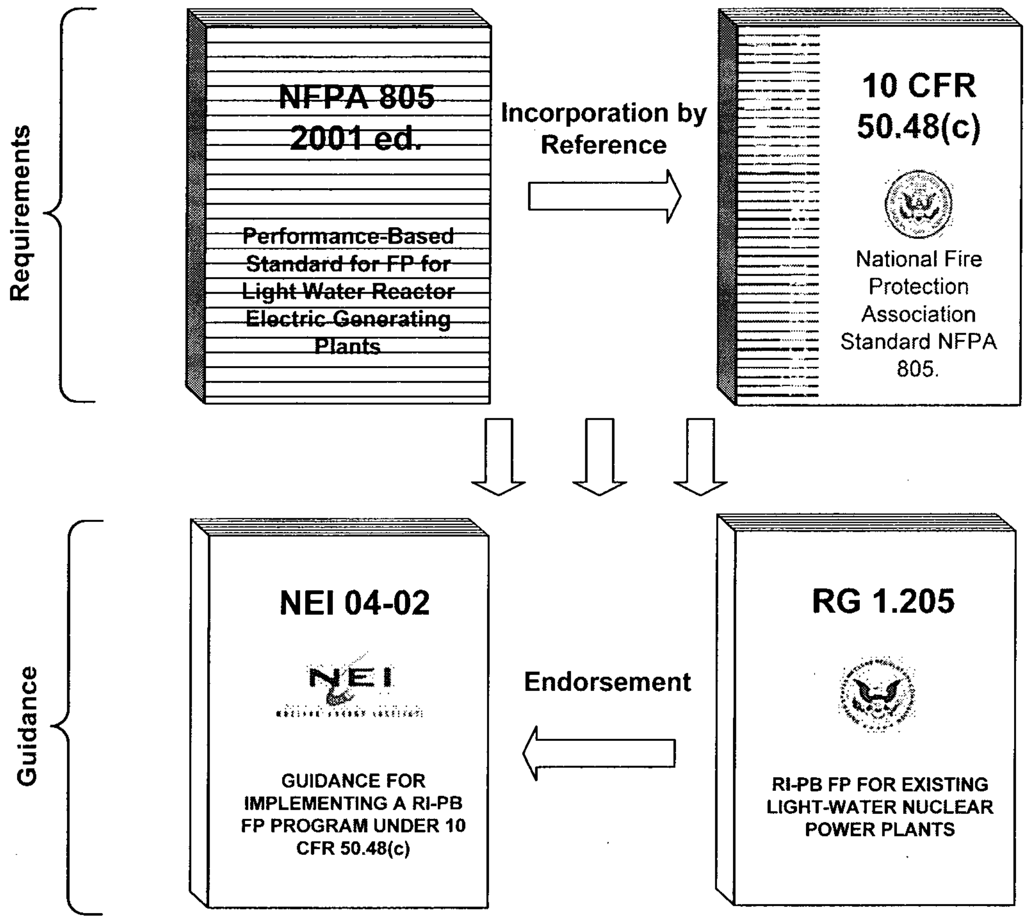

Figure 1-1 NFPA 805 Transition – Implementation Requirements/Guidance

1.1.2 Transition to 10 CFR 50.48(c)

1.1.2.1 Start of Transition

NextEra Energy Duane Arnold, LLC submitted a revised letter of intent to the NRC on July 11, 2006 for DAEC to adopt NFPA 805 in accordance with 10 CFR 50.48(c). DAEC had been included in the Nuclear Management Company's (NMC's) letter of intent dated November 30, 2005. By letter dated October, 30, 2006, the NRC granted a three year enforcement discretion period.

In accordance with COMSECY-08-022, NextEra Energy Duane Arnold, LLC, requested on January 30, 2009 that the due date for the 10 CFR 50.48(c) License Amendment Request be extended to 6 months past the date of the safety evaluation approving the second pilot plant. The NRC granted the enforcement discretion extension on June 22, 2009.

In accordance with SECY-11-061, NextEra Energy Duane Arnold, LLC, requested on June 23, 2011 that the due date for the 10 CFR 50.48(c) license amendment request (LAR) be extended to September 30, 2011. Consistent with NRC Enforcement Policy, the enforcement discretion period will continue until the NRC approval of the LAR is completed.

1.1.2.2 Transition Process

The transition to NFPA 805 includes the following high level activities:

- Development of a Fire Probabilistic Risk Assessment (PRA)
- Completion of activities required to transition the pre-transition Licensing Basis to 10 CFR 50.48(c) as specified in NEI 04-02 and RG 1.205

1.2 Purpose

The purpose of the Transition Report is as follows:

1) Describe the process implemented to transition the current fire protection program to compliance with the additional requirements of 10 CFR 50.48(c);
2) Summarize the results of the transition process;
3) Explain the bases for conclusions that the fire protection program complies with 10 CFR 50.48(c) requirements;
4) Describe the new fire protection licensing basis, and
5) Describe the configuration management processes used to manage post-transition changes to the station and the fire protection program, and resulting impact on the licensing basis.

2.0 OVERVIEW OF EXISTING FIRE PROTECTION PROGRAM

2.1 Current Fire Protection Licensing Basis

DAEC was licensed to operate on February 22, 1974. As a result, the DAEC fire protection program is based on compliance with 10 CFR 50.48(a), 10 CFR 50.48(b), and the following License Condition:

NextEra Energy Duane Arnold, LLC Renewed Facility Operating License No. DPR-49, License Condition 2.C(3) states:

> *NextEra Energy Duane Arnold, LLC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the Duane Arnold Energy Center and as approved in the SER dated June 1, 1978, and Supplement dated February 10, 1981, subject to the following provision:*
>
> *NextEra Energy Duane Arnold, LLC may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.*

2.2 NRC Acceptance of the Fire Protection Licensing Basis

In response to the NRC's request, NextEra Energy Duane Arnold, LLC performed a fire hazards analysis which analyzed the DAEC fire protection program against the guidance of Appendix A to Branch Technical Position (BTP) Auxiliary Power Conversion Systems Branch (APCSB) 9.5-1. The results of the analysis, in addition to proposed modifications and additions to the fire protection program, were communicated to the NRC by letters dated January 18, 1977, January 11, 1978, January 12, 1978, February 1, 1978, February 21, 1978, March 24, 1978, and April 19, 1978. Furthermore, this analysis served as the basis for the Appendix A to BTP APCSB 9.5-1 safety evaluation, dated June 1, 1978, and the associated License Amendment No. 43 which implemented fire protection technical specifications and added a license condition for the completion of fire protection modifications.

Additional information and commitments were transmitted to the NRC by letters dated July 3, 1978, August 29, 1978, October 30, 1978, June 7, 1979, November 29, 1979, March 7, 1980, April 1, 1980, June 5, 1980, July 3, 1980, and February 4, 1981. These submittals served as the basis for the supplement to the safety evaluation report dated February 10, 1981 and the associated License Amendment No. 63, which closed out incomplete items and confirmed items remaining open from the original safety evaluation.

NextEra Energy Duane Arnold, LLC received formal notification from the NRC on November 24, 1980 that the 10 CFR 50.48 had been published on November 19, 1980 and would become effective February 17, 1981.

In response to the new requirements, NextEra Energy Duane Arnold, LLC provided an assessment of the DAEC shutdown capability in the event of a fire in a letter dated June 22, 1982. In a safety evaluation dated January 6, 1983, the NRC concluded that the proposed DAEC design meets the requirements of Appendix R to 10 CFR 50 Section

III.G.3 and III.L for the three areas of the plant requiring alternative shutdown (Control Room, Control Building HVAC room, and the HVAC heat exchanger and chiller area).

In addition to the approval of the DAEC alternative shutdown design, the NRC granted the following:

- Exemption #01 (19830426), Appendix R Exemption from Fire Protection Requirements of III.G.2 for Division 1 and Division 2 Cables Supplying the Scram Valves for Reactor Building North and South CRD Module Areas (III.G.2 Criteria)
- Exemption #02 (19830426), Appendix R Exemption from the Requirement to Provide Fixed Fire Suppression in the Control Room (III.G.3 Criteria)
- Exemption #03 (19831219), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less Than 3 Hour Fire Ratings Between Miscellaneous Doors and Dampers (III.G.2.a Criteria)
- Exemption #04 (19831219), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less than 3 Hour Fire Ratings Between Zones (Equipment Hatch) (III.G.2.a Criteria)
- Exemption #05 (19831219), Appendix R Exemption from the Automatic Suppression Requirement for the Turbine Building Water Treatment and Condensate Pump Area (III.G.2.c Criteria)
- Exemption #06 (19831219), Appendix R Exemption from the Requirement for Full Coverage by Automatic Suppression Systems in the HVAC Heat Exchanger and Chiller Area (III.G.3 Criteria)
- Exemption #07 (19850701), Appendix R Exemption from the 8-Hour Battery Requirement for the Control Room (III.J Criteria)
- Exemption #08 (19871014), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less Than 3 Hour Fire Ratings Between Zones (Doors No. 202 and 203) (III.G.2.a Criteria)
- Exemption #09 (19871014), Appendix R Exemption from 3 Hour Rated Barrier in the Reactor Building Torus Area (III.G.2.a Criteria)
- Exemption #10 (19871014), Appendix R Exemption from Automatic Suppression and Detection in the Reactor Building Torus Area (III.G.2.b Criteria)
- Exemption #11 (19871014), Appendix R Exemption from the Requirement for 3 Hour Fire Barriers in the Laydown Area and RWCU Area (Fire Zone 3-A/3-B) (III.G.2.a Criteria)
- Exemption #12 (19871014), Appendix R Exemption from the Requirement for 3 Hour Fire Barriers in the Reactor Building RHR Valve Room (Fire Zone 2-D) (III.G.2.a Criteria)
- Exemption #13 (19871014), Appendix R Exemption from the Requirement for 3 Hour Rated Fire Barriers in the Equipment Hatch Between Fire Zones 3-B and 4-B (III.G.2.a Criteria)
- Exemption #14 (19871014), Appendix R Exemption from the Requirement of Separation of Redundant Trains of Safe Shutdown Cables and Equipment by 3 Hour Rated Fire Barriers for the Ventilation Duct Fire Dampers (III.G.2.a Criteria)

- Exemption #15 (19871014), Appendix R Exemption from the Requirement that Structural Steel Forming Part of or Supporting Fire Barriers be Protected to a Fire Resistance Equivalent to that of the Barrier (III.G.2.a Criteria)
- Exemption #16 (19910816), Appendix R Exemption from the 3-Hour Fire Barrier Requirement for the Drywell Expansion Gap (III.G.2.a Criteria)

3.0 TRANSITION PROCESS

3.1 Background

Section 4.0 of NEI 04-02 describes the process for transitioning from compliance with the current fire protection licensing basis to the new requirements of 10 CFR 50.48(c). NEI 04-02 contains the following steps:

1) Licensee determination to transition the licensing basis and devote the necessary resources to it
2) Submit a Letter of Intent to the NRC stating the licensee's intention to transition the licensing basis in accordance with a tentative schedule
3) Conduct the transition process to determine the extent to which the current fire protection licensing basis supports compliance with the new requirements and the extent to which additional analyses, plant and program changes, and alternative methods and analytical approaches are needed
4) Submit a LAR
5) Complete transition activities that can be completed prior to the receipt of the license amendment
6) Receive a safety evaluation
7) Complete implementation of the new licensing basis, including completion of modifications identified in Attachment S

3.2 NFPA 805 Process

Section 2.2 of NFPA 805 establishes the general process for demonstrating compliance with NFPA 805. This process is illustrated in Figure 3-1. It shows that except for the fundamental fire protection requirements, compliance can be achieved on a fire area basis either by deterministic or RI-PB methods. Consistent with the guidance in NEI 04-02, NextEra Energy Duane Arnold, LLC has implemented the NFPA 805 Section 2.2 process by first determining the extent to which its current fire protection program supports findings of deterministic compliance with the requirements in NFPA 805. RI-PB methods are being applied to the requirements for which deterministic compliance could not be shown.

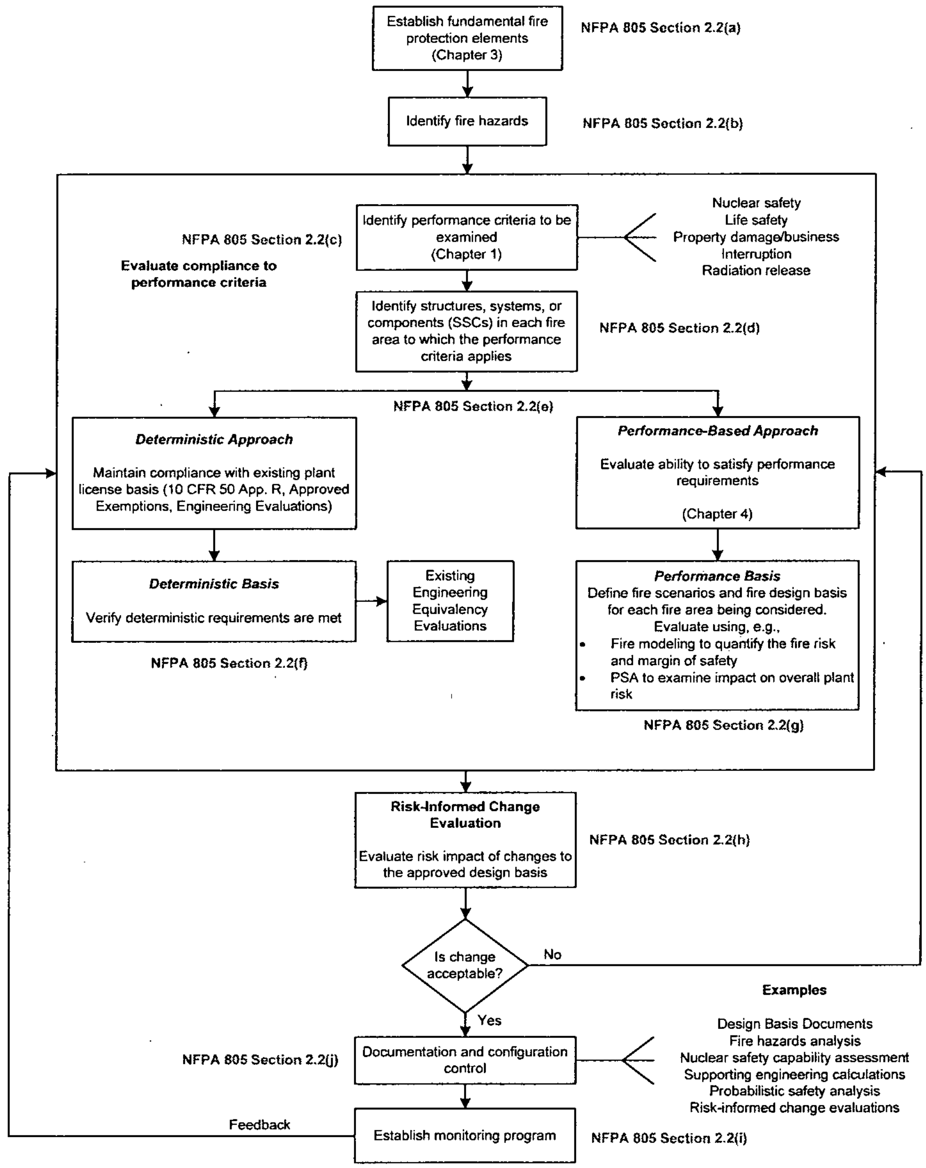

Figure 3-1 NFPA 805 Process [NEI 04-02 Figure 3-1 based on Figure 2-2 of NFPA 805][3]

3.3 NEI 04-02 – NFPA 805 Transition Process

NFPA 805 contains technical processes and requirements for a RI-PB fire protection program. NEI 04-02 was developed to provide guidance on the overall process (programmatic, technical, and licensing) for transitioning from a traditional fire protection licensing basis to a new RI-PB method based upon NFPA 805, as shown in Figure 3-2.

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3 Note: 10 CFR 50.48(c) does not incorporate by reference Life Safety and Plant Damage/Business Interruption goals, objectives and criteria. See 10 CFR 50.48(c) for specific exceptions to the incorporation by reference of NFPA 805.

Section 4.0 of NEI 04-02 describes the detailed process for assessing a fire protection program for compliance with NFPA 805, as shown in Figure 3-2.

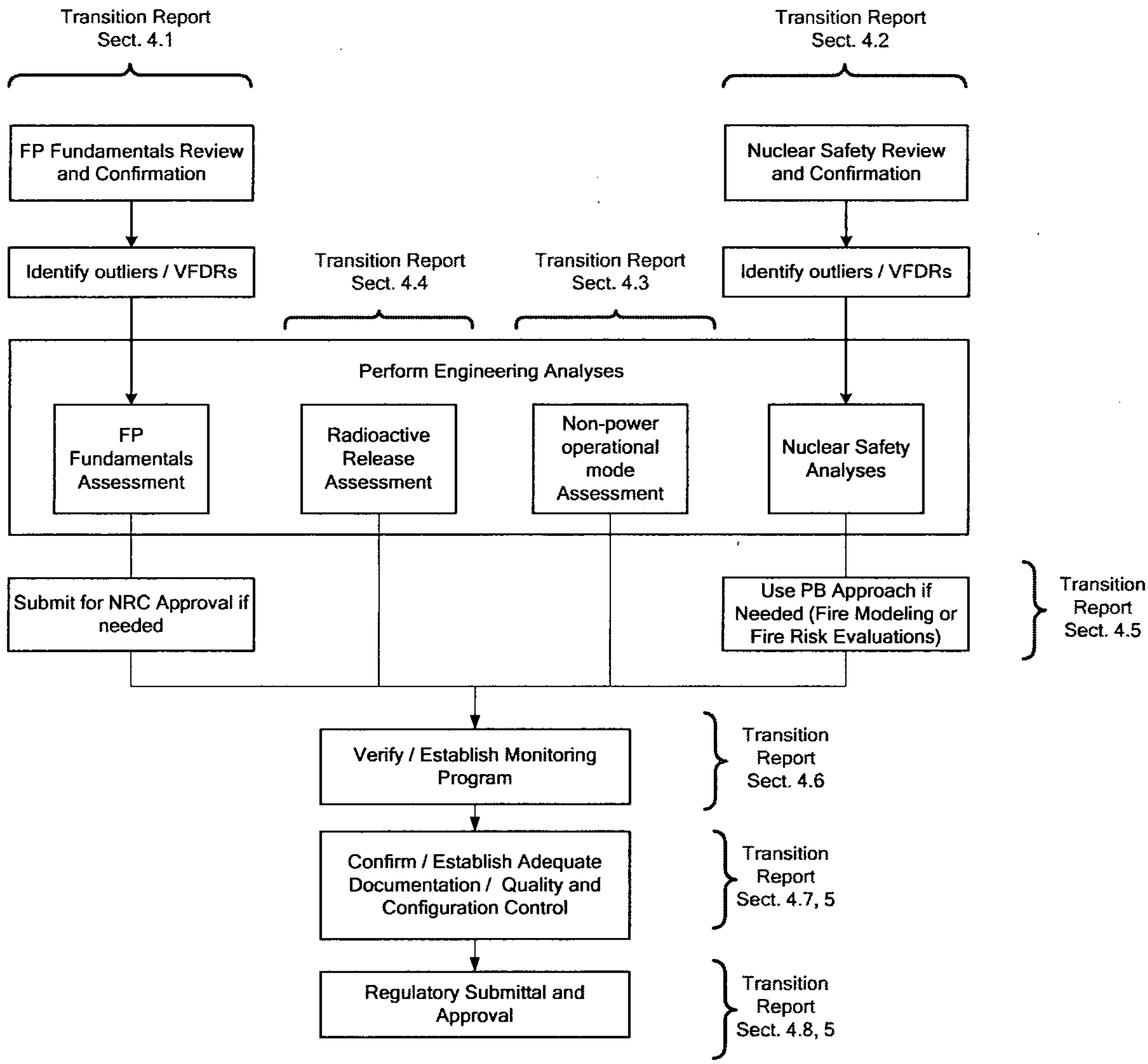

Figure 3-2 Transition Process (Simplified) [based on NEI 04-02 Figure 4-1]

3.4 NFPA 805 Frequently Asked Questions (FAQs)

The NRC has worked with NEI and two pilot plants (Oconee Nuclear Station and Harris Nuclear Plant) to define the licensing process for transitioning to a new licensing basis under 10 CFR 50.48(c) and NFPA 805. Both the NRC and the industry recognized the need for additional clarifications to the guidance provided in RG 1.205, NEI 04-02, and the requirements of NFPA 805. The NFPA 805 Frequently Asked Question (FAQ) process was jointly developed by NEI and NRC to facilitate timely clarifications of NRC positions. This process is described in a letter from the NRC dated July 12, 2006, to NEI and in Regulatory Issues Summary (RIS) 2007-19, Process for Communicating

Clarifications of Staff Positions Provided in RG 1.205 Concerning Issues Identified during the Pilot Application of NFPA Standard 805, dated August 20, 2007.

Under the FAQ process, transition issues are submitted to the NEI NFPA 805 Task Force for review, and subsequently presented to the NRC during public FAQ meetings. Once the NEI NFPA 805 Task Force and NRC reach agreement, the NRC issues a memorandum to indicate that the FAQ is acceptable. NEI 04-02 will be revised to incorporate the approved FAQs. This is an on-going revision process that will continue through the transition of NFPA 805 transition plants. Final closure of the FAQs will occur when future revisions of RG 1.205, endorsing the related revisions of NEI 04-02, are approved by the NRC. It is expected that additional FAQs will be written and existing FAQs will be revised as plants continue NFPA 805 transition after the pilot plant safety evaluations.

Attachment H contains the list of approved FAQs not yet incorporated into the endorsed revision of NEI 04-02. These FAQs have been used to clarify the guidance in RG 1.205, NEI 04-02, and the requirements of NFPA 805 and in the preparation of this LAR.

4.0 COMPLIANCE WITH NFPA 805 REQUIREMENTS

4.1 Fundamental Fire Protection Program and Design Elements

The Fundamental Fire Protection Program and Design Elements are established in Chapter 3 of NFPA 805. Section 4.3.1 of NEI 04-02 provides a systematic process for determining the extent to which the pre-transition licensing basis and plant configuration meets these criteria and for identifying the fire protection program changes that would be necessary for compliance with NFPA 805. NEI 04-02 Appendix B-1 provides guidance on documenting compliance with the program requirements of NFPA 805 Chapter 3.

4.1.1 Overview of Evaluation Process

The comparison of the DAEC fire protection program to the requirements of NFPA 805 Chapter 3 was performed and documented in a report entitled, NFPA 805 Chapter 3 Compliance Review. The report used the guidance contained in NEI 04-02, Section 4.3.1 and Appendix B-1 (See Figure 4-1).

Each section and subsection of NFPA 805 Chapter 3 was reviewed against the current fire protection program. Upon completion of the activities associated with the review, the following compliance statement(s) was used:

- Complies - For those sections/subsections determined to meet the specific requirements of NFPA 805
- Complies with Clarification - For those sections/subsections determined to meet the requirements of NFPA 805 with clarification
- Complies by Previous NRC approval - For those sections/subsections where the specific NFPA 805 Chapter 3 requirements are not met but previous NRC approval of the configuration exists
- Complies with use of Existing Engineering Equivalency Evaluations (EEEEs) - For those sections/subsections determined to be equivalent to the NFPA 805 Chapter 3 requirements as documented by engineering analysis
- Submit for NRC Approval - For those sections/subsections for which approval is sought in this LAR submittal in accordance with 10 CFR 50.48(c)(2)(vii). A summary of the bases of acceptability is provided (See Attachment L for details)

In some cases multiple compliance statements have been assigned to a specific NFPA 805 Chapter 3 section/subsection. Where this is the case, each compliance/compliance basis statement clearly references the corresponding requirement of NFPA 805 Chapter 3.

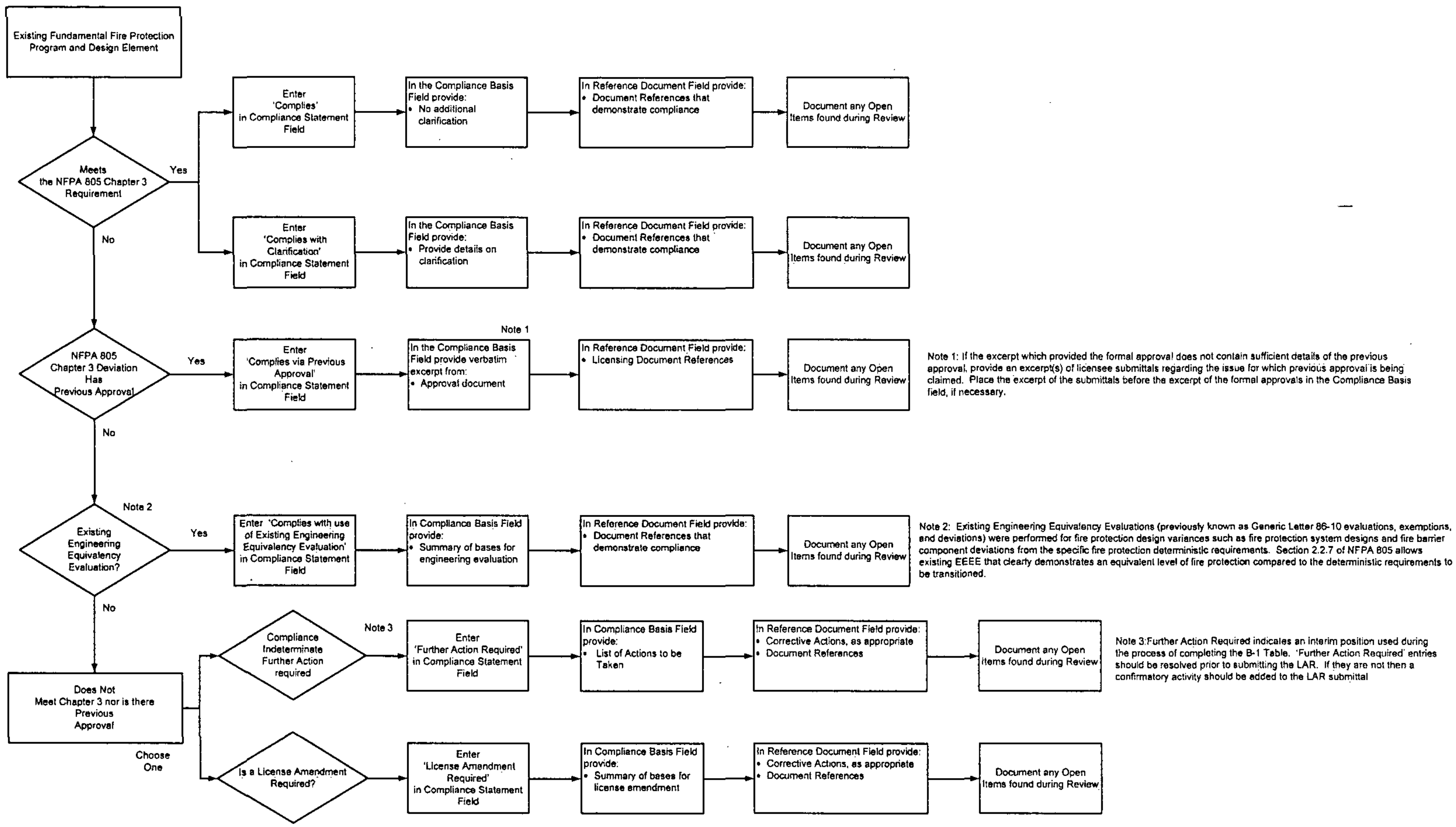

Figure 4-1 - Fundamental Fire Protection Program and Design Elements Transition Process [Based on NEI 04-02 Figure 4-2][4]

4 Figure 4-1 depicts the process used during the transition and therefore contains elements (i.e., open items) that represent interim resolutions. Additional detail on the transition of EEEEs is included in Section 4.2.2.

4.1.2 Results of the Evaluation Process

4.1.2.1 NFPA 805 Chapter 3 Requirements Met or Previously Approved by the NRC

Attachment A contains the NEI 04-02 Table B-1 Transition of Fundamental Fire Protection Program and Design Elements. This table provides the compliance basis for the requirements in NFPA 805 Chapter 3. Except as identified in Section 4.1.2.3, Attachment A demonstrates that the fire protection program at DAEC either:

- Complies directly with the requirements of NFPA 805 Chapter 3
- Complies with clarification with the requirements of NFPA 805 Chapter 3
- Complies through the use of existing engineering equivalency evaluations which are valid and of appropriate quality
- Complies with a previously NRC approved alternative to NFPA 805 Chapter 3 and therefore the specific requirement of NFPA 805 Chapter 3 is supplanted

4.1.2.2 NFPA 805 Chapter 3 Requirements Requiring Clarification of Prior NRC Approval

NPFA 805 Section 3.1 states in part, *"Previously approved alternatives from the fundamental protection program attributes of this chapter by the AHJ take precedence over the requirements contained herein."* In some cases prior NRC approval of an NFPA 805 Chapter 3 program attribute may be unclear. NextEra Energy Duane Arnold, LLC requests that the NRC concur with their finding of prior approval for the following sections of NFPA 805 Chapter 3:

- None

4.1.2.3 NFPA 805 Chapter 3 Requirements Not Previously Approved by NRC

The following sections of NFPA 805 Chapter 3 are not specifically met nor do previous NRC approvals of alternatives exist:

- 3.3.3 – Approval is requested for the use of epoxy floor coatings
- 3.3.5.2 – Approval is requested for the use of plastic conduits for embedded installations
- 3.5.11 – Approval is requested for (1) the pump house sprinkler system and standpipe on a common header and (2) the control building Standby Filter Unit carbon filter deluge system and standpipes on a common header

The specific deviation and a discussion of how the alternative satisfies 10 CFR 50.48(c)(2)(vii) requirements is provided in Attachment L. NextEra Energy Duane Arnold, LLC requests NRC approval of these performance-based methods.

4.1.3 Definition of Power Block and Plant

Where used in NFPA 805 Chapter 3 the terms 'Power Block' and 'Plant' refer to structures that have equipment required for nuclear plant operations, such as Containment, Auxiliary Building, Service Building, Control Building, Fuel Building, Radioactive Waste, Water Treatment, Turbine Building, and intake structures or structures that are identified in the facility's pre-transition licensing basis.

All structures within the DAEC Owner Controlled Area were reviewed to determine the potential impact of fire on the nuclear safety and radioactive release criteria described in Section 1.5 of NFPA 805. This was accomplished by identifying the structures that contain either

- Equipment that could affect
  - Plant operation for power generation
  - Equipment important to safety
  - Ability to maintain nuclear safety performance criteria in the event of a fire

OR

- Radioactive materials that could potentially be released in event of a fire

These structures are listed in Attachment I and define the 'power block' and 'plant'.

4.2 Nuclear Safety Performance Criteria

The Nuclear Safety Performance Criteria are established in Section 1.5 of NFPA 805. Chapter 4 of NFPA 805 provides the methodology to determine the fire protection systems and features required to achieve the performance criteria outlined in Section 1.5. Section 4.3.2 of NEI 04-02 provides a systematic process for determining the extent to which the pre-transition licensing basis meets these criteria and for identifying any necessary fire protection program changes. NEI 04-02, Appendix B-2 provides guidance on documenting the transition of Nuclear Safety Capability Assessment (NSCA) Methodology and the Fire Area compliance strategies.

4.2.1 Nuclear Safety Capability Assessment Methodology

The NSCA Methodology review consists of four processes:

- Establishing compliance with NFPA 805 Section 2.4.2
- Establishing the Safe and Stable Conditions for the Plant
- Establishing Recovery Actions
- Evaluating Multiple Spurious Operations

The methodology for demonstrating reasonable assurance that a fire during non-power operational (NPO) modes will not prevent the plant from achieving and maintaining the fuel in a safe and stable condition is an additional requirement of 10 CFR 50.48(c) and is addressed in Section 4.3.

4.2.1.1 Compliance with NFPA 805 Section 2.4.2

Overview of Process

NFPA 805 Section 2.4.2 Nuclear Safety Capability Assessment states:

"The purpose of this section is to define the methodology for performing a nuclear safety capability assessment. The following steps shall be performed:

(1) Selection of systems and equipment and their interrelationships necessary to achieve the nuclear safety performance criteria in Chapter 1

(2) Selection of cables necessary to achieve the nuclear safety performance criteria in Chapter 1

(3) Identification of the location of nuclear safety equipment and cables
(4) Assessment of the ability to achieve the nuclear safety performance criteria given a fire in each fire area"

The NSCA methodology review evaluated the existing post-fire safe shutdown analysis (SSA) methodology against the guidance provided in NEI 00-01, Revision 1 Chapter 3, Deterministic Methodology, as discussed in Appendix B-2 of NEI 04-02. The methodology is depicted in Figure 4-2 and consisted of the following activities:

- Each specific section of NFPA 805 2.4.2 was correlated to the corresponding section of Chapter 3 of NEI 00-01 Revision 1. Based upon the content of the NEI 00-01 methodology statements, a determination was made of the applicability of the section to the station.
- The plant-specific methodology was compared to applicable sections of NEI 00-01 and one of the following alignment statements and its associated basis were assigned to the section:
  - Aligns
  - Aligns with intent
  - Not in Alignment
  - Not in Alignment, but Prior NRC Approval
  - Not in Alignment, but no adverse consequences
- For those sections that do not align, an assessment was made to determine if the failure to maintain strict alignment with the guidance in NEI 00-01 could have adverse consequences. Since NEI 00-01 is a guidance document, portions of its text could be interpreted as 'good practice' or intended as an example of an efficient means of performing the analyses. If the section has no adverse consequences, these sections of NEI 00-01 can be dispositioned without further review.

The comparison of the DAEC existing post-fire SSA methodology to NEI 00-01 Chapter 3 (NEI 04-02 Table B-2) was performed and documented in a report entitled, Table B-2 – NFPA 805 Chapter 2 Nuclear Safety Transition Methodology Review for Duane Arnold Energy Center.

Results from Evaluation Process

The method used to perform the existing post-fire SSA with respect to selection of systems and equipment, selection of cables, and identification of the location of equipment and cables, either meets the NRC endorsed guidance directly or met the intent of the endorsed guidance with adequate justification as documented in Attachment B.

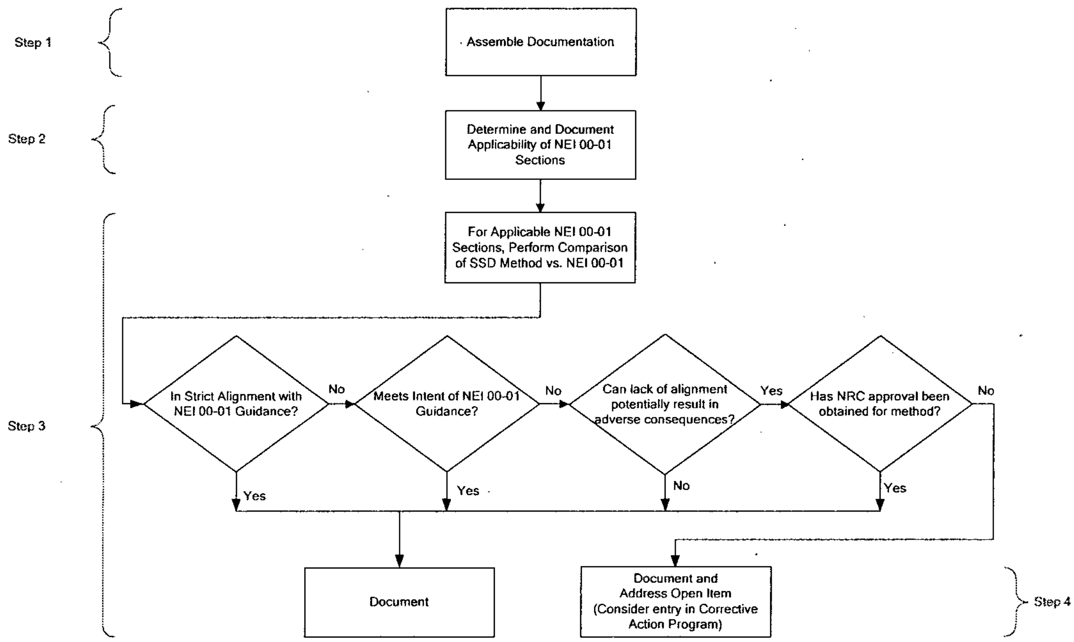

Figure 4-2 – Summary of Nuclear Safety Methodology Review Process (FAQ 07-0039)

4.2.1.2 Safe and Stable Conditions for the Plant

Overview of Process

The nuclear safety goals, objectives and performance criteria of NFPA 805 allow more flexibility than the previous deterministic programs based on 10 CFR 50, Appendix R and NUREG 0800, Section 9.5-1 (and NEI 00-01, Chapter 3) since NFPA 805 only requires the licensee to maintain the fuel in a safe and stable condition rather than achieve and maintain cold shutdown.

NFPA 805, Section 1.6.56, defines Safe and Stable Conditions as follows

> *"For fuel in the reactor vessel, head on and tensioned, safe and stable conditions are defined as the ability to maintain K_{eff} <0.99, with a reactor coolant temperature at or below the requirements for hot shutdown for a boiling water reactor and hot standby for a pressurized water reactor. For all other configurations, safe and stable conditions are defined as maintaining K_{eff} <0.99 and fuel coolant temperature below boiling."*

The nuclear safety goal of NFPA 805 requires "*...reasonable assurance that a fire during any operational mode and plant configuration will not prevent the plant from achieving and maintaining the fuel in a safe and stable condition*" without a specific reference to a mission time or event coping duration.

For the plant to be in a safe and stable condition, it may not be necessary to perform a transition to cold shutdown as currently required under 10 CFR 50, Appendix R. Therefore, the unit may remain at or below the temperature defined by a hot shutdown plant operating state for the event.

Results

Based on the report entitled, Table B-2 – NFPA 805 Chapter 2 Nuclear Safety Transition Methodology Review, the NFPA 805 licensing basis for DAEC is to achieve and maintain hot shutdown conditions following any fire occurring with the reactor operating at power, shutdown prior to aligning the RHR system for shutdown cooling, or in transition between these two operational phases. For the most limiting fire scenarios in every fire area, a report entitled, Table B-3 – NFPA 805 Chapter 4 Nuclear Safety Transition Fire Area Assessment, documents the availability of long term subcooled natural circulation decay heat removal provided by water from the torus, with temperature maintained by RHR operating in the suppression pool cooling mode. The significant volume of water in the torus is available for primary makeup to match nominal system losses.

Initiation of RHR in the suppression pool cooling mode does not imply that the plant would proceed all the way to cold shutdown. Following stabilization at hot shutdown, a long term strategy for reactivity control, decay heat removal, and inventory/pressure control would be determined based on the extent of equipment damage. If an assessment of the post-fire conditions indicated that placing RHR in the shutdown cooling mode would be advisable, then repair activities would commence in a safe and controlled manner to restore plant equipment necessary for reactor cooldown.

Demonstration of the Nuclear Safety Performance Criteria for safe and stable conditions was performed in two analyses.

- At-Power analysis, for fires occurring with the reactor in power operation, startup, or hot shutdown with RHR aligned in the suppression pool cooling mode. This analysis is discussed in Section 4.2.4.
- Non-Power analysis, which includes hot shutdown (from initiation of RHR in the shutdown cooling mode), cold shutdown, and refueling. This analysis is discussed in Section 4.3.

4.2.1.3 Establishing Recovery Actions

Overview of Process

NEI 04-02 and RG 1.205 suggest that a licensee submit a summary of its approach for addressing the transition of operator manual actions (OMAs) as recovery actions in the LAR (NEI-04-02, Section 4.6 and RG 1.205, Regulatory Position 2.2.1). As a minimum, NEI 04-02 suggests that the assumptions, criteria, methodology, and overall results be included for the NRC to determine the acceptability of the licensee's methodology.

The discussion below provides the methodology used to transition pre-transition OMAs and to determine the population of post-transition recovery actions. This process is based on FAQ 07-0030 and consists of the following steps:

- Step 1: Clearly define the primary control station(s) and determine which pre-transition OMAs are taken at primary control station(s) (Activities that occur in the main control room are not considered pre-transition OMAs). Activities that take place at primary control station(s) or in the main control room are not recovery actions, by definition.

- Step 2: Determine the population of recovery actions that are required to resolve variances from deterministic requirements (VFDRs) (to meet the risk acceptance criteria or maintain a sufficient level of defense-in-depth).
- Step 3: Evaluate the additional risk presented by the use of recovery actions required to demonstrate the availability of a success path.
- Step 4: Evaluate the feasibility of the recovery actions.
- Step 5: Evaluate the reliability of the recovery actions.

Results

The review results are documented in documents entitled, Table B-3 – NFPA 805 Chapter 4 Nuclear Safety Transition Fire Area Assessment, Duane Arnold Energy Center Fire Risk Evaluations, Feasibility of Operator Manual/Recovery Actions and Verification of Alternate Shutdown Time Constraints, and Documentation of Recovery Action Feasibility. Refer to Attachment G for the detailed evaluation process and summary of the results from the process and Attachment W for additional information on the risk-informed treatment of recovery actions.

4.2.1.4 Evaluation of Multiple Spurious Operations

Overview of Process

NEI 04-02 suggests that a licensee submit a summary of its approach for addressing potential fire-induced MSOs for NRC review and approval. As a minimum, NEI 04-02 suggests that the summary contain sufficient information relevant to methods, tools, and acceptance criteria used to enable the NRC to determine the acceptability of the licensee's methodology. The methodology utilized to address MSOs for DAEC is summarized below.

As part of the NFPA 805 transition project, a review and evaluation of DAEC susceptibility to fire-induced MSOs was performed. The process was conducted in accordance with NEI 04-02 and RG 1.205, as supplemented by FAQ 07-0038. The Boiling Water Reactor Owners Group (BWROG) generic MSO list included in NEI 00-01, Revision 2, dated June 5, 2009 was utilized.

The approach outlined in Figure 4-3 (based on Figure 4-8 from FAQ 07-0038) is one acceptable method to address fire-induced MSOs. This method used insights from the Fire PRA developed in support of transition to NFPA 805 and consists of the following:

- Identifying potential MSOs of concern
- Conducting an expert panel to assess plant specific vulnerabilities (e.g., per NEI 00-01, Revision 1 Section F.4.2)
- Updating the Fire PRA model and new NSCA to include the MSOs of concern
- Evaluating for NFPA 805 Compliance
- Documenting Results

This process is intended to support the transition to a new licensing basis. Post-transition changes would use the RI-PB change process. The post-transition change process for the assessment of a specific MSO would be a simplified version of this process, and may not need the level of detail shown in the following section (e.g., An

expert panel may not be necessary to identify and assess a new potential MSO. Identification of new potential MSOs may be part of the plant change review process and/or inspection process).

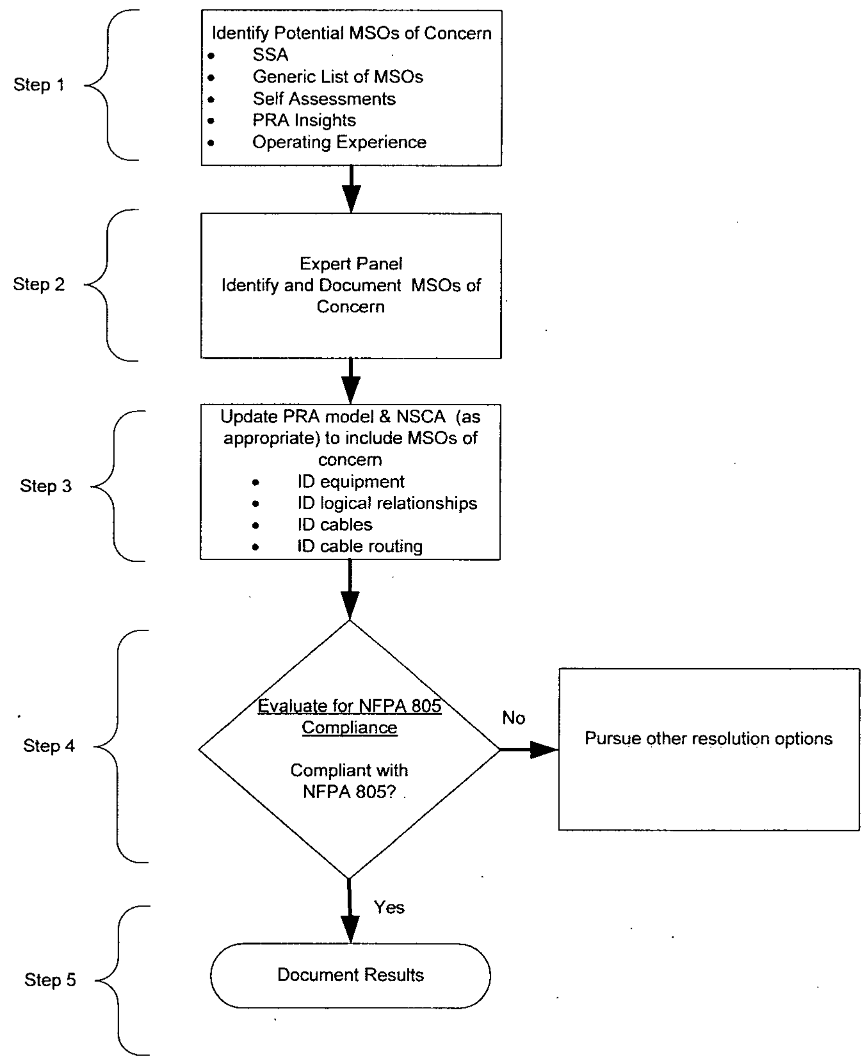

Figure 4-3 – Multiple Spurious Operations – Transition Resolution Process (Based on FAQ 07-0038)

Results

Refer to Attachment F for the results from the implementation of the process.

4.2.2 Existing Engineering Equivalency Evaluation Transition

Overview of Evaluation Process

The EEEEs that support compliance with NFPA 805 Chapter 3 or Chapter 4 (both those that existed prior to the transition and those that were created during the transition) were reviewed using the methodology contained in NEI 04-02. The methodology for performing the EEEE review includes the following determinations:

- The EEEE is not based solely on quantitative risk evaluations
- The EEEE is an appropriate use of an engineering equivalency evaluation
- The EEEE is of appropriate quality
- *The Standard License Condition is met*
- The EEEE is technically adequate
- The EEEE reflects the plant as-built condition
- The basis for acceptability of the EEEE remains valid

In accordance with the guidance in RG 1.205, Regulatory Position 2.3.2, and NEI 04-02, as clarified by FAQ 07-0054, Demonstrating Compliance with Chapter 4 of NFPA 805, EEEEs that demonstrate that a fire protection system or feature is 'adequate for the hazard' are summarized in the LAR as follows:

- If not requesting specific approval for 'adequate for the hazard' EEEEs, then the EEEE was referenced where required and a brief description of the evaluated condition was provided.
- If requesting specific NRC approval for 'adequate for the hazard' EEEEs, then EEEE was referenced where required to demonstrate compliance and was included in Attachment L for NRC review and approval.

In all cases, the reliance on EEEEs to demonstrate compliance with NFPA 805 requirements was documented in the LAR.

Results

The review results for EEEEs are documented in the report entitled NFPA 805 Existing Engineering Equivalency Evaluation Review Report.

In accordance with the guidance provided in RG 1.205, Regulatory Position 2.3.2, and NEI 04-02, as clarified by FAQ 07-0054, Demonstrating Compliance with Chapter 4 of NFPA 805, EEEEs used to demonstrate compliance with Chapters 3 and 4 of NFPA 805 are referenced in Attachments A and C as appropriate. None of the transitioning EEEEs require NRC approval.

4.2.3 Licensing Action Transition

Overview of Evaluation Process

The existing licensing actions (exemptions and safety evaluations) review was performed in accordance with NEI 04-02. The methodology for the licensing action review included the following:

- Determination of the bases for acceptability of the licensing action
- Determination that these bases for acceptability are still valid and required for NFPA 805

Results

Attachment K contains the detailed results of the Licensing Action Review.

The following licensing actions will be transitioned into the NFPA 805 fire protection program as previously approved (NFPA Section 2.2.7). These licensing actions are considered compliant under 10 CFR 50.48(c).

- Exemption #04 (19831219), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less than 3 Hour Fire Ratings Between Zones (Equipment Hatch) (III.G.2.a Criteria)
- Exemption #15 (19871014), Appendix R Exemption from the Requirement that Structural Steel Forming Part of or Supporting Fire Barriers be Protected to a Fire Resistance Equivalent to that of the Barrier (III.G.2.a Criteria)
- Exemption #16 (19910816), Appendix R Exemption from the 3-Hour Fire Barrier Requirement for the Drywell Expansion Gap (III.G.2.a Criteria)

The following licensing actions are no longer necessary and will not be transitioned into the NFPA 805 fire protection program:

- Exemption #01 (19830426), Appendix R Exemption from Fire Protection Requirements of III.G.2 for Division 1 and Division 2 Cables Supplying the Scram Valves for Reactor Building North and South CRD Module Areas (III.G.2 Criteria)

  This exemption is no longer required because the fire risk evaluation has found that the fire area is compliant with NFPA 805 Section 4.2.4.

- Exemption #02 (19830426), Appendix R Exemption from the Requirement to Provide Fixed Fire Suppression in the Control Room (III.G.3 Criteria)

  This exemption is no longer required because the fire risk evaluation has found that the fire area is compliant with NFPA 805 Section 4.2.4.

- Exemption #03 (19831219), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less Than 3 Hour Fire Ratings Between Miscellaneous Doors and Dampers (III.G.2.a Criteria)

  This exemption is no longer required because the subject boundaries either (1) were upgraded to a 3-hour rating, (2) no longer require a 3-hour rating, or (3) have been demonstrated adequate for the hazard in existing engineering equivalency evaluation(s).

- Exemption #05 (19831219), Appendix R Exemption from the Automatic Suppression Requirement for the Turbine Building Water Treatment and Condensate Pump Area (III.G.2.c Criteria)

  This exemption is no longer required because the NSCA has found that the fire area is compliant with NFPA 805 Section 4.2.4.

- Exemption #06 (19831219), Appendix R Exemption from the Requirement for Full Coverage by Automatic Suppression Systems in the HVAC Heat Exchanger and Chiller Area (III.G.3 Criteria)

  This exemption is no longer required because the NSCA has found that the fire area is compliant with NFPA 805 Section 4.2.4.

- Exemption #07 (19850701), Appendix R Exemption from the 8-Hour Battery Requirement for the Control Room (III.J Criteria)

This exemption is no longer required because NFPA 805 does not require 8 hour battery backed emergency lights.

- Exemption #08 (19871014), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less Than 3 Hour Fire Ratings Between Zones (Doors No. 202 and 203) (III.G.2.a Criteria)

  This exemption is no longer required because the fire risk evaluation has found that the fire area is compliant with NFPA 805 Section 4.2.4.

- Exemption #09 (19871014), Appendix R Exemption from 3 Hour Rated Barrier in the Reactor Building Torus Area (III.G.2.a Criteria)

  This exemption is no longer required because the fire risk evaluation has found that the fire area is compliant with NFPA 805 Section 4.2.4.

- Exemption #10 (19871014), Appendix R Exemption from Automatic Suppression and Detection in the Reactor Building Torus Area (III.G.2.b Criteria)

  This exemption is no longer required because the fire risk evaluation has found that the fire area is compliant with NFPA 805 Section 4.2.4.

- Exemption #11 (19871014), Appendix R Exemption from the Requirement for 3 Hour Fire Barriers in the Laydown Area and RWCU Area (Fire Zone 3-A/3-B) (III.G.2.a Criteria)

  This exemption is no longer required because the NSCA has found that the fire area is compliant with NFPA 805 Section 4.2.4.

- Exemption #12 (19871014), Appendix R Exemption from the Requirement for 3 Hour Fire Barriers in the Reactor Building RHR Valve Room (Fire Zone 2-D) (III.G.2.a Criteria)

  This exemption is no longer required because the fire risk evaluation has found that the fire area is compliant with NFPA 805 Section 4.2.4.

- Exemption #13 (19871014), Appendix R Exemption from the Requirement for 3 Hour Rated Fire Barriers in the Equipment Hatch Between Fire Zones 3-B and 4-B (III.G.2.a Criteria)

  This exemption is no longer required because the NSCA has found that the fire area is compliant with NFPA 805 Section 4.2.4.

- Exemption #14 (19871014), Appendix R Exemption from the Requirement of Separation of Redundant Trains of Safe Shutdown Cables and Equipment by 3 Hour Rated Fire Barriers for the Ventilation Duct Fire Dampers (III.G.2.a Criteria)

  This exemption is no longer required because the subject boundaries either (1) no longer require a 3-hour rating or (2) have been demonstrated adequate for the hazard in existing engineering equivalency evaluation(s).

Since the exemptions are either compliant with 10 CFR 50.48(c) or no longer necessary, in accordance with the requirements of 10 CFR 50.48(c)(3)(i), NextEra Energy Duane Arnold, LLC requests that the exemptions listed in Attachment K be rescinded as part of the LAR process. See Attachment O, Orders and Exemptions.

4.2.4 Fire Area Transition

Overview of Evaluation Process

The Fire Area Transition (NEI 04-02 Table B-3) was performed using the methodology contained NEI 04-02 and FAQ 07-0054. The methodology for performing the Fire Area Transition, depicted in Figure 4-4, is outlined as follows:

Step 1 - Assembled documentation. Gathered industry and plant-specific fire area analyses and licensing basis documents.

Step 2 – Document fulfillment of nuclear safety performance criteria.

- Assessed accomplishment of nuclear safety performance goals. Documented the method of accomplishment, in summary level form, for the fire area. The description of key assumptions utilized in the SSA and an overview of accomplishment of each of the performance goals are included in Attachment C.
- Documented evaluation of effects of fire suppression activities. Documented the evaluation of the effects of fire suppression activities on the ability to achieve the nuclear safety performance criteria.
- Performed licensing action reviews. Performed a review of the licensing aspects of the selected fire area and document the results of the review. See Section 4.2.3.
- Performed existing engineering equivalency evaluation reviews. Performed a review of existing engineering equivalency evaluations (or create new evaluations) documenting the basis for acceptability. See Section 4.2.2.
- Pre-transition OMA reviews. Performed a review of pre-transition OMAs to determine those actions taking place outside of the main control room or outside of the primary control station(s). See Section 4.2.1.3.

Step 3 – VFDR Identification and characterization and resolution considerations. Identified variances from the deterministic requirements of NFPA 805, Section 4.2.3. Documented variances as either a separation issue or a degraded fire protection system or feature. Developed VFDR problem statements to support resolution.

Step 4 – Performance-Based evaluations (Fire Modeling or Fire Risk Evaluations) See Section 4.5.2 for additional information.

Step 5 – Final Disposition.

- Documented final disposition of the VFDRs in Attachment C (NEI 04-02 Table B-3).
- For recovery action compliance strategies, ensured the manual action feasibility analysis of the required recovery actions was completed. Note: if a recovery action cannot meet the feasibility requirements established per NEI 04-02, then alternate means of compliance was considered.
- Documented the post transition NFPA 805 Chapter 4 compliance basis.

Step 6 – Documented required fire protection systems and features. Reviewed the NFPA 805 Section 4.2.3 compliance strategies (including fire area licensing actions and engineering evaluations) and the NFPA 805 Section 4.2.4 compliance strategies

(including simplifying deterministic assumptions) to determine the scope of fire protection systems and features 'required' by NFPA 805 Chapter 4. The 'required' fire protection systems and features are subject to the applicable requirements of NFPA 805 Chapter 3.

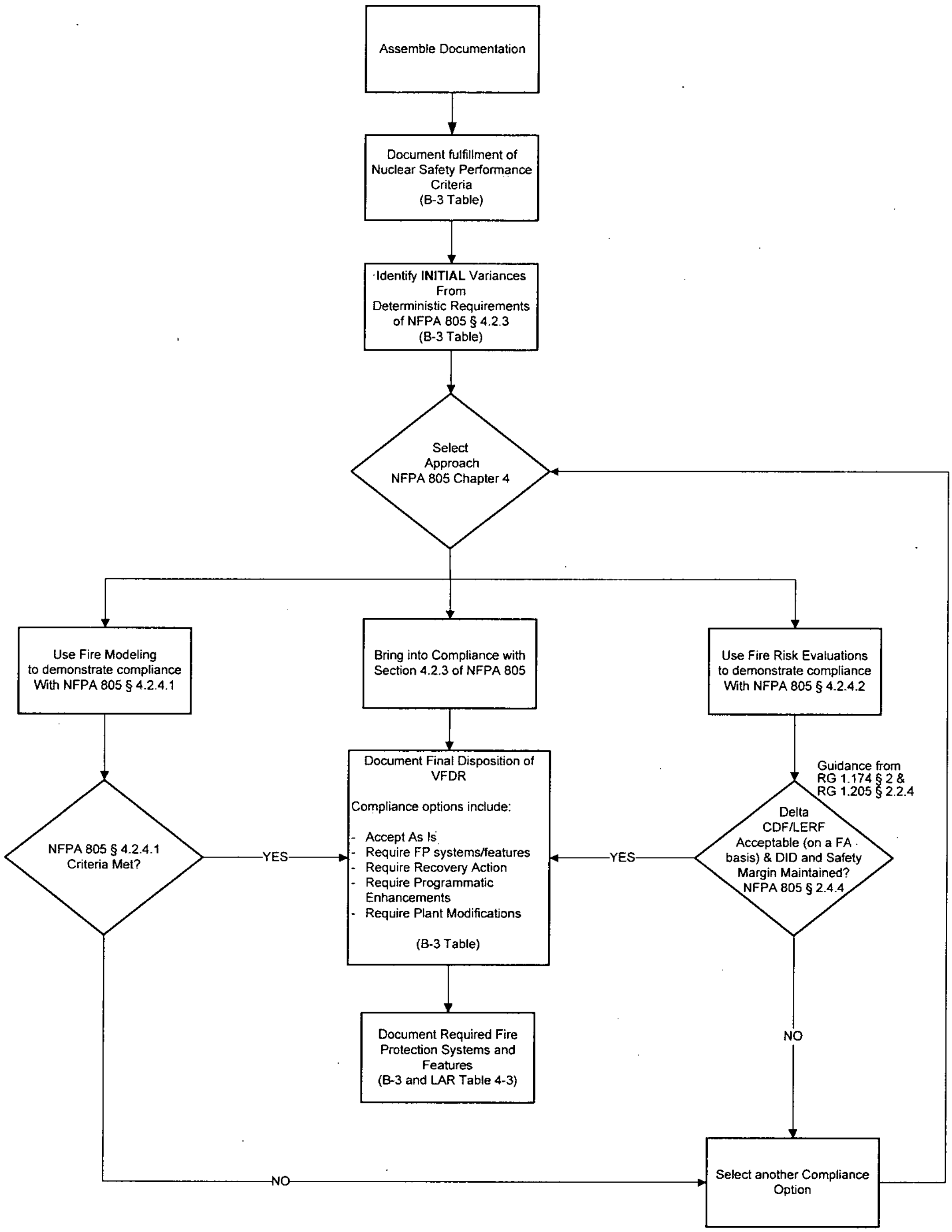

Figure 4-4 – Summary of Fire Area Review [Based on FAQ 07-0054]

Results of the Evaluation Process

Attachment C contains the results of the Fire Area Transition review (NEI 04-02 Table B-3). On a fire area basis, Attachment C summarizes compliance with Chapter 4 of NFPA 805. Attachment C also contains a description of key assumptions utilized in the At-Power Analysis and an overview of accomplishment of each of the performance goals.

NEI 04-02 Table B-3 includes the following summary level information for each fire area:

- Regulatory Basis – NFPA 805 post-transition regulatory bases are included.
- Performance Goal Summary – An overview of the method of accomplishment of each of the performance criteria in NFPA 805 Section 1.5 is provided.
- Reference Documents – Specific references to NSCA Documents are provided.
- Fire Suppression Activities Effect on Nuclear Safety Performance Criteria – A summary of the method of accomplishment is provided.
- Licensing Actions – Specific references to exemption requests that will remain part of the post-transition licensing basis. A brief description of the condition and the basis for acceptability of the licensing action are provided.
- EEEE – Specific references to EEEE that rely on determinations of 'adequate for the hazard' that will remain part of the post-transition licensing basis. A brief description of the condition and the basis for acceptability are provided.
- Required Fire Protection Systems and Features – A listing of the required fire protection systems and features is provided.
- Summaries of Fire Risk Evaluations performed for variances from the deterministic requirements are also provided.
- VFDRs – Specific variances from the deterministic requirements of NFPA 805 Section 4.2.3 are listed.

4.3 Non-Power Operational Modes

4.3.1 Overview of Evaluation Process

NextEra Energy Duane Arnold, LLC implemented the process outlined in NEI 04-02 and FAQ 07-0040, Clarification on Non-Power Operations. The goal (as depicted in Figures 4-5 and 4-6) is to ensure that contingency plans are established when the plant is in an NPO mode where the risk is intrinsically high. During low risk periods, normal risk management controls and fire prevention/protection processes and procedures will be utilized.

The process to demonstrate that the nuclear safety performance criteria are met during NPO modes involved the following steps:

- Reviewed the existing Outage Management Processes
- Identified Equipment/Cables:
    - Reviewed plant systems to determine success paths that support each of the defense-in-depth Key Safety Functions (KSFs), and
    - Identified cables required for the selected components and determine their routing

- Performed Fire Area Assessments (identified pinch points – plant locations where a single fire may damage all success paths of a KSF)
- Will update current processes to manage pinch-points associated with fire-induced vulnerabilities during the outage

The process is depicted in Figures 4-5 and 4-6. The results are presented in Section 4.3.2.

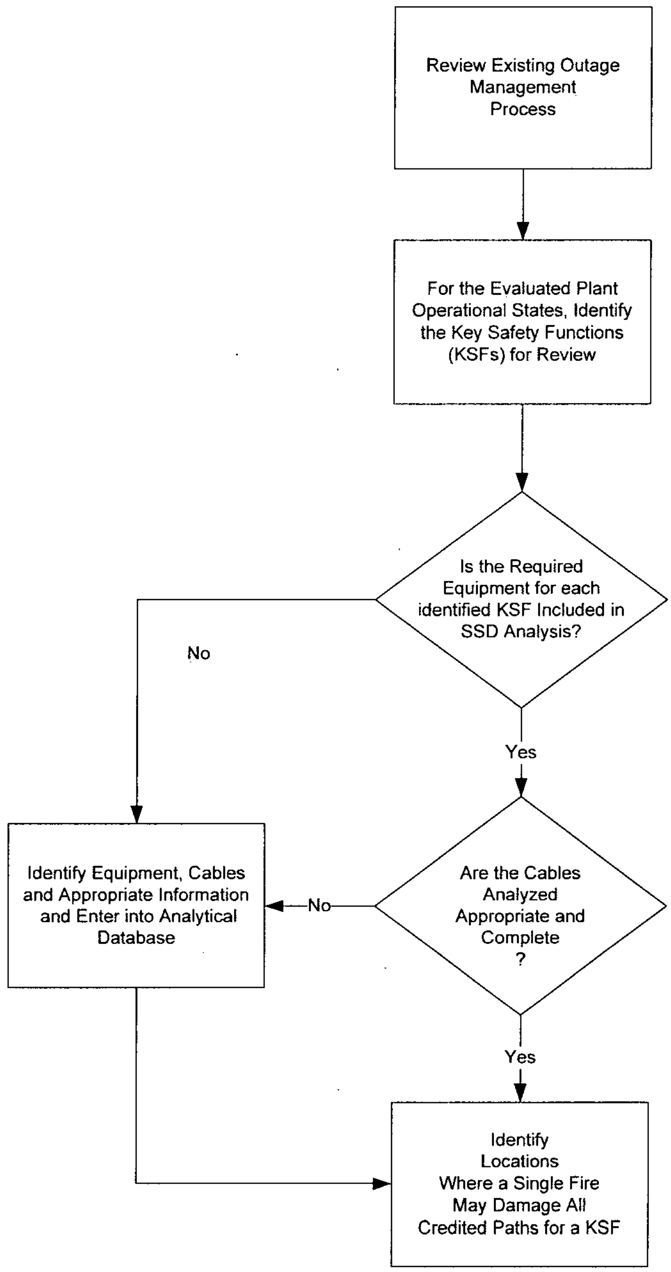

Figure 4-5 Review POSs, KSFs, Equipment, and Cables and Identify Pinch Points

Higher Risk Evolution as Defined by Plant Specific Outage Risk Criteria for example
1) Time to Boil
2) Reactor Coolant System and Fuel Pool Inventory
3) Decay Heat Removal

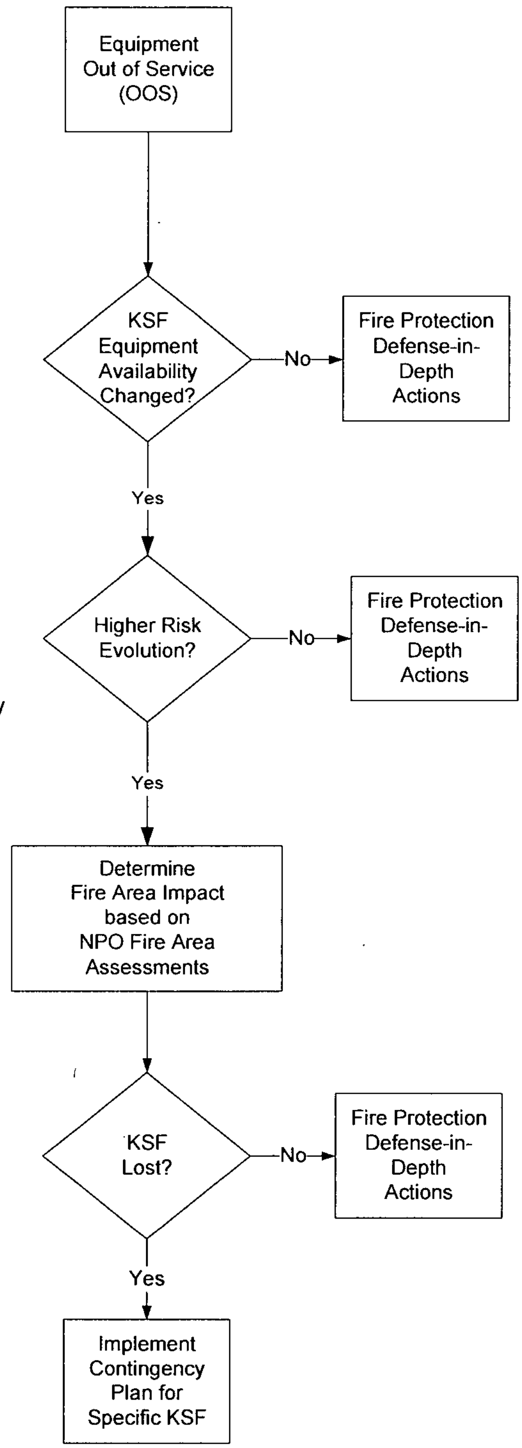

Figure 4-6 Manage Pinch Points

4.3.2 Results of the Evaluation Process

Based on FAQ 07-0040, the Plant Operating States considered for equipment and cable selection are defined in a report entitled, NFPA 805 Non-Power Operational Modes Transition Review. Systems were identified to provide three KSFs: Decay Heat Removal Capability, Inventory Control, and Electrical Power Availability (to the extent that it supports the Decay Heat Removal and Inventory Control functions). Components from the chosen systems were grouped into NPO Function Codes, which were then related to establish KSF success paths. For those components not already in the DAEC NFPA 805 Database or those with a functional state for non-power operations differing from that in the At-Power Analysis, cable selection and routing was performed as described in the plant's NSCA methodology. Components were designated by NPO Function Code within the DAEC NFPA 805 Database. Once all information had been entered into the DAEC NFPA 805 Database, a series of reports were generated to allow evaluation of 'KSF pinch points' for designated fire scenarios.

The report entitled, NFPA 805 Non-Power Operational Modes Transition Review, contains the fire scenario assessments comprising the 'KSF pinch point' analysis and recommendations for changes to fire risk and outage management procedures and other administrative controls. In accordance with FAQ 07-0040, any evaluated scenario in which all of the credited success paths for a given KSF are lost is considered a 'KSF pinch point.'

The list of recommendations specified in the evaluation considers the following actions from FAQ 07-0040:

- Restriction of hot work in analysis areas during periods of increased vulnerability
- Verification of functional detection and / or suppression in the vulnerable analysis areas
- Limitation of transient combustible materials in analysis areas during periods of increased vulnerability
- Plant equipment configuration changes (e.g., removing power from equipment once it is placed in its desired position)
- Provision of additional fire patrols at periodic intervals or other appropriate compensatory measures (such as surveillance cameras) during periods of increased vulnerability
- Rescheduling work to a period with lower risk or higher defense-in-depth

See Attachment D for more complete details. Based on incorporation of the recommendations from the 'KSF pinch point' evaluations into appropriate plant procedures prior to implementation of the NFPA 805 fire protection program, the performance goals for NPO modes are fulfilled and the requirements of NFPA 805 are met. See Attachment S for an Implementation Item.

4.4 Radioactive Release Performance Criteria

4.4.1 Overview of Evaluation Process

The review of the Fire Protection Program against NFPA 805 requirements for fire suppression related radioactive release was performed using the methodology

contained in the report entitled, DAEC NFPA 805 Radioactive Release Review. The methodology consists of the following:

- Reviewed fire pre-plans and fire brigade training materials to identify fire protection program elements (e.g., systems / components / procedural control actions / flow paths, etc.) that are being credited to meet the radioactive release goals, objectives, and performance criteria during all plant operating modes, including full power and non-power conditions.
- Reviewed engineering controls to ensure containment of gaseous and liquid effluents (e.g., smoke and fire fighting agents). This review included all plant operating modes (including full power and non-power conditions). Otherwise, provide a bounding analysis, quantitative analysis, or other analysis that demonstrates that the limits for instantaneous release of radioactive effluents specified in the unit's Technical Specifications are met.

4.4.2 Results of the Evaluation Process

The radioactive release review determined the fire protection program will be compliant with the requirements of NFPA 805 and the guidance in NEI 04-02 and RG 1.205 upon completion of the implementation items identified in Attachment E. See Attachment S for an Implementation Item.

The main strategy for complying with the radioactive release requirements is ensuring that all buildings or areas containing radioactive hazards or the potential for an uncontrolled release during a fire have adequate strategies to minimize the uncontrolled release of radioactive material during fire fighting activities. This includes the revision or creation of documentation such as pre-fire plans, fire brigade training materials, standard operating procedures, and administrative controls.

The site specific review of the direct effects of fire suppression activities on radioactive release is summarized in Attachment E.

4.5 Fire PRA and Performance-Based Approaches

RI-PB evaluations are an integral element of an NFPA 805 fire protection program. Key parts of RI-PB evaluations include:

- A Fire PRA (discussed in Section 4.5.1 and Attachments U, V, and W)
- NFPA 805 Performance-Based Approaches (discussed in Section 4.5.2)

4.5.1 Fire PRA Development and Assessment

In accordance with the guidance in RG 1.205, a Fire PRA model was developed for DAEC in conformance with the requirements of Part 4, Requirements for Fires At-Power PRA, of the ASME and ANS combined PRA Standard, ASME/ANS RA-Sa-2009, Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Application, (hereafter referred to as Fire PRA Standard). NextEra Energy Duane Arnold, LLC held a peer review in June 2010 using the NEI 07-12 Fire PRA peer review process. The resulting fire risk assessment model is used as the analytical tool to perform Fire Risk Evaluations during the transition process.

Section 4.5.1.1 describes the Internal Events PRA model. Section 4.5.1.2 describes the Fire PRA model. Section 4.5.1.3 describes the results and resolution of the peer review of the Fire PRA, and Section 4.5.1.4 describes insights gained from the Fire PRA.

4.5.1.1 Internal Events PRA

The DAEC base internal events PRA (DAEC08B) was the starting point for the Fire PRA. Attachment U provides a discussion of the internal events PRA and the results and disposition of the most recent peer review.

4.5.1.2 Fire PRA

The internal events PRA was modified to capture the effects of fire both as an initiator of an event and as a potential failure mode of affected circuits and individual targets. DAEC is a single unit site; therefore, the PRA models are representative of the unit being analyzed. The Fire PRA was developed using the guidance for Fire PRA development in NUREG/CR-6850, FAQs, and report entitled, Supplemental Fire PRA Methods. The Fire PRA was developed using the EPRI FRANC software and results were compiled using the EPRI XINITS software.

The Fire PRA quality and results are discussed in the subsequent sections and in Attachments V and W, respectively

Fire Model Utilization in the Application

Fire modeling was performed as part of the Fire PRA development (NFPA 805 Section 4.2.4.2). RG 1.205, Regulatory Position 4.2 and Section 5.1.2 of NEI 04-02, provide guidance to identify fire models that are acceptable to the NRC for plants implementing a risk-informed, performance-based licensing basis.

The acceptability of the use of these fire models is included in Attachment J.

4.5.1.3 Results of Fire PRA Peer Review

The DAEC Fire PRA (DAEC08A) was peer reviewed against the requirements of ASME/ANS RA-Sa-2009, Part 4.

The results (i.e., Supporting Requirement capability assessments and Facts & Observations (F&Os)) documented in the June 2010 Fire PRA peer review report were used to support the DAEC Fire PRA update (DAEC08B) for the NFPA 805 application.

The Fire PRA update addressed the Supporting Requirement assessed deficiencies (i.e., Not Met or Capability Category I (CC I)). Completion of recommendations related to Supporting Requirement assessments and 'Finding' F&Os results in a Capability Category II assessment for the associated Supporting Requirements. Some items are not completed at this time and are deferred. These items have been dispositioned for the potential impact on the Fire PRA and the application. The results of the peer review are summarized in Attachment V.

4.5.1.4 Risk Insights

Risk insights were documented as part of the development of the Fire PRA. The total plant fire CDF/LERF was derived using the guidance for Fire PRA development in NUREG/CR-6850, FAQs, and report entitled, Supplemental Fire PRA Methods, and is

useful in identifying the areas of the plant where fire risk is greatest. A review of each fire initiating event that individually represents 1% or greater of the calculated fire risk is included in Attachment W.

4.5.2 Performance-Based Approaches

NFPA 805 outlines the approaches for performing performance-based analyses. As specified in Section 4.2.4, there are generally two types of analyses performed for the performance-based approach:

- Fire Modeling (NFPA 805 Section 4.2.4.1)
- Fire Risk Evaluation (NFPA 805 Section 4.2.4.2)

4.5.2.1 Fire Modeling Approach

The fire modeling approach was not utilized for demonstrating compliance with NFPA 805 for DAEC.

4.5.2.2 Fire Risk Approach

Overview of Evaluation Process

The Fire Risk Evaluations were completed as part of the DAEC NFPA 805 transition. These Fire Risk Evaluations were developed using the process described below. This methodology is based upon the requirements of NFPA 805, industry guidance in NEI 04-02, and RG 1.205. These are summarized in Table 4-1.

Table 4-1 Fire Risk Evaluation Guidance Summary Table

Document	Section(s)	Topic
NFPA 805	2.2(h), 4.2.4, A.2.2(h), A.2.4.4, D.5	Change Evaluation (2.2(h), 2.2.9, 2.4.4 A.2.2(h), A.2.4.4, D.5) Risk of Recovery Actions (4.2.4) Use of Fire Risk Evaluation (4.2.4.2)
NEI 04-02 Revision 2	4.4, 5.3, Appendix B, Appendix I, Appendix J	Change Evaluation, Change Evaluation Forms (Appendix I), No specific discussion of Fire Risk Evaluation
RG 1.205 Revision 1	C.2.2.4, C.2.4, C.3.2	Risk Evaluations (C.2.2.4) Recovery Actions (C.2.4)

During the transition to NFPA 805, variances from the deterministic requirements in Section 4.2.3 of NFPA 805 were evaluated using a Fire Risk Evaluation per Section 4.2.4.2 of NFPA 805. A Fire Risk Evaluation was performed for each fire area containing VFDRs.

If the Fire Risk Evaluation meets the acceptance criteria, this is confirmation that a success path effectively remains free of fire damage and that the performance-based approach is acceptable per Section 4.2.4.2 of NFPA 805.

The Fire Risk Evaluation process is generally based on FAQ 07-0054 (See Figure 4-7) and consists of the following steps:

Step 1 – Preparation for the Fire Risk Evaluation.

- Definition of the Variances from the Deterministic Requirements. The definition of the VFDR includes a description of problem statement and the section of

NFPA 805 that is not met, type of VFDR (e.g., separation issue or degraded fire protection system), and proposed evaluation per applicable NFPA 805 section.

- Preparatory Evaluation – Fire Risk Evaluation Team Review. Using the information obtained during the development of the NEI 04-02 B-3 Table and the Fire PRA, a team review of the VFDR was performed. Depending on the scope and complexity of the VFDR, the team may include the Safe shutdown/NSCA Engineer, the Fire Protection Engineer, and the Fire PRA Engineer. The purpose and objective of this team review was to address the following:
  - Review of the Fire PRA modeling treatment of VFDR
  - Ensure discrepancies were captured and resolved

Step 2 – Performed the Fire Risk Evaluation

- The Evaluator coordinated as necessary with the Safe shutdown/NSCA Engineer, Fire Protection Engineer and Fire PRA Engineer to assess the VFDR using the Fire Risk Evaluation process to perform the following:
  - Change in Risk Calculation with consideration for additional risk of recovery actions and required fire protection systems and features due to fire risk
  - Fire area change in risk summary

Step 3 – Reviewed the Acceptance Criteria

- The acceptance criteria for the Fire Risk Evaluation consist of two parts. One is quantitatively based and the other is qualitatively based. The quantitative figures of merit are delta CDF and delta LERF. The qualitative factors are defense-in-depth and safety margin.
  - Risk Acceptance Criteria. The transition risk evaluation was measured quantitatively for acceptability using the delta CDF and delta LERF criteria from RG 1.174, as clarified in RG 1.205 Regulatory Position 2.2.4.
  - Defense-in-Depth. A review of the impact of the change on defense-in-depth was performed, using the guidance from NEI 04-02.
  - Safety Margin Assessment. A review of the impact of the change on safety margin was performed.

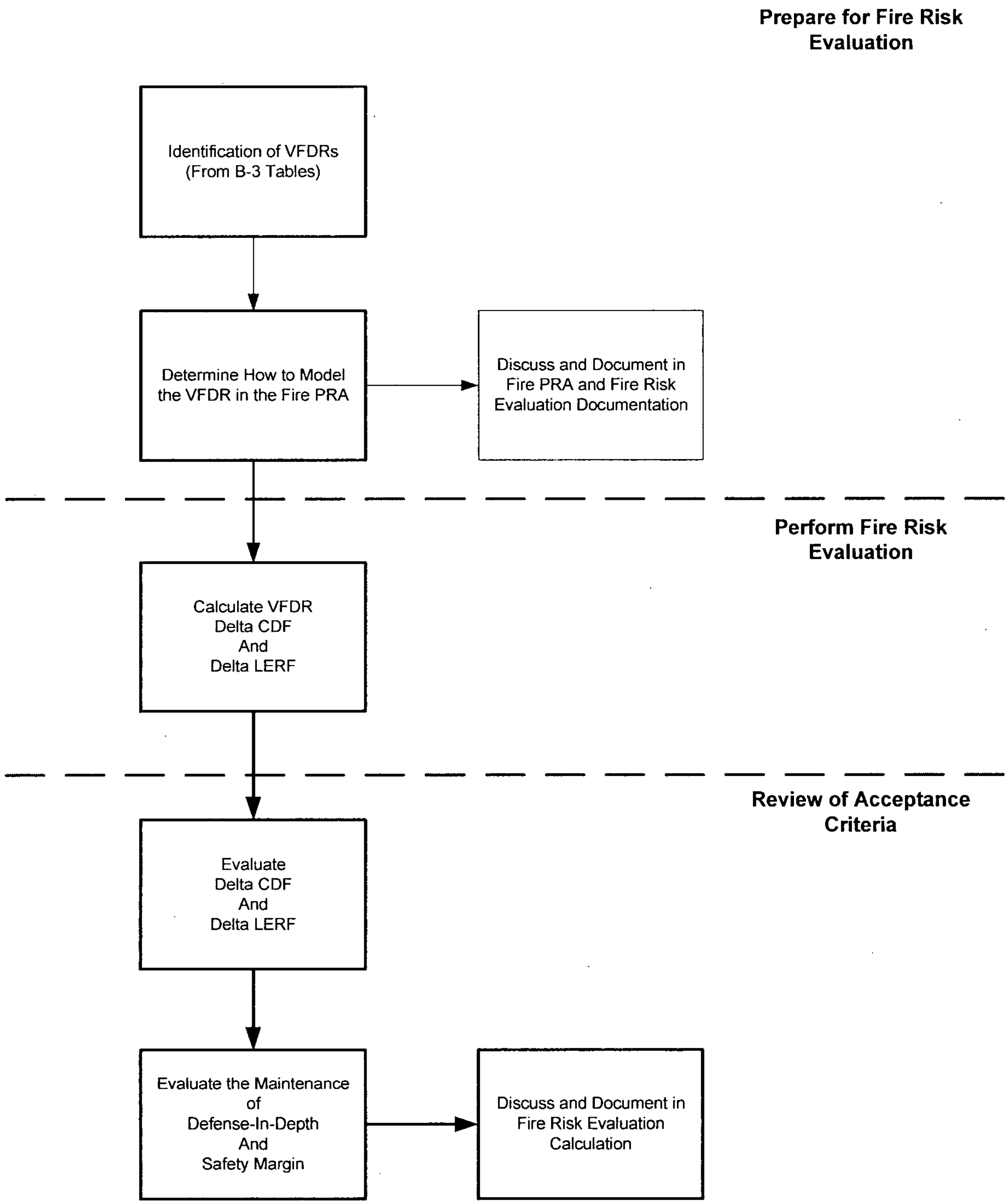

Figure 4-7 – Fire Risk Evaluation Process (NFPA 805 Transition) [Based on FAQ 07-0054]

Results of Evaluation Process

Disposition of VFDRs

The DAEC NSCA and the NFPA 805 transition project activities have identified a number of variances from the deterministic requirements of NFPA 805 Section 4.2.3. These variances were dispositioned either by modifying the plant or using the fire risk evaluation process.

Each variance dispositioned using a Fire Risk Evaluation was assessed against the Fire Risk Evaluation acceptance criteria of delta CDF and delta LERF; and maintenance of defense-in-depth and safety margin criteria from Section 5.3.5 of NEI 04-02 and RG 1.205. The results of these evaluations are summarized in Attachment C.

Following completion of transition activities and planned modifications and program changes, the plant will be compliant with 10 CFR 50.48(c).

Risk Change Due to NFPA 805 Transition

In accordance with the guidance in RG 1.205, Regulatory Position 2.2.4, Risk Evaluations, risk increases or decreases for each fire area using Fire Risk Evaluations and the overall plant should be provided. Note that the risk increase due to the use of recovery actions was included in the risk change for transition for each fire area.

RG 1.205, Regulatory Position 2.2.4.2 states in part

> *"The total increase or decrease in risk associated with the implementation of NFPA 805 for the overall plant should be calculated by summing the risk increases and decreases for each fire area (including any risk increases resulting from previously approved recovery actions). The total risk increase should be consistent with the acceptance guidelines in Regulatory Guide 1.174. Note that the acceptance guidelines of Regulatory Guide 1.174 may require the total CDF, LERF, or both, to evaluate changes where the risk impact exceeds specific guidelines. If the additional risk associated with previously approved recovery actions is greater than the acceptance guidelines in Regulatory Guide 1.174, then the net change in total plant risk incurred by any proposed alternatives to the deterministic criteria in NFPA 805, Chapter 4 (other than the previously approved recovery actions), should be risk neutral or represent a risk decrease."*

The risk increases and decreases are provided in Attachment W.

4.6 Monitoring Program

NFPA 805 Section 3.2.3(3) requires that procedures be established for reviews of the fire protection program related performance and trends. NFPA 805, Section 2.6 requires a monitoring program that in part is to establish acceptable performance levels and a method to monitor and assess the performance of the fire protection program. The NFPA 805 requirements for reviews of programs related to performance and trending is provided under the NFPA 805 monitoring program.

The monitoring program will be implemented after the safety evaluation issuance as part of the fire protection program transition to NFPA 805. See Attachment S for an Implementation Item.

In order to assess the impact of the transition to NFPA 805 on the current monitoring program, the DAEC fire protection program documentation such as the maintenance program processes, fire protection program implementing procedures, and plant change processes will be reviewed. Sections 4.5.3 and 5.2 of the NEI 04-02 and FAQ 10-0059 will be used to establish the review process and that process is described in the following sections.

The following scope will be documented appropriately:

- The scope of fire protection and NSCA structures, systems, and components (SSCs) and programmatic elements to monitor
- The levels of availability, reliability, or other criteria for those elements that require monitoring

4.6.1 Overview of NFPA 805 Requirements and NEI 04-02 Guidance on the NFPA 805 Fire Protection System and Feature Monitoring Program

Section 2.6 of NFPA 805 states:

> *"A monitoring program shall be established to ensure that the availability and reliability of the fire protection systems and features are maintained and to assess the performance of the fire protection program in meeting the performance criteria. Monitoring shall ensure that the assumptions in the engineering analysis remain valid."*

The intent of the monitoring review is to confirm the adequacy of the existing surveillance, inspection, testing, compensatory measures, and oversight processes for transition to NFPA 805. This review considers the following:

- The adequacy of the scope of structure, systems and components within existing plant programs
- The performance criteria for the availability and reliability of the required structure, systems and components
- The adequacy of the plant corrective action program in determining causes of equipment and programmatic failures and in minimizing their recurrence

4.6.2 Overview of Post-Transition NFPA 805 Monitoring Program

This section describes the overall post-transition NFPA 805 monitoring program process. The monitoring program will be implemented after the safety evaluation issuance as part of the fire protection program transition to NFPA 805. The monitoring process is comprised of four phases.

- Phase 1 – Scoping
- Phase 2 – Screening Using Risk Criteria
- Phase 3 – Risk Target Value Determination
- Phase 4 – Monitoring Implementation

Phase 1 – Scoping

In order to meet the NFPA 805 requirements for monitoring, the following categories of SSCs and programmatic elements will be reviewed during the implementation phase for inclusion in the NFPA 805 monitoring program:

- Structures, Systems, and Components required to comply with NFPA 805, specifically:
  - Fire protection systems and features required by the NSCA
  - Fire protection systems and features modeled in the Fire PRA
  - Fire protection systems and features required by Chapter 3 of NFPA 805
  - NSCA equipment
  - Structures, systems and components relied upon to meet radioactive release criteria
- Fire Protection Programmatic Elements
- Key Assumptions in Engineering Analyses (specifically analyses performed to demonstrate compliance with the nuclear safety and radioactive release performance criteria)

As a minimum the fire protection systems and features (required to meet Chapter 3 of NFPA 805 and the NSCA criteria) and SSCs required to meet the radioactive release criteria will be included in the existing inspection and test programs and in the system/program health program. In addition passive features that are relied upon to demonstrate compliance with Chapter 4 of NFPA 805 will also be included in the existing inspection and test programs and in the system/program health program. The existing programs are adequate for routine monitoring of these SSCs. SSCs that are not addressed in the existing programs will be added.

Phase 2 – Screening Using Risk Criteria

Phase 2 of the process uses the risk significance criteria and screens the SSCs and programmatic elements to determine High Safety Significant SSCs and programmatic elements. This may be accomplished at the component, programmatic element, and/or functional level. Since risk is evaluated at the analysis unit level (fire compartment, fire area, fire zone, or ignition source), criteria must be developed to determine those analysis units for which the SSCs are considered High Safety Significant (HSS).

The Fire PRA is the primary tool used to establish the risk significance criteria and performance bounding guidelines. The screening thresholds used to determine risk significant analysis units are those that meet the following criteria:

Risk Achievement Worth (RAW) of the monitored parameter ≥ 2.0

(AND) either

Core Damage Frequency (CDF) x (RAW) ≥ 1.0E-07 per year

(OR)

Large Early Release Frequency (LERF) x (RAW) ≥ 1.0E-08 per year

High Safety Significant fire protection systems and features and nuclear safety capability equipment are those that meet or exceed the risk significant screening criteria. The SSCs and programmatic elements for these HSS analysis units will be included in the additional monitoring program of NFPA 805.

Low Safety Significant fire protection systems and features and nuclear safety capability equipment are those that do not meet the risk significant screening criteria and are monitored via existing programs/processes.

Additionally, the review may include other analysis units (and required fire protection/NSCA SSCs and programmatic elements) that are not risk significant (per the screening criteria) but are included based on plant specific history and/or operational considerations.

Phase 3 – Risk Target Value Determination

Phase 3 consists of using the Fire PRA, or other processes as appropriate, to determine target values of reliability and availability for the High Safety Significant, fire protection/NSCA SSCs and programmatic elements established in Phase 2.

Failure criteria are established by an expert panel or evaluation based on the required fire protection and nuclear safety capability SSCs and programmatic elements assumed level of performance in the supporting analyses. Action levels are established for the SSCs at the component level, program level, or functionally through the use of the pseudo system or 'performance monitoring group' concept. The actual action level is determined based on the number of component, program or functional failures within a sufficiently bounding time period (~2-3 operating cycles). Adverse trends and unacceptable levels of availability, reliability, and performance will be reviewed against established action levels.

Documentation of the monitoring program failure criteria and action level targets will be contained in a documented evaluation. It is anticipated that the availability and reliability criterion for High Safety Significant Performance Monitoring Groups will use the guidance included in several industry documents tempered by site-specific operating experience, Fire PRA assumptions, and equipment types (and vendor data or valid design input when available). Industry documents such as the EPRI Fire Protection Equipment Surveillance Optimization and Maintenance Guide 1006756, Final Report July 2003, NFPA codes, and/or the NRC Fire Protection Significance Determination Process in addition to site specific operating experience data may be used.

Phase 4 – Monitoring Implementation

Phase 4 is the implementation of the monitoring program, once the monitoring scope and criteria are established. The corrective action process will be used to address performance of fire protection and nuclear safety SSCs that do not meet performance criteria.

For High Safety Significant fire protection and nuclear safety SSCs that are monitored, unacceptable levels of availability, reliability, and performance will be reviewed against the established action levels. If an action level is triggered, a non-conformance report will be initiated to identify the negative trend. A corrective action plan will then be developed using the appropriate licensee process. Once the plan has been

implemented, improved performance should return the SSC back to below the established action level.

A periodic assessment will be performed (e.g., at a frequency of approximately every two to three operating cycles), taking into account, where practical, industry wide operating experience. This may be conducted as part of other established assessment activities. Issues that will be addressed include:

- Review systems with performance criteria. Do performance criteria still effectively monitor the functions of the system? Do the criteria still monitor the effectiveness of the fire protection and NSCA systems?
- Have the supporting analyses been revised such that the performance criteria are no longer applicable or new fire protection and NSCA SSCs, programmatic elements and/ or functions need to be in scope?
- Based on the performance during the assessment period, are there any trends in system performance that should be addressed that are not being addressed?

4.7 Program Documentation, Configuration Control, and Quality Assurance

4.7.1 Compliance with Documentation Requirements in Section 2.7.1 of NFPA 805

In accordance with the requirements and guidance in NFPA 805 Section 2.7.1 and NEI 04-02, NextEra Energy, Duane Arnold, LLC has documented analyses to support compliance with 10 CFR 50.48(c). The analyses are being performed in accordance with DAEC processes for ensuring assumptions are clearly defined, that results are easily understood, that results are clearly and consistently described, and that sufficient detail is provided to allow future review of the entire analyses.

Analyses, as defined by NFPA 805 Section 2.4, performed to demonstrate compliance with 10 CFR 50.48(c) will be maintained for the life of the plant and organized to facilitate review for accuracy and adequacy. Note these analyses do not include items such as periodic tests, hot work permits, fire impairments, etc.

The fire protection design basis document described in Section 2.7.1.2 of NFPA 805 and necessary supporting documentation described in Section 2.7.1.3 of NFPA 805 will be created as part of transition to 10 CFR 50.48(c) to ensure program implementation following receipt of the safety evaluation. See Attachment S for an Implementation Item. Appropriate cross references will be established to supporting documents as required by DAEC processes. Figure 4-8 depicts the planned post-transition documentation and relationships.

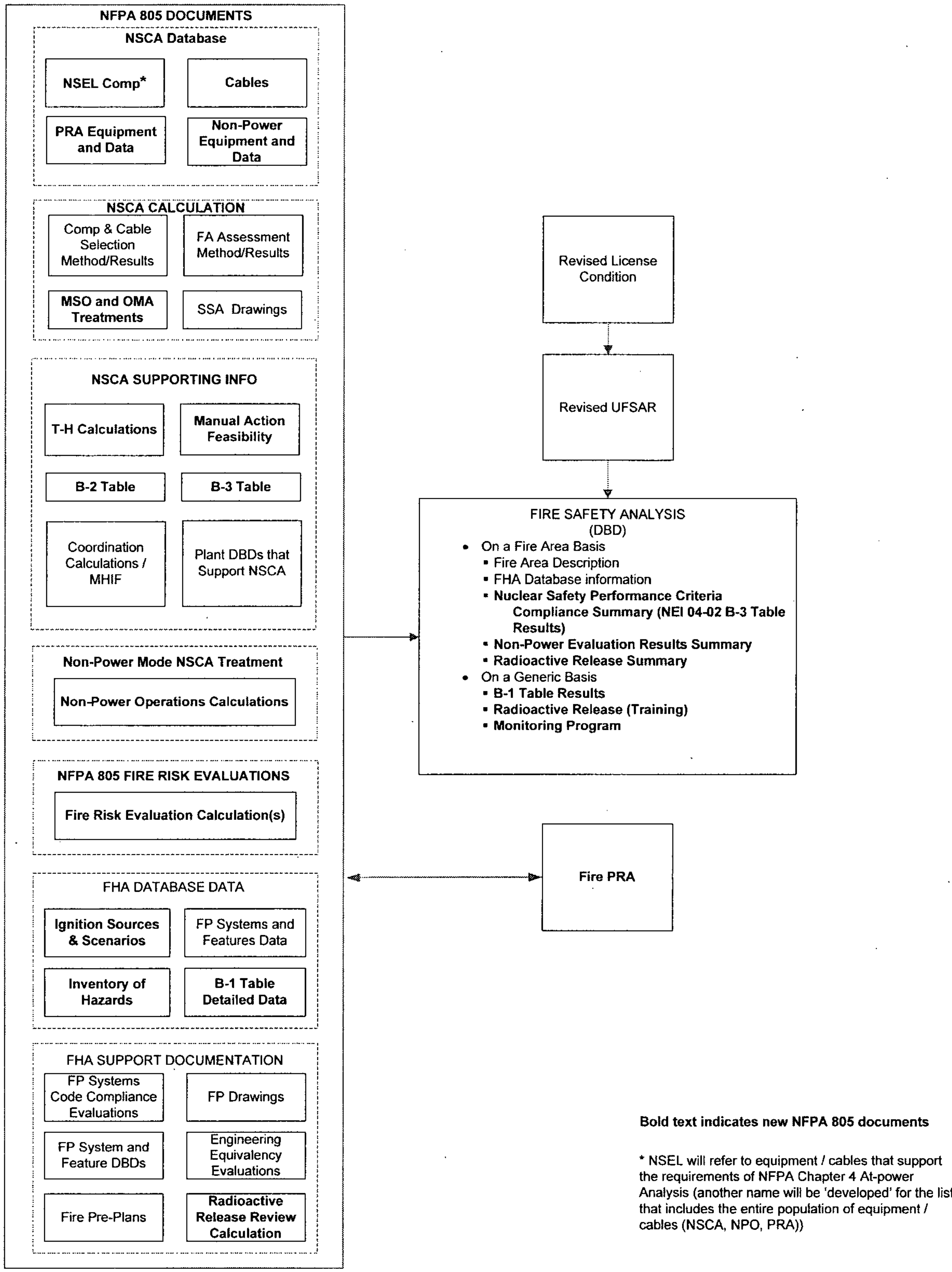

Figure 4-8 – NFPA 805 Planned Post-Transition Documents and Relationships

4.7.2 Compliance with Configuration Control Requirements in Section 2.7.2 and 2.2.9 of NFPA 805

Program documentation established, revised, or utilized in support of compliance with 10 CFR 50.48(c) is subject to DAEC configuration control processes that meet the requirements of Section 2.7.2 of NFPA 805. This includes the appropriate procedures and configuration control processes for ensuring that changes impacting the fire protection program are reviewed appropriately. The RI-PB post transition change process, to be developed during the transition implementation period, is based upon the requirements of NFPA 805, and industry guidance in NEI 04-02, and RG 1.205. See Attachment S for an Implementation Item. These requirements are summarized in Table 4-2.

Table 4-2 Change Evaluation Guidance Summary Table

Document	Section(s)	Topic
NFPA 805	2.2(h), 2.2.9, 2.4.4, A.2.2(h), A.2.4.4, D.5	Change Evaluation
NEI 04-02	5.3, Appendix B, Appendix I, Appendix J	Change Evaluation, Change Evaluation Forms (Appendix I)
RG 1.205	C.2.2.4, C.3.1, C.3.2, C.4.3	Risk Evaluation, Standard License Condition, Change Evaluation Process, Fire PRA

The post-transition Plant Change Evaluation Process consists of the following 4 steps and is depicted in Figure 4-9:

- Defining the Change
- Performing the Preliminary Risk Screening.
- Performing the Risk Evaluation
- Evaluating the Acceptance Criteria

Change Definition

The Change Evaluation process begins by defining the change or altered condition to be examined and the baseline configuration as defined by the Design Basis and Licensing Basis (NFPA 805 Licensing Basis post-transition).

- The baseline is defined as that plant condition or configuration that is consistent with the Design Basis and Licensing Basis (NFPA 805 Licensing Basis post-transition).
- The changed or altered condition or configuration that is not consistent with the Licensing Basis is defined as the proposed alternative.

Preliminary Risk Review

Once the definition of the change is established, a screening is then performed to identify and resolve minor changes to the fire protection program. This screening is consistent with fire protection regulatory review processes in place at nuclear plants under traditional licensing bases. This screening process is modeled after the NEI 02-

03 process. This process will address most administrative changes (e.g., changes to the combustible control program, organizational changes, etc.).

The characteristics of an acceptable screening process that meets the 'assessment of the acceptability of risk' requirement of Section 2.4.4 of NFPA 805 are:

- The quality of the screen is sufficient to ensure that potentially greater than minimal risk increases receive detailed risk assessments appropriate to the level of risk.
- The screening process must be documented and be available for inspection by the NRC.
- The screening process does not pose undue evaluation or maintenance burden.

If any of the above is not met, proceed to the Risk Evaluation step.

Risk Evaluation

The screening is followed by engineering evaluations that may include fire modeling and risk assessment techniques. The results of these evaluations are then compared to the acceptance criteria. Changes that satisfy the acceptance criteria of NFPA 805 Section 2.4.4 and the license condition can be implemented within the framework provided by NFPA 805. Changes that do not satisfy the acceptance criteria cannot be implemented within this framework. The acceptance criteria require that the resultant change in CDF and LERF be consistent with the license condition. The acceptance criteria also include consideration of defense-in-depth and safety margin, which would typically be qualitative in nature.

The risk evaluation involves the application of fire modeling analyses and risk assessment techniques to obtain a measure of the changes in risk associated with the proposed change. In certain circumstances, an initial evaluation in the development of the risk assessment could be a simplified analysis using bounding assumptions provided the use of such assumptions does not unnecessarily challenge the acceptance criteria discussed below.

Acceptability Determination

The Change Evaluations are assessed for acceptability using the delta CDF (change in core damage frequency) and delta LERF (change in large early release frequency) criteria from the license condition. The proposed changes are also assessed to ensure they are consistent with the defense-in-depth philosophy and that sufficient safety margins were maintained.

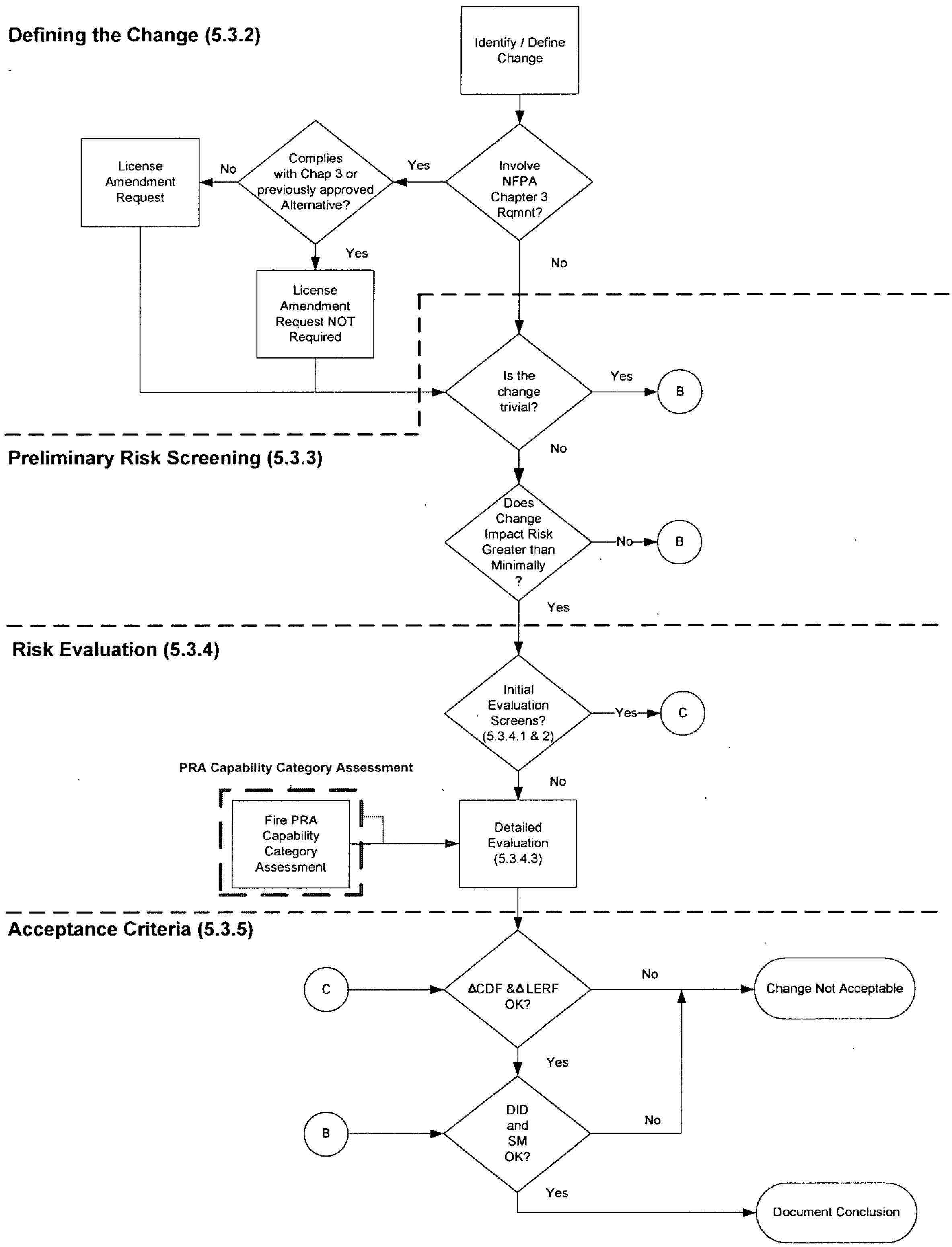

Figure 4-9 Plant Change Evaluation [NEI 04-02 Figure 5-1]
Note: references in Figure refer to NEI 04-02 Sections

The DAEC fire protection program configuration is defined by the program documentation. To the greatest extent possible, the existing configuration control processes for modifications, calculations and analyses, and fire protection program reviews will be utilized to maintain configuration control of the fire protection program documents. The configuration control procedures which govern the various DAEC documents and databases that currently exist will be revised to reflect the new NFPA 805 licensing bases requirements.

Several NFPA 805 document types such as: NSCA Supporting Information, Non-Power Mode NSCA Treatment, etc., generally require new control procedures and processes to be developed since they are new documents and databases created as a result of the transition to NFPA 805. The new procedures will be modeled after the existing processes for similar types of documents and databases. System level design basis documents will be revised to reflect the NFPA 805 role that the system components now play.

The process for capturing the impact of proposed changes to the plant on the fire protection program will continue to be a multiple step review. The first step of the review is an initial screening for process users to determine if there is a potential to impact the Fire Protection program as defined under NFPA 805 through a series of screening questions/checklists contained in one or more procedures depending upon the configuration control process being used. Reviews that identify potential Fire Protection program impacts will be sent to qualified individuals (Fire Protection, Safe Shutdown/NSCA, Fire PRA) to ascertain the program impacts, if any. If Fire Protection program impacts are determined to exist as a result of the proposed change, the issue would be resolved by one of the following:

- Deterministic Approach: Comply with NFPA 805 Chapter 3 and 4.2.3 requirements.
- Performance-Based Approach: Utilize the NFPA 805 change process developed in accordance with NEI 04-02, RG 1.205, and the DAEC NFPA 805 fire protection license condition to assess the acceptability of the proposed change. This process would be used to determine if the proposed change could be implemented 'as-is' or whether prior NRC approval of the proposed change is required.

This process follows the requirements in NFPA 805 and the guidance outlined in RG 1.174 which requires the use of qualified individuals, procedures that require calculations be subject to independent review and verification, record retention, peer review, and a corrective action program that ensures appropriate actions are taken when errors are discovered.

4.7.3 Compliance with Quality Requirements in Section 2.7.3 of NFPA 805

Fire Protection Program Quality

NextEra Energy Duane Arnold, LLC will maintain the existing Fire Protection Quality Assurance program. No changes to the current program are necessary.

During the transition to 10 CFR 50.48(c), NextEra Energy Duane Arnold, LLC performed work in accordance with the quality requirements of Section 2.7.3 of NFPA 805.

Fire PRA Quality

Configuration control of the Fire PRA model will be maintained by integrating the Fire PRA model into the existing processes used to ensure configuration control of the internal events PRA model. This process conforms with Section 1-5 of the ASME Standard for PRA Quality and ensures that NextEra Energy Duane Arnold, LLC maintains an as-built, as-operated PRA model of the plant. The process has been peer reviewed. Quality assurance of the Fire PRA is assured via the same processes applied to the internal events model.

Specific Requirements of NFPA 805 Section 2.7.3

NFPA 805 Section 2.7.3.1 – Review

Analyses, calculations, and evaluations performed in support of compliance with 10 CFR 50.48(c) were performed in accordance with DAEC procedures that require independent review.

NFPA 805 Section 2.7.3.2 – Verification and Validation

Calculational models and numerical methods used in support of compliance with 10 CFR 50.48(c) were verified and validated as required by Section 2.7.3.2 of NFPA 805.

NFPA 805 Section 2.7.3.3 – Limitations of Use

Engineering methods and numerical models used in support of compliance with 10 CFR 50.48(c) were applied appropriately as required by Section 2.7.3.3 of NFPA 805.

NFPA 805 Section 2.7.3.4 – Qualification of Users

Cognizant personnel who use and apply engineering analysis and numerical methods in support of compliance with 10 CFR 50.48(c) are competent and experienced as required by Section 2.7.3.4 of NFPA 805.

During the transition to 10 CFR 50.48(c), work was performed in accordance with the quality requirements of Section 2.7.3 of NFPA 805. Personnel who used and applied engineering analysis and numerical methods (e.g. fire modeling) in support of compliance with 10 CFR 50.48(c) are competent and experienced as required by NFPA 805 Section 2.7.3.4.

Post-transition, for personnel performing fire modeling or Fire PRA development and evaluation, NextEra Energy Duane Arnold, LLC will develop and maintain qualification requirements for individuals assigned various tasks. Position Specific Guides will be developed to identify and document required training and mentoring to ensure individuals are appropriately qualified per the requirements of NFPA 805 Section 2.7.3.4 to perform assigned work. See Attachment S for an Implementation Item.

NFPA 805 Section 2.7.3.5 – Uncertainty Analysis

Uncertainty analyses were performed as required by 2.7.3.5 of NFPA 805 and the results were considered in the context of the application. This is of particular interest in fire modeling and Fire PRA development. Note: 10 CFR 50.48(c)(2)(iv) states that

NFPA 805 Section 2.7.3.5 is not required for the deterministic approach because conservatism is included in the deterministic criteria.

4.8 Summary of Results

4.8.1 Results of the Fire Area Review

A summary of the NFPA 805 compliance basis and the required fire protection systems and features is provided in Table 4-3. The table provides the following information from the NEI 04-02 Table B-3:

- Fire Area / Fire Zone: Fire Area/Zone Identifier
- Description: Fire Area/Zone Description
- NFPA 805 Compliance Basis: Post-transition NFPA 805 Chapter 4 compliance basis (Note: Compliance is determined on a Fire Area basis therefore a compliance basis is not provided for individual fire zones.)
- Required Fire Protection Systems and Features: Fire protection systems and features required in the Fire Area based on NFPA 805 Chapter 4 compliance. Other required features may include Electrical Raceway Fire Barrier Systems, fire barriers, combustible control procedures, spatial separation, etc. The documentation of required fire protection systems and features does not include the documentation of the fire area boundaries. Fire area boundaries are required and documentation of the fire area boundaries has been performed as part of reviews of engineering evaluations, licensing actions, or as part of the reviews of the NEI 04-02 Table B-1 process. The information is provided on a fire zone basis. The basis for the requirement of the fire protection system / feature is designated as follows:
  - S – Separation Criteria: Fire protection systems and features required for Chapter 4 Separation Criteria in Section 4.2.3
  - E – EEEE/LA Criteria: Fire protection systems and features required for acceptability of Existing Engineering Equivalency Evaluations / NRC approved Licensing Action (i.e., Exemptions/Safety Evaluation Reports) (Section 2.2.7)
  - R – Risk Criteria: Fire protection systems and features required to meet the Risk Criteria for the Performance-Based Approach (Section 4.2.4)
  - D – Defense-in-Depth Criteria: Fire protection systems and features required to maintain adequate balance of defense-in-depth for a performance-based approach (Section 4.2.4)

During the implementation phase, the DAEC procedures and processes will be updated to reflect the NFPA 805 required fire protection systems and features. See Attachment S for an Implementation Item.

Attachment W contains the results of the Fire Risk Evaluations, additional risk of recovery actions, and the change in risk on a fire area basis.

4.8.2 Plant Modifications and Items to be Completed During the Implementation Phase

Planned modifications, studies, and evaluations to comply with NFPA 805 are described in Attachment S.

The Fire PRA model represents the as-built, as-operated and maintained plant as it will be configured at the completion of the transition to NFPA 805. The Fire PRA model includes credit for the planned implementation of the modifications identified in Attachment S. Following installation of modifications and the attendant installation details, additional refinements surrounding the modification may need to be incorporated into the Fire PRA model. However, these changes are not expected to be significant. No other significant plant changes are outstanding with respect to their inclusion in the Fire PRA model.

4.8.3 Supplemental Information –Other Licensee Specific Issues

There are no DAEC specific issues that warrant additional treatment in this section.

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: BA - Buffer Areas
Compliance Basis: NFPA 805 Section 4.2.3.2 Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E	Procedures/Guidance: -- EEEE/LA: Combustible material controls are required to support multiple fire area boundary evaluations
02E	Reactor Building - Offgas Recombiner Room	None	None	None	None
02F	Reactor Building - Railroad Airlock	None	None	None	None
02M	Reactor Building - Exhaust Fan Room Chase	None	None	None	None
03F	Reactor Building - Cleanup Phase Separator Room	None	None	None	None
04C	Reactor Building - Exhaust Fan Room	None	None	None	None
13A	Radwaste Building - Radwaste Drumming and Shipping Area	None	None	None	None
13B	Radwaste Building - Radwaste Treatment and Access Area	None	None	None	None
13C	Radwaste Building - Radwaste Precoat and Access Area	None	None	None	None
13D	Radwaste Building - Radwaste Control Room	None	None	None	None
13E	Radwaste Building - Stair 18	None	None	None	None
14A	Machine Shop Building - Machine Shop	None	None	None	None
15A	Offgas Retention Building - Offgas Charcoal Adsorber Vault	None	None	None	None
15B	Offgas Retention Building - Offgas Control and Glycol Area	None	None	None	None
15C	Offgas Retention Building - Offgas Prefilter and Condenser Area	None	None	None	None
16C	Pumphouse - Main Circ Pump Room and Circ Pit	None	None	None	None
16D	Pumphouse - Diesel Fire Pump Room	None	None	None	None
16E	Pumphouse - Fire Pump Day Tank Room	None	None	None	None
16G	Pumphouse - Stilling Basin and Wet Pits	None	None	None	None
18A	Security Center - Security Control Point (SCP)	None	None	None	None

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: BA - Buffer Areas
Compliance Basis: NFPA 805 Section 4.2.3.2 Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
18B	Security Center - Lobby	None	None	None	None
18C	Security Center - Second Floor Except CAS	None	None	None	None
18D	Security Center - Central Alarm Station (CAS)	None	None	None	None
19A	Data Acquisition Center - Tech Support and Office Area	None	None	None	None
19B	Data Acquisition Center - Mechanical Room	None	None	None	None
19C	Data Acquisition Center - Computer Room	None	None	None	None
19D	Data Acquisition Center - First Floor Except 19A	None	None	None	None
19E	Data Acquisition Center - Second Floor Except 19C	None	None	None	None
19F	Data Acquisition Center - West Stair 1	None	None	None	None
19G	Data Acquisition Center - North Stair 2	None	None	None	None
20A	Administration Building - First Floor	None	None	None	None
20B	Administration Building - Second Floor	None	None	None	None
20C	Administration Building - Third Floor	None	None	None	None
20D	Administration Building - Stair 2	None	None	None	None
20E	Administration Building - Stair 3	None	None	None	None
20F	Administration Building - Stair 4	None	None	None	None
20G	Administration Building - Elevator	None	None	None	None
21A	LLRPSF - Surge Tank Room (Room 802)	None	None	None	None
21B	LLRPSF - Drum Storage (Room 801)	None	None	None	None
21C	LLRPSF - DAW Storage Area (Room 804)	None	None	None	None
21D	LLRPSF - Spent Resin Storage Vault (Room 803)	None	None	None	None
21E	LLRPSF - Truck Bay, Access and Mezzanine (Rooms 800, 805, 806, & 842)	None	None	None	None

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: BA - Buffer Areas
Compliance Basis: NFPA 805 Section 4.2.3.2 Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
21F	LLRPSF - Radiation Protection Storage (Room 808)	None	None	None	None
21G	LLRPSF - Gymnasium and Corridors (Rooms 807, 810, 826, 834 thru 837, 839 thru 841)	None	None	None	None
21H	LLRPSF - Container Storage Room (Room 838)	None	None	None	None
21I	LLRPSF - Sump Room (Room 809)	None	None	None	None
21J	LLRPSF - Helper Foreman's Office & Count Room (Rooms 832, 833)	None	None	None	None
21K	LLRPSF - Laundry Area (Rooms 811 thru 825)	None	None	None	None
21L	LLRPSF - Storage Area (Room 831)	None	None	None	None
21M	LLRPSF - Railroad Bay Extension (Room 827)	None	None	None	None
21N	LLRPSF - HVAC/ Electrical Equipment Room (Room 862)	None	None	None	None
21O	LLRPSF - Hydrolazing Decontamination Area (Room 829)	None	None	None	None
21P	LLRPSF - East Corridor & Storage Rooms (Rooms 859, 861, 863)	None	None	None	None
21Q	LLRPSF - Mezzanine Storage & Snubber Repair (Room 860)	None	None	None	None
21R	LLRPSF - Metrology Lab Area (Rooms 844 thru 858)	None	None	None	None
21S	LLRPSF - Hot Tool Crib (Room 828)	None	None	None	None
21T	LLRPSF - Equipment Room (Room 843)	None	None	None	None
21U	LLRPSF - Storage & Future Expansion, Upper Level (Room 864)	None	None	None	None
21W	LLRPSF - Stair 1 and Exit Corridor	None	None	None	None
21X	LLRPSF - Stair 2	None	None	None	None
21Y	LLRPSF - Stair 3	None	None	None	None

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: BA - Buffer Areas
Compliance Basis: NFPA 805 Section 4.2.3.2 Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
21Z	LLRPSF - Stair 4	None	None	None	None
22A	Service Air Compressor Building	None	None	None	None

Fire Area ID: CB1 - Cable Spread Room, Control Room and HVAC Area
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E	Procedures/Guidance: -- EEEE/LA: Combustible material controls are required to support multiple fire area boundary evaluations
11A	Control Building - Cable Spreading Room	E, R, D	E, R, D	None	Detection System, Fire Zone 11A-1: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support fire area boundary evaluation -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 11A-2: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support fire area boundary evaluation -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 11A-3: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support fire area boundary evaluation -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 11A-4: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support fire area boundary evaluation -- Risk: Detection is specifically modeled in the fire PRA Extinguisher, 11A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Gaseous Suppression, Cardox System 1: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support fire area boundary evaluation Hose, Hose Station 35: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Hose, Hose Station 36: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: CB1 - Cable Spread Room, Control Room and HVAC Area
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
12A	Control Building - Control Room Complex	E, R, D	R, D	R	Detection System, Fire Zone 12A-1: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 12A-2: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 12A-3: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 12A-4: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 12A-5: -- DID: Fire Brigade response could be challenging -- Risk: Incipient detection is specifically modeled in the fire PRA Detection System, Fire Zone 12A-6: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 12A-7: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Extinguisher, 12A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Extinguisher, 12A-02: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Extinguisher, 12A-03: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Extinguisher, 12A-04: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Extinguisher, 12A-05: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Extinguisher, 12A-06: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Extinguisher, 12A-07:

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: CB1 - Cable Spread Room, Control Room and HVAC Area
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
					-- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Extinguisher, 12A-09: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Hose, Hose Station 37: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Hose, Hose Station 38: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Internal Panel Barrier: -- Risk: Internal fire barriers in Control Room panels 1C06, 1C08, and 1C31 are specifically modeled in the fire PRA
12B	Control Building - Control Building HVAC Room & HVAC Chase	D	R, D	None	Detection System, Fire Zone 12B-1: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 12B-2: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 12B-3: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 12B-4: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 12B-5: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 12B-6: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Extinguisher, 12B-01: -- DID: Requried to maintain Echelon 2 of defense-in-depth Water Suppression, Deluge System 21: -- DID: Fire Brigade response could be challenging Water Suppression, Deluge System 22: -- DID: Fire Brigade response could be challenging Water Suppression, Sprinkler System 12: -- DID: Fire Brigade response could be challenging

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: CB2 - West Essential Switchgear Room and 125VDC Battery
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E	Procedures/Guidance: -- EEEE/LA: Combustible material controls are required to support multiple fire area boundary evaluations
10B	Control Building - 1D2, West Battery Room	R, D	R, D	None	Detection System, Fire Zone 10B: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Hose, Hose Station 24: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression
10E	Control Building - 1A4, West Essential Switchgear Room (Div. II)	R, D	R, D	None	Detection System, Fire Zone 10E: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Extinguisher, 10E-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 24: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression

Fire Area ID: CB3 - East Essential Switchgear Room and 125VDC Battery
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
10D	Control Building - 1D1, East Battery Room	R, D	D	None	Detection System, Fire Zone 10D: -- DID: Fire Brigade response could be challenging Hose, Hose Station 24: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression
10F	Control Building - 1A3, East Essential Switchgear Room (Div. I)	R, D	R, D	None	Detection System, Fire Zone 10F: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Extinguisher, 10F-01: -- DID: Requried to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 24: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 39: -- DID: Requried to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression
10G	Control Building - Electrical Chase	None	None	None	None

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: CB4 - Battery Corridor and 250VDC Battery Room
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E	Procedures/Guidance: -- EEEE/LA: Combustible material controls are required to support multiple fire boundary evaluations.
10A	Control Building - Battery Room Corridor	R, D	R, D	None	Detection System, Fire Zone 10A: -- DID: Fire Brigade response could be challenging -- Risk: Detection is specifically modeled in the fire PRA Extinguisher, 10A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 24: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression
10C	Control Building - 1D4, Middle Battery Room	R, D	D	None	Detection System, Fire Zone 10C: -- DID: Fire Brigade response could be challenging Extinguisher, 10A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 24: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression

Fire Area ID: DRY - Drywell
Compliance Basis: NFPA 805 Figure 4.2.2 and Section 4.2.3.4 Deterministic Approach for Containment

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
DRY	Reactor Building - Drywell and Expansion Gap	None	None	None	None

Fire Area ID: EX1 - Exterior Areas
Compliance Basis: NFPA 805 Section 4.2.3.2 Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
CT1	"A" Cooling Tower (West)	None	None	None	None
CT2	"B" Cooling Tower (East)	None	None	None	None
OAG	Outside Above Ground	None	None	None	None
OGS	Offgas Stack	None	None	None	None

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: EX1 - Exterior Areas
Compliance Basis: NFPA 805 Section 4.2.3.2 Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
OUG	Outside Under Ground	None	None	S	Division 1 Underground Duct Bank: -- Separation: Protects Division 1 'A' River Water cables. Division 2 Underground Duct Bank: -- Separation: Protects Division 2 RHR Service Water cables

Fire Area ID: IS1 - Intake Structure Division I Pump Room
Compliance Basis: NFPA 805 Section 4.2.3.2 Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E	Procedures/Guidance: -- EEEE/LA: Combustible material controls are required to support multiple fire area boundary evaluations.
17A	Intake Structure - Division I Pump Room (North)	None	None	None	None
17C	Intake Structure - Division I Screen Area (North)	None	None	None	None

Fire Area ID: IS2 - Intake Structure Division II Pump Room
Compliance Basis: NFPA 805 Section 4.2.3.2 Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E	Procedures/Guidance: -- EEEE/LA: Combustible material controls are required to support multiple fire area boundary evaluations.
17B	Intake Structure - Division II Pump Room (South)	None	None	None	None
17D	Intake Structure - Division II Screen Area (South)	None	None	None	None

Fire Area ID: PH1 - Division II RHRSW/ESW Pump Room and Piping Area
Compliance Basis: NFPA 805 Section 4.2.3.3 (b) Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: PH1 - Division II RHRSW/ESW Pump Room and Piping Area
Compliance Basis: NFPA 805 Section 4.2.3.3 (b) Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E, S	Procedures/Guidance: -- EEEE/LA: Combustible material controls are required to support multiple fire boundary evaluations. -- Separation: Combustible controls necessary to maintain 20 foot separation with no intervening combustibles or fire hazards
16A	Pumphouse - "B" RHRSW and ESW Pump Room	None	S	S	20 Feet of Separation in Fire Zone 16A: -- Separation: Separation of success paths associated with RHR Service Water, River Water, ESW, AC Power, and ESW/RHRSW Pump Room HVAC. Detection System, Fire Zone 16A: -- Separation: Deterministic Compliance
16F	Pumphouse - Basement	S	S	S	20 Feet of Separation in Fire Zone 16F: -- Separation: Separation of success paths associated with RHR Service Water, River Water, ESW, AC Power, and ESW/RHRSW Pump Room HVAC. Dedicated Conduit: -- Separation: Conduit 2T247 must be maintained as a dedicated conduit to support the River Water separation compliance strategy. Detection System, Fire Zone 16F: -- Separation: Deterministic Compliance Water Suppression, Sprinkler System 21: -- Separation: Deterministic Compliance

Fire Area ID: PH2 - Division I RHRSW/ESW Pump Room
Compliance Basis: NFPA 805 Section 4.2.3.2 Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E	Procedures/Guidance: -- EEEE/LA: Combustible material controls are required to support multiple fire area boundary evaluations
16B	Pumphouse - "A" RHRSW and ESW Pump Room	None	None	None	None

Fire Area ID: RB1 - 757 Elevation Reactor Building and Torus Area, RCIC Room, HPCI Room, and Southeast Corner Room
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E, D	Procedures/Guidance: -- DID: Enhanced combustible controls in Fire Zone 02G -- EEEE/LA: Combustible material controls are required to support multiple fire area boundary evaluations

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: RB1 - 757 Elevation Reactor Building and Torus Area, RCIC Room, HPCI Room, and Southeast Corner Room
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
01AN	Reactor Building - Torus North (Bays 1 -5 and 11 -16)	D	None	S	ERFBS, RB1 RHR SDC cable protection: -- Separation: Required to protect cables for SDC suction line isolation. Extinguisher, 01AN-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 01AN-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 01AN-03: -- DID: Required to maintain Echelon 2 of defense-in-depth
01AS	Reactor Building - Torus South (Bays 5 - 11)	D	None	None	Extinguisher, 01AS-01: -- DID: Required to maintain Echelon 2 of defense-in-depth
01B	Reactor Building - Northwest Corner Room	D	D	None	Detection System, Fire Zone 01B: -- DID: Fire Brigade response could be challenging Extinguisher, 01B-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 22: -- DID: Required to maintain Echelon 2 of defense-in-depth
01D	Reactor Building - Southeast Corner Room	D	D	None	Detection System, Fire Zone 01D: -- DID: Fire Brigade response could be challenging Extinguisher, 01D-01: -- DID: Required to maintain Echelon 2 of defense-in-depth
01E	Reactor Building - HPCI Room	E, D	None	None	Extinguisher, 01E-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 40: -- DID: Required to maintain Echelon 2 of defense-in-depth Water Suppression, Deluge System 2: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support structural steel evaluation
01F	Reactor Building - RCIC Room	D	None	None	Extinguisher, 01F-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 01F-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 40: -- DID: Required to maintain Echelon 2 of defense-in-depth
01G	Reactor Building - Southwest Corner Room	D	D	None	Detection System, Fire Zone 01G: -- DID: Fire Brigade response could be challenging Extinguisher, 01G-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 01G-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 01G-03: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 21: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 48:

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: RB1 - 757 Elevation Reactor Building and Torus Area, RCIC Room, HPCI Room, and Southeast Corner Room
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
					-- DID: Required to maintain Echelon 2 of defense-in-depth
01H	Reactor Building - Radwaste 1T-70 Tank Room	None	None	None	None
02A	Reactor Building - North CRD Module Area	D	E, D	S	Detection System, Fire Zone 02A-1: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support structural steel evaluation Detection System, Fire Zone 02A-2: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support structural steel evaluation ERFBS, RB1 SRV cable protection: -- Separation: Required to protect cables for the ability to open three SRV's. Extinguisher, 02A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 02A-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 02A-03: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 02A-04: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 02A-05: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 22: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 23: -- DID: Required to maintain Echelon 2 of defense-in-depth
02B	Reactor Building - South CRD Module Area	E, D	E, D	None	Detection System, Fire Zone 02B-1: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support structural steel evaluation Detection System, Fire Zone 02B-2: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support structural steel evaluation Extinguisher, 02B-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 02B-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 02B-03: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 02B-04: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 02B-05: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 02B-06: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 02B-07: -- DID: Required to maintain Echelon 2 of defense-in-depth

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: RB1 - 757 Elevation Reactor Building and Torus Area, RCIC Room, HPCI Room, and Southeast Corner Room
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
					Hose, Hose Station 21: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 40: -- DID: Required to maintain Echelon 2 of defense-in-depth Water Suppression, Deluge System 18: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support fire area boundary evaluation and licensing action
02C	Reactor Building - CRD Repair Room	D	None	None	Hose, Hose Station 23: -- DID: Required to maintain Echelon 2 of defense-in-depth
02D	Reactor Building - RHR Valve Room	D	D	None	Detection System, Fire Zone 02D: -- DID: Fire Brigade response could be challenging Hose, Hose Station 22: -- DID: Required to maintain Echelon 2 of defense-in-depth
02G	Reactor Building - Steam Tunnel	None	None	None	None
02L	Reactor Building - RHR Valve Room Pipe Chase	None	None	None	None

Fire Area ID: RB3 - 786 Elevation Reactor Building and Above
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E	Procedures/Guidance: -- EEEE/LA: Combustible material controls are required to support multiple fire area boundary evaluations
02H	Reactor Building - North Chase	None	None	None	None
02J	Reactor Building - North Stair 8	None	None	None	None
02K	Reactor Building - South Stair 6 and Elevator	None	None	None	None
03A	Reactor Building - North Laydown Area 786'	E, R, D	E, R, D	None	Detection System, Fire Zone 03A: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support structural steel evaluation -- Risk: Detection is specifically modeled in the fire PRA Extinguisher, 03A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 03A-02: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 03A-03: -- DID: Required to maintain Echelon 2 of defense-in-depth

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: RB3 - 786 Elevation Reactor Building and Above
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
					-- Risk: Required for manual suppression Extinguisher, 03A-04: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 26: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 27: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression
03B	Reactor Building - South Hatch Area 786'	E, R, D	E, D	None	Detection System, Fire Zone 03B-1: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support structural steel evaluation Extinguisher, 03B-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 03B-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 25: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Hose, Hose Station 26: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 27: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Water Suppression, Deluge System 18: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support fire area boundary evaluation and licensing action
03C	Reactor Building - Standby Gas Treatment System Room	E, R, D	E, R	None	Detection System, Fire Zone 03C-1: -- EEEE/LA: Detection required to support fire area boundary evaluation -- Risk: Detection is specifically modeled in the fire PRA Detection System, Fire Zone 03C-2: -- EEEE/LA: Detection required to support fire area boundary evaluation -- Risk: Detection is specifically modeled in the fire PRA Hose, Hose Station 27: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Water Suppression, Deluge System 19: -- EEEE/LA: Suppression required to support fire area boundary evaluation Water Suppression, Deluge System 20:

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: RB3 - 786 Elevation Reactor Building and Above
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
					-- EEEE/LA: Suppression required to support fire area boundary evaluation
03D	Reactor Building - MG Sets Room	E, R, D	E, R, D	None	Detection System, Fire Zone 03D-1: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support penetration seal evaluation Detection System, Fire Zone 03D-2: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support penetration seal evaluation -- Risk: Detection is specifically modeled in the fire PRA Extinguisher, 03D-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 25: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Hose, Hose Station 27: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Water Suppression, Deluge System 8: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to penetration seal evaluation Water Suppression, Deluge System 9: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support penetration seal evaluation
03E	Reactor Building - Spent Resin Tank Room	E, R, D	None	None	Hose, Hose Station 26: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 27: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression
04A	Reactor Building - RBCCW Heat Exchanger/Chillers	E, D	E, D	None	Detection System, Fire Zone 04A: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support structural steel evaluation Extinguisher, 04A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 04A-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 28: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 29: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation Water Suppression, Sprinkler System 11:

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: RB3 - 786 Elevation Reactor Building and Above
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
					-- DID: Fire Brigade response could be challenging
04B	Reactor Building - South Hatch Area 812'	E, D	E	None	Detection System, Fire Zone 04B: -- EEEE/LA: Detection required to support structural steel evaluation Extinguisher, 04B-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 04B-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 28: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 41: -- DID: Required to maintain Echelon 2 of defense-in-depth Water Suppression, Sprinkler System 10: -- EEEE/LA: Suppression required to support penetration seal evaluation
04D	Reactor Building - Heating Hot Water Pumps Room	D	D	None	Detection System, Fire Zone 04D: -- DID: Fire Brigade response could be challenging Hose, Hose Station 28: -- DID: Required to maintain Echelon 2 of defense-in-depth
04E	Reactor Building - Air Supply Fan Room	D	None	None	Hose, Hose Station 28: -- DID: Required to maintain Echelon 2 of defense-in-depth
04F	Reactor Building - Jungle Room	E, D	E	None	Detection System, Fire Zone 04F: -- EEEE/LA: Detection required to support fire area boundary evaluation Hose, Hose Station 29: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation
04G	Reactor Building - Fuel Pool Pump Area	D	None	None	Extinguisher, 04G-01: -- DID: Required to maintain Echelon 2 of defense-in-depth
05A	Reactor Building - Laydown and Hatch Area 833'	D	E	None	Detection System, Fire Zone 05A: -- EEEE/LA: Detection required to support structural steel evaluation Extinguisher, 05A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 05A-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 42: -- DID: Required to maintain Echelon 2 of defense-in-depth
05B	Reactor Building - Phase Separator/Skimmer Surge Tank Rooms	D	None	None	Extinguisher, 05B-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 05B-02: -- DID: Required to maintain Echelon 2 of defense-in-depth
05C	Reactor Building - Turbine Building Exhaust Fan Penthouse	D	None	None	Extinguisher, 05C-01: -- DID: Required to maintain Echelon 2 of defense-in-depth

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: RB3 - 786 Elevation Reactor Building and Above
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
06A	Reactor Building - Refuel Floor	D	None	None	Extinguisher, 06A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 06A-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 06A-03: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 06A-04: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 43: -- DID: Required to maintain Echelon 2 of defense-in-depth

Fire Area ID: RB4 - Northeast Corner Room
Compliance Basis: NFPA 805 Section 4.2.3.2 Deterministic Approach

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E	Procedures/Guidance: -- EEEE/LA: Combustible material controls are required to support multiple structural steel evaluations
01C	Reactor Building - Northeast Corner Room	D	D	None	Detection System, Fire Zone 01C: -- DID: Fire Brigade response could be challenging Extinguisher, 01C-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 01C-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 23: -- DID: Required to maintain Echelon 2 of defense-in-depth

Fire Area ID: TB1 - Turbine Building
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
(All)	Area Wide	None	None	E, D	Procedures/Guidance: -- DID: Enhanced combustible controls in Fire Zone 02G -- EEEE/LA: Combustible material controls are required to support multiple fire area boundary evaluations
02G	Reactory Building - Steam Tunnel	E, R, D	None	None	Hose, Hose Station 10: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: TB1 - Turbine Building
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
07A	Turbine Building - Reactor Feed Pump Area	E, R, D	None	None	Extinguisher, 07A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 07A-02: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 07A-03: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 7: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Water Suppression, Deluge System 3: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support structural steel evaluation -- Risk: Suppression is specifically modeled in the fire PRA Water Suppression, Deluge System 4: -- EEEE/LA: Suppression required to support structural steel evaluation
07B	Turbine Building - 1A2, Lower Switchgear Room	R, D	E, R	None	Detection System, Fire Zone 07B: -- EEEE/LA: Detection required to support structural steel evaluation -- Risk: Detection is specifically modeled in the fire PRA Extinguisher, 07B-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 7: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression
07C	Turbine Building - Turbine Lube Oil Tank Area	E, R, D	None	S	Concrete Chase: -- Separation: Required to protect cables for RHR Service Water, River Water, ESW and Division 2 AC Power. Extinguisher, 07C-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 07C-02: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 5: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 7: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Water Suppression, Deluge System 7: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support structural steel evaluation -- Risk: Suppression is specifically modeled in the fire PRA Water Suppression, Sprinkler System 1:

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: TB1 - Turbine Building
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
					-- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support structural steel evaluation -- Risk: Suppression is specifically modeled in the fire PRA
07D	Turbine Building - Turbine Lube Oil Storage Tank Vault	E, R, D	None	None	Water Suppression, Sprinkler System 1: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support structural steel evaluation -- Risk: Suppression is specifically modeled in the fire PRA
07E	Turbine Building - Condensate Pump Area	E, D	E	None	Detection System, Fire Zone 07E: -- EEEE/LA: Detection required to support structural steel evaluation Extinguisher, 07E-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 07E-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 07E-03: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 1: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation Hose, Hose Station 2: -- DID: Required to maintain Echelon 2 of defense-in-depth
07F	Turbine Building - Condenser/Heater Bay	E, R, D	None	None	Extinguisher, 07F-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 07F-02: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 07F-03: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 07F-04: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 07F-05: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 07F-06: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 07F-07: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 10: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: TB1 - Turbine Building
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
					Hose, Hose Station 12: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Hose, Hose Station 3: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Hose, Hose Station 4: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Hose, Hose Station 6: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Water Suppression, Sprinkler System 16: -- Risk: Suppression is specifically modeled in the fire PRA Water Suppression, Sprinkler System 4: -- DID: Fire Brigade response could be challenging -- Risk: Suppression is specifically modeled in the fire PRA
07G	Turbine Building - Steam Jet Air Ejector Room	E, D	None	None	Hose, Hose Station 1: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation
07H	Turbine Building - North Stair 12	None	None	S	Concrete Chase: -- Separation: Required to protect cables for RHR Service Water, River Water, ESW and Division 2 AC Power.
07J	Turbine Building - South Stair 14	None	None	None	None
08A	Turbine Building - Ground Floor North	E, R, D	None	None	Hose, Hose Station 13: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Water Suppression, Deluge System 7: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support structural steel evaluation -- Risk: Suppression is specifically modeled in the fire PRA
08B	Turbine Building - 1A1, Upper Switchgear Room	R, D	E, R	None	Detection System, Fire Zone 08B: -- EEEE/LA: Detection required to support structural steel evaluation -- Risk: Detection is specifically modeled in the fire PRA Extinguisher, 08B-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 13: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: TB1 - Turbine Building
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
08C	Turbine Building - East Tube Pulling Area	D	None	None	Extinguisher, 08C-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 11: -- DID: Required to maintain Echelon 2 of defense-in-depth
08D	Turbine Building - Ground Floor South	E, R, D	None	None	Extinguisher, 08D-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Extinguisher, 08D-02: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 8: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression Hose, Hose Station 9: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Water Suppression, Deluge System 6: -- Risk: Suppression is specifically modeled in the fire PRA Water Suppression, Sprinkler System 9: -- Risk: Suppression is specifically modeled in the fire PRA
08E	Turbine Building - Aux Boiler Room	R, D	None	None	Extinguisher, 08E-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 8: -- DID: Required to maintain Echelon 2 of defense-in-depth -- Risk: Required for manual suppression
08F	Turbine Building - 1G-21, "B" EDG Room (West)	E, R, D	E, D	None	Detection System, Fire Zone 08F: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support code compliance engineering evaluation Extinguisher, 08F-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation Extinguisher, 08F-02: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation Hose, Hose Station 9: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Water Suppression, Preaction System 3: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support code compliance engineering evaluation -- Risk: Suppression is specifically modeled in the fire PRA for Fire Zone

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: TB1 - Turbine Building
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
					08F only
08G	Turbine Building - "B" EDG Day Tank Room	E, R, D	E, D	None	Detection System, Fire Zone 08G: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support code compliance engineering evaluation Hose, Hose Station 9: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Water Suppression, Preaction System 3: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support code compliance engineering evaluation -- Risk: Suppression is specifically modeled in the fire PRA for Fire Zone 08F only
08H	Turbine Building - 1G-31, "A" EDG Room (East)	E, R, D	E, D	None	Detection System, Fire Zone 08H: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support code compliance engineering evaluation Extinguisher, 08H-01: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation Extinguisher, 08H-02: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation Hose, Hose Station 9: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Water Suppression, Preaction System 2: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Suppression required to support code compliance engineering evaluation -- Risk: Suppression is specifically modeled in the fire PRA for Fire Zone 08H only
08J	Turbine Building - "A" EDG Day Tank Room	E, R, D	E, D	None	Detection System, Fire Zone 08J: -- DID: Fire Brigade response could be challenging -- EEEE/LA: Detection required to support code compliance engineering evaluation Hose, Hose Station 9: -- DID: Required to maintain Echelon 2 of defense-in-depth -- EEEE/LA: Suppression required to support fire area boundary evaluation -- Risk: Required for manual suppression Water Suppression, Preaction System 2: -- DID: Fire Brigade response could be challenging

Table 4-3
NFPA 805 Ch 4 Required FP Systems/Features

Fire Area ID: TB1 - Turbine Building
Compliance Basis: NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

Fire Zone ID	Description	Required Suppression System	Required Detection System	Required Fire Protection Feature	Required Fire Protection Feature and System Details
					-- EEEE/LA: Suppression required to support code compliance engineering evaluation -- Risk: Suppression is specifically modeled in the fire PRA for Fire Zone 08H only
08K	Turbine Building - Demineralizer Pump and Tank Cells	None	None	None	None
09A	Turbine Building - Op Deck North	D	None	None	Extinguisher, 09A-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 09A-03: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 09A-04: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 19: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 20: -- DID: Required to maintain Echelon 2 of defense-in-depth
09B	Turbine Building - Op Deck Middle	D	None	None	Extinguisher, 09B-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 09B-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 09B-03: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 16: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 17: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 18: -- DID: Required to maintain Echelon 2 of defense-in-depth
09C	Turbine Building - Op Deck South	D	None	None	Extinguisher, 09C-01: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 09C-02: -- DID: Required to maintain Echelon 2 of defense-in-depth Extinguisher, 09C-03: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 14: -- DID: Required to maintain Echelon 2 of defense-in-depth Hose, Hose Station 15: -- DID: Required to maintain Echelon 2 of defense-in-depth

5.0 REGULATORY EVALUATION

5.1 Introduction – 10 CFR 50.48

On July 16, 2004 the NRC amended 10 CFR 50.48, Fire Protection, to add a new subsection, 10 CFR 50.48(c), which establishes alternative fire protection requirements. 10 CFR 50.48 endorses, with exceptions, NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants – 2001 Edition (NFPA 805), as a voluntary alternative for demonstrating compliance with 10 CFR 50.48 Section (b), Appendix R, and Section (f), Decommissioning.

The voluntary adoption of 10 CFR 50.48(c) by DAEC does not eliminate the need to comply with 10 CFR 50.48(a) and 10 CFR 50, Appendix A, GDC 3, Fire Protection. The NRC addressed the overall adequacy of the regulations during the promulgation of 10 CFR 50.48(c) (Reference FR Notice 69 FR 33536 dated June 16, 2004,).

> *"NFPA 805 does not supersede the requirements of GDC 3, 10 CFR 50.48(a), or 10 CFR 50.48(f). Those regulatory requirements continue to apply to licensees that adopt NFPA 805. However, under NFPA 805, the means by which GDC 3 or 10 CFR 50.48(a) requirements may be met is different than under 10 CFR 50.48(b). Specifically, whereas GDC 3 refers to SSCs important to safety, NFPA 805 identifies fire protection systems and features required to meet the Chapter 1 performance criteria through the methodology in Chapter 4 of NFPA 805. Also, under NFPA 805, the 10 CFR 50.48(a)(2)(iii) requirement to limit fire damage to SSCs important to safety so that the capability to safely shut down the plant is ensured is satisfied by meeting the performance criteria in Section 1.5.1 of NFPA 805. The Section 1.5.1 criteria include provisions for ensuring that reactivity control, inventory and pressure control, decay heat removal, vital auxiliaries, and process monitoring are achieved and maintained.*
>
> *This methodology specifies a process to identify the fire protection systems and features required to achieve the nuclear safety performance criteria in Section 1.5 of NFPA 805. Once a determination has been made that a fire protection system or feature is required to achieve the performance criteria of Section 1.5, its design must meet any applicable requirements of NFPA 805, Chapter 3. Having identified the required fire protection systems and features, the licensee selects either a deterministic or performance-based approach to demonstrate that the performance criteria are satisfied. This process satisfies the GDC 3 requirement to design and locate SSCs important to safety to minimize the probability and effects of fires and explosions."*

The new rule provides actions that may be taken to establish compliance with 10 CFR 50.48(a), which requires each operating nuclear power plant to have a fire protection program plan that satisfies GDC 3, as well as specific requirements in that section. The transition process described in 10 CFR 50.48(c)(3)(ii) provides, in pertinent parts, that a licensee intending to adopt the new rule must, among other things, "*modify the fire protection plan required by paragraph (a) of that section to reflect the licensee's decision to comply with NFPA 805*". Therefore, to the extent that the contents of the existing fire protection program plan required by 10 CFR 50.48(a) are inconsistent with NFPA 805, the fire protection program plan must be modified to

achieve compliance with the requirements in NFPA 805. All other requirements of 10 CFR 50.48 (a) and GDC 3 have corresponding requirements in NFPA 805.

A comparison of the current requirements in 10 CFR 50, Appendix R with the comparable requirements in Section 3 of NFPA 805 shows that the two sets of requirements are consistent in many respects. This was further clarified in FAQ 07-0032, 10 CFR 50.48(a) and GDC 3 clarification. The following tables provide a cross reference of fire protection regulations associated with the post-transition DAEC fire protection program and applicable industry and DAEC documents that address the topic.

10 CFR 50.48(a)

Table 5-1 10 CFR 50.48(a) – Applicability/Compliance Reference

	10 CFR 50.48(a) Section(s)	Applicability/Compliance Reference
(1)	Each holder of an operating license issued under this part or a combined license issued under part 52 of this chapter must have a fire protection plan that satisfies Criterion 3 of appendix A to this part. This fire protection plan must:	See below
	(i) Describe the overall fire protection program for the facility;	NFPA 805 Section 3.2 NEI 04-02 Table B-1
	(ii) Identify the various positions within the licensee's organization that are responsible for the program;	NFPA 805 Section 3.2.2 NEI 04-02 Table B-1
	(iii) State the authorities that are delegated to each of these positions to implement those responsibilities; and	NFPA 805 Section 3.2.2 NEI 04-02 Table B-1
	(iv) Outline the plans for fire protection, fire detection and suppression capability, and limitation of fire damage.	NFPA 805 Section 2.7 and Chapters 3 and 4 NEI 04-02 B-1 and B-3 Tables
(2)	The plan must also describe specific features necessary to implement the program described in paragraph (a)(1) of this section such as:	See below
	(i) Administrative controls and personnel requirements for fire prevention and manual fire suppression activities;	NFPA 805 Sections 3.3.1 and 3.4 NEI 04-02 Table B-1
	(ii) Automatic and manually operated fire detection and suppression systems; and	NFPA 805 Sections 3.5 through 3.10 and Chapter 4 NEI 04-02 B-1 and B-3 Tables
	(iii) The means to limit fire damage to structures, systems, or components important to safety so that the capability to shut down the plant safely is ensured.	NFPA 805 Section 3.3 and Chapter 4 NEI 04-02 B-3 Table
(3)	The licensee shall retain the fire protection plan and each change to the plan as a record until the Commission terminates the reactor license. The licensee shall retain each superseded revision of the procedures for 3 years from the date it was superseded.	NFPA 805 Section 2.7.1.1 requires that documentation (Analyses, as defined by NFPA 805 2.4, performed to demonstrate compliance with this standard) be maintained for the life of the plant. See Administrative Control Procedure (ACP) 115.1, Record Control.
(4)	Each applicant for a design approval, design certification, or manufacturing license under part 52 of this chapter must have a description and analysis of the fire protection design features for the standard plant necessary to demonstrate compliance with Criterion 3 of appendix A to this part.	Not applicable. DAEC is licensed under 10 CFR 50.

General Design Criterion 3

Table 5-2 GDC 3 – Applicability/Compliance Reference

GDC 3, Fire Protection, Statement	Applicability/Compliance Reference
Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions.	NFPA 805 Chapters 3 and 4 NEI 04-02 B-1 and B-3 Tables
Noncombustible and heat resistant materials shall be used wherever practical throughout the unit, particularly in locations such as the containment and control room.	NFPA 805 Sections 3.3.2, 3.3.3, 3.3.4, 3.11.4 NEI 04-02 B-1 Table
Fire detection and fighting systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems, and components important to safety.	NFPA 805 Chapters 3 and 4 NEI 04-02 B-1 and B-3 Tables
Firefighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components	NFPA 805 Sections 3.4 through 3.10 and 4.2.1 NEI 04-02 Table B-3

10 CFR 50.48(c)

Table 5-3 10 CFR 50.48(c) – Applicability/Compliance Reference

10 CFR 50.48(c) Section(s)	Applicability/Compliance Reference
(1) *Approval of incorporation by reference.* National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition" (NFPA 805), which is referenced in this section, was approved for incorporation by reference by the Director of the Federal Register pursuant to 5 U.S.C. 552(a) and 1 CFR part 51.	General Information. NFPA 805 (2001 edition) is the edition used.
(2) Exceptions, modifications, and supplementation of NFPA 805. As used in this section, references to NFPA 805 are to the 2001 Edition, with the following exceptions, modifications, and supplementation:	General Information. NFPA 805 (2001 edition) is the edition used.
(i) *Life Safety Goal, Objectives, and Criteria.* The Life Safety Goal, Objectives, and Criteria of Chapter 1 are not endorsed.	The Life Safety Goal, Objectives, and Criteria of Chapter 1 of NFPA 805 are not part of the LAR.
(ii) *Plant Damage/Business Interruption Goal, Objectives, and Criteria.* The Plant Damage/Business Interruption Goal, Objectives, and Criteria of Chapter 1 are not endorsed.	The Plant Damage/Business Interruption Goal, Objectives, and Criteria of Chapter 1 of NFPA 805 are not part of the LAR.
(iii) *Use of feed-and-bleed.* In demonstrating compliance with the performance criteria of Sections 1.5.1(b) and (c), a high-pressure charging/injection pump coupled with the pressurizer power-operated relief valves (PORVs) as the sole fire-protected safe shutdown path for maintaining reactor coolant inventory, pressure control, and decay heat removal capability (i.e., feed-and-bleed) for pressurized-water reactors (PWRs) is not permitted.	Not applicable to DAEC (BWR).
(iv) Uncertainty analysis. An uncertainty analysis performed in accordance with Section 2.7.3.5 is not required to support deterministic approach calculations.	Uncertainty analysis was not performed for deterministic methodology.
(v) Existing cables. In lieu of installing cables meeting flame propagation tests as required by Section 3.3.5.3, a flame-retardant coating may be applied to the electric cables, or an automatic fixed fire suppression system may be installed to provide an equivalent level of protection. In addition, the italicized exception to Section 3.3.5.3 is not endorsed.	Electrical cable construction complies with a flame propagation test that was found acceptable to the NRC as documented in Attachment A.
(vi) Water supply and distribution. The italicized exception to Section 3.6.4 is not endorsed. Licensees who wish to use the exception to Section 3.6.4 must submit a request for a license amendment in accordance with paragraph (c)(2)(vii) of this section.	DAEC 'complies via previous NRC approval' as documented in Attachment A.

Table 5-3 10 CFR 50.48(c) – Applicability/Compliance Reference

	10 CFR 50.48(c) Section(s)	Applicability/Compliance Reference
	(vii) Performance-based methods. Notwithstanding the prohibition in Section 3.1 against the use of performance-based methods, the fire protection program elements and minimum design requirements of Chapter 3 may be subject to the performance-based methods permitted elsewhere in the standard. Licensees who wish to use performance-based methods for these fire protection program elements and minimum design requirements shall submit a request in the form of an application for license amendment under § 50.90. The Director of the Office of Nuclear Reactor Regulation, or a designee of the Director, may approve the application if the Director or designee determines that the performance-based approach; (A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release; (B) Maintains safety margins; and (C) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).	The use of performance-based methods for NFPA 805 Chapter 3 is requested. See Attachment L.
(3)	*Compliance with NFPA 805.*	See below
	(i) A licensee may maintain a fire protection program that complies with NFPA 805 as an alternative to complying with paragraph (b) of this section for plants licensed to operate before January 1, 1979, or the fire protection license conditions for plants licensed to operate after January 1, 1979. The licensee shall submit a request to comply with NFPA 805 in the form of an application for license amendment under § 50.90. The application must identify any orders and license conditions that must be revised or superseded, and contain any necessary revisions to the plant's technical specifications and the bases thereof. The Director of the Office of Nuclear Reactor Regulation, or a designee of the Director, may approve the application if the Director or designee determines that the licensee has identified orders, license conditions, and the technical specifications that must be revised or superseded, and that any necessary revisions are adequate. Any approval by the Director or the designee must be in the form of a license amendment approving the use of NFPA 805 together with any necessary revisions to the technical specifications.	The LAR was submitted in accordance with 10 CFR 50.90. The LAR included applicable license conditions, orders, technical specifications/bases that needed to be revised and/or superseded.
	(ii) The licensee shall complete its implementation of the methodology in Chapter 2 of NFPA 805 (including all required evaluations and analyses) and, upon completion, modify the fire protection plan required by paragraph (a) of this section to reflect the licensee's decision to comply with NFPA 805, before changing its fire protection program or nuclear power plant as permitted by NFPA 805.	The LAR and transition report summarize the evaluations and analyses performed in accordance with Chapter 2 of NFPA 805.
(4)	Risk-informed or performance-based alternatives to compliance with NFPA 805. A licensee may submit a request to use risk-informed or performance-based alternatives to compliance with NFPA 805. The request must be in the form of an application for license amendment under § 50.90 of this chapter. The Director of the Office of Nuclear Reactor Regulation, or designee of the Director, may approve the application if the Director or designee determines that the proposed alternatives: (i) Satisfy the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release; (ii) Maintain safety margins; and (iii) Maintain fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).	No risk-informed or performance-based alternatives to compliance with NFPA 805 (per 10 CFR 50.48(c)(4)) were utilized.

5.2 Regulatory Topics

5.2.1 License Condition Changes

The current DAEC fire protection license condition 2.C(3) is being replaced with the Standard License Condition based upon Regulatory Position 3.1 of RG 1.205, as shown in Attachment M.

5.2.2 Technical Specifications

NextEra Energy Duane Arnold, LLC conducted a review of the Technical Specifications to determine which Technical Specifications are required to be revised, deleted, or superseded. NextEra Energy Duane Arnold, LLC determined that the changes to the Technical Specifications and applicable justification listed in Attachment N are adequate for the DAEC adoption of the new fire protection licensing basis.

5.2.3 Orders and Exemptions

A review was conducted of the DAEC docketed correspondence to determine if there were any orders or exemptions that needed to be superseded or revised. A review was also performed to ensure that compliance with the physical protection requirements, security orders, and adherence to those commitments applicable to the plant are maintained. A discussion of affected orders and exemptions is included in Attachment O.

5.3 Regulatory Evaluations

5.3.1 No Significant Hazards Consideration

A written evaluation of the significant hazards consideration of a proposed license amendment is required by 10 CFR 50.92. NextEra Energy Duane Arnold, LLC has evaluated the proposed amendment and determined that it involves no significant hazards consideration. According to 10 CFR 50.92, a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not:

- Involve a significant increase in the probability or consequences of an accident previously evaluated; or
- Create the possibility of a new or different kind of accident from any accident previously evaluated; or
- Involve a significant reduction in a margin of safety.

This evaluation is contained in Attachment Q.

Based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public. NextEra Energy Duane Arnold, LLC has evaluated the proposed amendment and determined that it involves no significant hazards consideration.

5.3.2 Environmental Consideration

Pursuant to 10 CFR 51.22(b), an evaluation of the LAR has been performed to determine whether it meets the criteria for categorical exclusion set forth in 10 CFR 51.22(c). That evaluation is discussed in Attachment R. The evaluation confirms that this LAR meets the criteria set forth in 10 CFR 51.22(c)(9) for categorical exclusion from the need for an environmental impact assessment or statement.

5.4 Transition Implementation Schedule

The following schedule for transitioning DAEC to the new fire protection licensing basis requires NRC approval of the LAR in accordance with the following schedule:

- Implementation of new NFPA 805 fire protection program to include procedure changes, process updates, and training to affected plant personnel. This will occur 180 days after NRC approval unless that falls with a scheduled outage window. Then this will occur 60 days after startup from that scheduled outage. See Attachment S Table S-2.
- Modifications will be completed by December 31, 2014. Appropriate compensatory measures will be maintained until modifications are complete. See Attachment S Table S-1.

6.0 REFERENCES

The following references were used in the development of the Transition Report. Additional references are included in the various Attachments.

NRC Documents

1) IN 92-18, Potential for Loss of Remote Shutdown Capability During a Control Room Fire, February 28, 1992.
2) Letter, NRC to NEI, Process for Frequently Asked Questions For Title 10 of The Code Of Federal Regulations, Part 50.48(c) Transitions, July 12, 2006 (ML061660105).
3) NRC Enforcement Policy, Policy Statement: Revision, Federal Register, Vol. 69, No. 115, June 16, 2004, pp. 33684–33685.
4) NRC Generic Letter 86-10, Supplement 1, Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains Within the Same Fire Area, March 25, 1994.
5) NRC Regulatory Issue Summary 2007-19: Communicating Clarifications of Staff Positions in RG 1.205 Concerning Issues Identified During Pilot Application of NFPA Std 805, August 20, 2007 (ML0611660105).
6) NUREG/CR-6850, EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities, April 2005.
7) Regulatory Guide 1.174, An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis, Revision 1 – November 2002.
8) Regulatory Guide 1.200, An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities, Revision 2 - March 2009).
9) Regulatory Guide 1.205, Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants, Revision 1, December 2009.
10) Voluntary Fire Protection Requirement for Light-Water Reactors; Adoption of NFPA 805 as a Risk-Informed, Performance-Based Alternative, Final Rule, Federal Register, Vol. 69, No. 115, June 16, 2004, pp. 33536–33551.

Other Industry Documents

1) ASME/ANS RA-Sa-2009, Addenda to ASME/ANS RA-S 2008, Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications, American Society of Mechanical Engineers/American Nuclear Society, New York, NY.
2) EPRI Fire Protection Equipment Surveillance Optimization and Maintenance Guide 1006756, Final Report July 2003
3) EPRI Report 1010068, Aggregation of Quantitative Risk Assessment Results, December 2005.
4) NEI 00-01, Guidance for Post-Fire Safe Shutdown Circuit Analysis, Revision 1, January 2005.

5) NEI 00-01, Guidance for Post-Fire Safe Shutdown Circuit Analysis, Revision 2, May 2009.
6) NEI 04-02, Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program under 10 CFR 50.48(c), Revision 2 April 2008.
7) NEI 05□04, Process for Performing Follow□on PRA Peer Reviews Using the ASME PRA Standard, Nuclear Energy Institute, Rev. 2.
8) NEI 05-04, Process for Performing Follow-on PRA Peer Reviews Using the ASME PRA Standard, Nuclear Energy Institute, Rev. 1, Draft G, November 2007.
9) NEI 07-12, Fire Probabilistic Risk Assessment (FPRA) Peer Review Process Guidelines, Nuclear Energy Institute, Rev. 0, November 2008.
10) NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition.
11) NUMARC 91-06, Guidelines for Industry Actions to Assess Shutdown Management.

Licensee Correspondence

1) IELP letter from Root to Denton, Information Concerning Fire Protection and Alternate Safe Shutdown (LDR 82-180), June 22, 1982. (8206240206)
2) IELP letter from Root to Denton, Appendix R, Fire Protection (NG-83-0092), January 10, 1983. (8301130033)
3) IELP letter from Root to Denton, Appendix R Exemption Requests (NG-83-0560), February 15, 1983. (8302180471)
4) NRC letter from Vassallo to Arnold, Exemption Requests, 10 CFR 50.48 Fire Protection and Appendix R to 10 CFR Part 50, April 26, 1983. (ML091310126)
5) NRC letter from Vassallo to Liu, Exemption Requests, 10 CFR 50.48 Fire Protection and Appendix R to 10 CFR 50, December 19, 1983. (ML021890257)
6) IELP letter from McGaughy to Denton, 10 CFR 50, Appendix R, Exemption Requests (NG-84-4135), September 28, 1984. (8410030374)
7) IELP letter from McGaughy to Denton, Information Concerning Fire Protection of Structural Steel to Support Our Exemption Requests of September 28, 1984, October 31, 1984. (8411070115)
8) IELP letter from McGaughy to Denton, 10 CFR 50, Appendix R, Fire Protection, Exemption Requests, and Changes to Previously Submitted Information (NG-85-0001), January 2, 1985. (8501160369)
9) NRC letter from Vassallo to Liu, Exemption Requests, 10 CFR 50.48 and Appendix R to 10 CFR 50, July 1, 1985. (ML021890421)
10) IELP letter from McGaughy to Denton, Information Requested Involving Two Motor Operated Valves, MO-1908 and MO-1909 (NG-86-3358), October 21, 1986. (8610280328)
11) IELP letter from McGaughy to Denton, Additional Information Regarding the Duane Arnold Energy Center's (DAEC) Compliance with 10 CFR 50.48 Fire Protection for Motor Operated Valves, MO-1908 and MO-1909 (NG-87-0513), February, 20 1987. (8703030541)

12) IELP letter, Rothert to Murley, 10 CFR 50 Appendix R Exemption Request for Drywell Expansion Gap (NG-87-1918), August 25, 1987. (8709100184)

13) NRC letter from Cappucci to Liu, Exemption from Appendix R to 10 CFR Part 50 Concern Separating Redundant Trains by 3-Hour Fire Barriers and Providing Automatic Fire Suppression and Detection Systems, October 14, 1987. (ML021900207 and ML041000504)

14) NRC letter from Shiraki to Liu, Exemption to 10 CFR 50, Appendix R, Section III.G.2, August 16, 1991. (ML021900627)

15) IELP letter from Franz to NRC, Exemption from 10 CFR 50, Appendix R Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979, for Fire Zone16-F (NG-96-1336), June 28, 1996. (9607080295)

16) IELP letter from Franz to Miraglia, Withdrawal of Request for Exemption from 10 CFR 50, Appendix R Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979, for the Thermo-Lag Installation Identified in 16-F (NG-96-2049), October 17, 1996. (9610290011)

17) Letter NMC to NRC, Letter of Intent to Transition to 10 CFR 40.48(c), November 30, 2005 (ML053460342).

18) Letter FPL Energy to NRC, Affirmation of Letter of Intent to Transition to 10 CFR 40.48(c), July 11, 2006 (ML062060317).

19) Letter NRC to FPL Energy, Response to Revised Letter of Intent, October 30, 2006 (ML062500229).

20) Letter FPL Energy to NRC, Request for Extension of Enforcement Discretion for a Revised Date for 10 CFR 50.48(c) License Amendment Request Submittal, January 30, 2009 (ML090570053).

21) Letter NRC to FPL Energy, Grants Extension of Enforcement Discretion Regarding NFPA Standard 805, June 22, 2009 (ML091600272).

22) Letter NextEra Energy to NRC, Request for Extension of Enforcement Discretion and Commitment to Submittal Dates for 10 CFR 50.48(c) License Amendment Request, June 23, 2011.

ATTACHMENTS

A. NEI 04-02 Table B-1 Transition of Fundamental Fire Protection Program & Design Elements

138 Pages Attached

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.1 General	3.1* General. This chapter contains the fundamental elements of the fire protection program and specifies the minimum design requirements for fire protection systems and features. These fire protection program elements and minimum design requirements shall not be subject to the performance-based methods permitted elsewhere in this standard. Previously approved alternatives from the fundamental protection program attributes of this chapter by the AHJ take precedence over the requirements contained herein.	N/A	N/A - Section Heading, no techical requirements. See sub-sections for specific compliance statements and references.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2 Fire Protection Plan	N/A	N/A	N/A - Section title, no techical requirements. See sub-sections for specific compliance statements and references.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.1 Intent	3.2.1 Intent. A site-wide fire protection plan shall be established. This plan shall document management policy and program direction and shall define the responsibilities of those individuals responsible for the plan's implementation. This section establishes the criteria for an integrated combination of components, procedures, and personnel to implement all fire protection program activities	Complies	The site-wide fire protection plan is delineated in the DAEC Fire Plan - Volume 1. The Fire Plan identifies the plant and corporate management positions responsible for implementing the Fire Protection Program and assigns their responsibilities and authorities.
References	**Document ID**		
	DAEC Fire Plan - Volume 1 Rev. 58 [Sections 1.0 and 2.0] - Program		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.2 Management Policy Direction and Responsibility.	3.2.2* Management Policy Direction and Responsibility. A policy document shall be prepared that defines management authority and responsibilities and establishes the general policy for the site fire protection program.	Complies	Management responsibilities and authorities are delineated in the DAEC Fire Plan-Volume 1.
References	**Document ID**		
	DAEC Fire Plan - Volume 1 Rev. 58 [Section 4.0] - Program		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.2.1 [Management Policy on Senior Management]	3.2.2.1* The policy document shall designate the senior management position with immediate authority and responsibility for the fire protection program.	Complies	The DAEC Fire Plan-Volume 1 delineates responsibilities and authorities to plant and corporate management positions for implementing the Fire Protection Program and assigns ultimate responsibility of the DAEC Fire Protection Program to the Site Vice President.

References | **Document ID**

DAEC Fire Plan - Volume 1 Rev. 58 [Section 4.0] - Program

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.2.2 [Management Policy on Daily Administration]	3.2.2.2* The policy document shall designate a position responsible for the daily administration and coordination of the fire protection program and its implementation.	Complies	The DAEC Fire Plan delineates the responsibilities for administration of the current fire protection program across several organizations such as Engineering, Operations, Nuclear Oversight, Training, Maintenance, etc. The Manager, Program Engineering has responsibility to coordinate implementation to ensure compliance.
References	**Document ID**		
	DAEC Fire Plan - Volume 1 Rev. 58 [Section 4.0] - Program		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.2.3 [Management Policy on Interfaces]	3.2.2.3* The policy document shall define the fire protection interfaces with other organizations and assign responsibilities for the coordination of activities. In addition, this policy document shall identify the various plant positions having the authority for implementing the various areas of the fire protection program.	Complies	The DAEC Fire Plan assigns responsibilities and authorities amongst the organizations for implementing the fire protection program.
References	**Document ID**		
	DAEC Fire Plan - Volume 1 Rev. 58 [Section 4.0] - Program		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.2.4 [Management Policy on AHJ]	3.2.2.4* The policy document shall identify the appropriate AHJ for the various areas of the fire protection program.	Complies	Implementation Item - Plant documentation will be updated to include the statement that the NRC is the authority having jurisdiction (AHJ) for fire protection changes requiring approval. This will be done prior to the implementation date. See Implementation Item in Table S-2 of Attachment S.

Open Item ID	3.2.2.4
Description	Plant documentation will be updated to include the statement that the NRC is the authority having jurisdiction (AHJ) for fire protection changes requiring approval.
Date Entered	06/18/2008
Disposition	AR01648614 will track the revision of plant documents to define the AHJ and approval requirements.
Open	Yes
Corrective Action	AR01648614
Include in LAR/TR	Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.3 Procedures	3.2.3* Procedures. Procedures shall be established for implementation of the fire protection program. In addition to procedures that could be required by other sections of the standard, the procedures to accomplish the following shall be established:	Complies	Procedures are established for the implementation of the fire protection program as described in the DAEC Fire Plan. See sub-paragraphs for specific compliance statements and references for the elements below.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.3 Procedures (1)	3.2.3 (1) * Inspection, testing, and maintenance for fire protection systems and features credited by the fire protection program	Complies with clarification	Procedures are established for inspection, testing and maintenance of fire protection systems as identified in the DAEC Fire Plan. Surveillance frequencies are outlined in the DAEC Fire Plan and may be modified in accordance with the methodology in EPRI Report TR1006756, Fire Protection Equipment Surveillance Optimization and Maintenance Guide.

References **Document ID**

DAEC Fire Plan - Volume 1 Rev. 58 [Sections 8.0 and 12.0] - Program

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.3 Procedures (2)	3.2.3 (2) * Compensatory actions implemented when fire protection systems and other systems credited by the fire protection program and this standard cannot perform their intended function and limits on impairment duration	Complies	Compensatory actions are implemented as identified in the DAEC Fire Plan and in ACP 1412.4.
References	**Document ID**		
	ACP 1412.4 Rev. 61 - Impairments to Fire Protection Systems		
	DAEC Fire Plan - Volume 1 Rev. 58 [Sections 6.3 and 12.0] - Program		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.3 Procedures (3)	3.2.3 (3) * Reviews of fire protection program — related performance and trends	Complies	Program performance including system monitoring and trending along with program health reports are implemented in accordance with administrative control procedures: ACP 1201.2, ACP 1208.7, ER-AA-201-2001 and ER-AA-201-2006. Implementation Item - The monitoring program required by NFPA 805 will include a process that monitors and trends the fire protection program based on specific goals established to measure effectiveness. This will be done prior to the implementation date. See Implementation Item in Table S-2 of Attachment S

References **Document ID**

ACP 1201.2 Rev. 24 - Conduct of Systems/Plant Engineering

ACP 1208.7 Rev. 13 - Program Health Process

ER-AA-201-2001 Rev. 4 - System and Program Health Reporting

ER-AA-201-2006 Rev. 1 - System Performance Monitoring

Open Item ID	3.2.3 (3)
Description	The monitoring program required by NFPA 805 will include a process that monitors and trends the fire protection program based on specific goals established to measure effectiveness.
Date Entered	11/22/2010
Disposition	AR01648614 will track the revision of plant documents to monitor and trend the fire protection program.
Open	Yes
Corrective Action	AR01648614
Include in LAR/TR	Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.3 Procedures (4)	3.2.3 (4) Reviews of physical plant modifications and procedure changes for impact on the fire protection program	Complies	Plant modifications and procedure changes are reviewed for impact on the fire protection program as described in ACP 103.13 and ACP 1203.53.

References **Document ID**

ACP 103.13 Rev. 4 [Section 3.7 and 3.8] - DAEC Engineering Change Process

ACP 1203.53 Rev. 14 - Fire Protection

Attachment A
NEI 04-02 Table B-1 Transition of Fundamental FP Program & Design Elements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.3 Procedures (5)	3.2.3 (5) Long-term maintenance and configuration of the fire protection program	Complies	Long-term maintenance and configuration of the fire protection program are established in ACP 1203.53.
References	**Document ID**		
	ACP 1203.53 Rev. 14 - Fire Protection		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.2.3 Procedures (6)	3.2.3 (6) Emergency response procedures for the plant industrial fire brigade.	Complies	Emergency response procedures for the fire brigade are detailed in the DAEC Fire Plan Volume II.

References | **Document ID**

DAEC Fire Plan - Volume II Rev. 47 - Fire Brigade Organization

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3 Prevention	3.3 Prevention. A fire prevention program with the goal of preventing a fire from starting shall be established, documented, and implemented as part of the fire protection program. The two basic components of the fire prevention program shall consist of both of the following: (1) Prevention of fires and fire spread by controls on operational activities (2) Design controls that restrict the use of combustible materials The design control requirements listed in the remainder of this section shall be provided as described.	Complies	The DAEC fire prevention program is established and implemented as detailed in the Fire Plan - Volume 1. It includes controls on operational activities and design controls that restrict the use of combustible materials. See following subsections for additional specific compliance statements and references.
References	**Document ID**		
	DAEC Fire Plan - Volume 1 Rev. 58 [Section 6.0] - Program		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1 Fire Prevention for Operational Activities.	3.3.1 Fire Prevention for Operational Activities. The fire prevention program activities shall consist of the necessary elements to address the control of ignition sources and the use of transient combustible materials during all aspects of plant operations. The fire prevention program shall focus on the human and programmatic elements necessary to prevent fires from starting or, should a fire start, to keep the fire as small as possible.	Complies	The control of ignition sources and transient combustible materials are established and implemented as detailed in the Fire Plan - Volume I. See following subsections for additional specific compliance statements and references.
References	**Document ID**		
	DAEC Fire Plan - Volume 1 Rev. 58 [Section 6.0] - Program		

Attachment A
NEI 04-02 Table B-1 Transition of Fundamental FP Program & Design Elements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.1 General Fire Prevention Activities	3.3.1.1 General Fire Prevention Activities. The fire prevention activities shall include but not be limited to the following program elements:	Complies	The DAEC fire prevention program is established and implemented as detailed in the Fire Plan - Volume 1. See following elements for additional specific compliance statements and references. Fire prevention activities include but are not limited to these following elements.
References	**Document ID**		
	DAEC Fire Plan - Volume 1 Rev. 58 [Section 6.0] - Program		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.1 General Fire Prevention Activities (1)	3.3.1.1 (1) Training on fire safety information for all employees and contractors including, as a minimum, familiarization with plant fire prevention procedures, fire reporting, and plant emergency alarms	Complies	General fire safety training for employees and contractors is covered during initial site indoctrination and annual re-qualification in the General Employee Training (GET) requirements and also in the DAEC Safe Practices Manual.
References	**Document ID**		
	FPLE Duane Arnold Energy Center Safe Practices Manual Rev. 12 -		
	General Employee Training (GET) -		

Attachment A
NEI 04-02 Table B-1 Transition of Fundamental FP Program & Design Elements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.1 General Fire Prevention Activities (2)	3.3.1.1 (2) * Documented plant inspections including provisions for corrective actions for conditions where unanalyzed fire hazards are identified	Complies	Periodic plant tours are scheduled, conducted and documented as required by Fire Plan - Volume I. Corrective actions are initiated for conditions that decrease the effectiveness of the fire protection program in accordance with PI-AA-205.
References	**Document ID**		
	DAEC Fire Plan - Volume 1 Rev. 58 [Section 4.0] - Program		
	PI-AA-205 Rev. 11 - Condition Evaluation and Corrective Action		

Attachment A
NEI 04-02 Table B-1 Transition of Fundamental FP Program & Design Elements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.1 General Fire Prevention Activities (3)	3.3.1.1 (3) * Administrative controls addressing the review of plant modifications and maintenance to ensure that both fire hazards and the impact on plant fire protection systems and features are minimized.	Complies	Administrative controls requiring the fire protection review of plant modifications and maintenance are covered in ACP 103.13 and ACP 1203.53.
References	**Document ID**		
	ACP 103.13 Rev. 4 - DAEC Engineering Change Process		
	ACP 1203.53 Rev. 14 - Fire Protection		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.2 Control of Combustible Materials	3.3.1.2* Control of Combustible Materials. Procedures for the control of general housekeeping practices and the control of transient combustibles shall be developed and implemented. These procedures shall include but not be limited to the following program elements:	Complies	The DAEC fire prevention program is established and implemented as detailed in the Fire Plan - Volume 1. See following elements for additional specific compliance statements and references. Procedures include but are not limited to the following elements (3.3.1.2 (1) through (6)).
References	**Document ID**		
	DAEC Fire Plan - Volume 1 Rev. 58 [Section 6.0] - Program		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.2 Control of Combustible Materials (1)	3.3.1.2 (1) * Wood used within the power block shall be listed pressure-impregnated or coated with a listed fire-retardant application. Exception: Cribbing timbers 6 in. by 6 in. (15.2 cm by 15.2 cm) or larger shall not be required to be fire-retardant treated.	Complies	Procedure ACP 1412.2 stipulates that wood used in the power block shall be fire retardant pressure-treated or painted with approved fire retardant paint, except that 6 x 6 cribbing timbers are not required to be treated as allowed by this section.
References	**Document ID**		
	ACP 1412.2 Rev. 37 [Section 3.4.1] - Control of Combustibles		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.2 Control of Combustible Materials (2)	3.3.1.2 (2) Plastic sheeting materials used in the power block shall be fire-retardant types that have passed NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films, large-scale tests, or equivalent.	Complies	Procedure ACP 1412.2 addresses control of combustibles. Implementation Item - Plant documentation will be updated to include the statement that plastic sheeting materials shall conform to the requirements of NFPA 701 or equivalent. This will be done prior to the implementation date. See Implementation Item in Table S-2 of Attachment S.

References	**Document ID**
	ACP 1412.2 Rev. 37 [Section 3.1] - Control of Combustibles

Open Item ID	3.3.1.2 (2)
Description	Plant documentation will be updated to include the statement that plastic sheeting materials shall conform to the requirements of NFPA 701 or equivalent.
Date Entered	11/22/2010
Disposition	AR01648614 will track the revision of plant documents to require plastic sheeting to be fire retardant.
Open	Yes
Corrective Action	AR01648614
Include in LAR/TR	Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.2 Control of Combustible Materials (3)	3.3.1.2 (3) Waste, debris, scrap, packing materials, or other combustibles shall be removed from an area immediately following the completion of work or at the end of the shift, whichever comes first.	Complies	Combustibles are controlled by Procedure ACP 1412.2. Generally, transient combustibles are minimized wherever reasonable alternatives are available. Individuals are responsible for minimizing the use of combustibles in the power block and following good housekeeping practices during the performance of work. Combustible materials are removed from work areas at the completion of the job. Where a job continues more than one shift, the cognizant supervisor ensures that combustible materials not needed for completion of the job (including waste, scrap and packing materials) are removed after each shift.

References **Document ID**

ACP 1412.2 Rev. 37 [Sections 3.1 and 3.4] - Control of Combustibles

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.2 Control of Combustible Materials (4)	3.3.1.2 (4) * Combustible storage or staging areas shall be designated, and limits shall be established on the types and quantities of stored materials.	Complies	Procedure ACP 1412.2 identifies designated combustible storage areas along with their limitations/requirements.
References	**Document ID**		
	ACP 1412.2 Rev. 37 [Section 3.3] - Control of Combustibles		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.2 Control of Combustible Materials (5)	3.3.1.2 (5) * Controls on use and storage of flammable and combustible liquids shall be in accordance with NFPA 30, Flammable and Combustible Liquids Code, or other applicable NFPA standards.	Complies via Engineering Evaluation	DAEC has performed a code evaluation for NFPA 30 and complies via engineering evaluation. Flammable and combustible liquids are controlled according to procedure ACP 1412.2. Per FAQ 06-0020, the following guidance applies as to which NFPA standards referenced in Chapter 3 are applicable: "Where used in NFPA 805, Chapter 3, the term, "applicable NFPA Standards" is considered to be equivalent to those NFPA standards identified in the current license basis (CLB) for procedures and systems in the Fire Protection Program that are transitioning to NFPA 805." No other NFPA standards were determined to be applicable.

References

Document ID

ACP 1412.2 Rev. 37 [Sections 3.4.2 and 3.4.3] - Control of Combustibles

FPE-M08-001 Rev. 0 - Flammable and Combustible Liquids Code NFPA 30-1969 Code Compliance Evaluation

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.2 Control of Combustible Materials (6)	3.3.1.2 (6) * Controls on use and storage of flammable gases shall be in accordance with applicable NFPA standards.	Complies via previous NRC approval	Flammable gases are controlled according to procedure ACP 1412.2. The control of flammable gases in this procedure is based on DAEC's commitment to meet NRC guidelines on fire protection administrative controls as described in GL-77-02, Fire Protection Functional Responsibilities, Administrative Control and Quality Assurance (FRACQA). The FRACQA guideline is that controls should be established that govern the handling of and limitation on the use of flammable gases. In its February 20, 1980 letter, NRC stated "By letter dated August 8, 1977, we sent you a copy of our guidelines, 'Nuclear Plant Fire Protection Functional Responsibilities, Admistrative Controls, and Quality Assurance.' We request that you review your fire protection program for conformance with those guidelines. Please provide the results of your review by March 15, 1980. In those areas where you meet the guidelines or intend to meet the guidelines, a statement to that effect is all that is necessary." DAEC responded in IELP letter LDR 80-77, dated March 7, 1980, "With regard to the guidelines, we either meet them or intend to meet them in accord with the license amendment SER schedule at the DAEC." NRC accepted IELP's response and in NRC letter dated June 4, 1980 stated "The staff has completed its review of open issues 3.1.5, 3.1.13, 3.2.4, 3.2.5, 3.2.6, 3.2.7 and 3.2.9. Subject to implementation of the staff's positions identified in Enclosure 2, we find IELP's proposed resolution of these issues acceptable." Open issue 3.2.9 was administrative controls per the NRC guidelines and was not a subject of Enclosure 2 of the letter. Therefore, DAEC was not required to meet NFPA standards with regards to the handling and use of flammable gases. Per FAQ 06-0020, the following guidance applies as to which NFPA standards referenced in Chapter 3 are applicable: "Where used in NFPA 805, Chapter 3, the term, "applicable NFPA Standards" is considered to be equivalent to those NFPA standards identified in the current license basis (CLB) for procedures and systems in the Fire Protection Program that are transitioning to NFPA 805." No NFPA standards were determined to be applicable.

References — **Document ID**

ACP 1412.2 Rev. 37 [Section 3.4.4] - Control of Combustibles

LDR 80-77 - IELP Response to NRC SER 1 (8003180507)

NRC letter dated February 20, 1980 - Ippolito to Arnold (8003140244)

NRC letter dated June 4, 1980 - NRC review status SER Open issues (8006190122)

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.3 Control of Ignition Sources	3.3.1.3 Control of Ignition Sources	N/A	N/A - Section title, no techical requirements. See sub-sections for specific compliance statements and references.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.3.1 [Control of Ignition Sources Code Requirements]	3.3.1.3.1* A hot work safety procedure shall be developed, implemented, and periodically updated as necessary in accordance with NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, and NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.	Complies	Hot work is governed by ACP 1412.3, which is periodically updated.
References	**Document ID** ACP 1412.3 Rev. 25 - Control of Ignition Sources		
		Complies via Engineering Evaluation	DAEC performed a NFPA 51B code review. Compliance with NFPA 241 is addressed through compliance with NFPA 51B. NFPA 241, 2000 edition, as referenced by NFPA 805-2001 with respect to hot work states "Responsibility for hot work operations and fire prevention precautions, including permits and fire watches, shall be in acoordance with NFPA 51B." Implementation Item - Plant documentation will be updated to indicate that cutting and welding activities are prohibited in areas where explosive atmospheres may develop due to poor housekeeping. This will be done prior to the implementation date. See Implementation Item in Table S-2 of Attachment S.
References	**Document ID** FPE-M08-003 - DDC-5416 Rev. 0 - FIRE PREVENTION DURING WELDING CUTTING AND OTHER HOT WORK		

Open Item ID	3.3.1.3.1-1
Description	Plant documentation will be updated to indicate that cutting and welding activities are prohibited in areas where explosive atmospheres may develop due to poor housekeeping.
Date Entered	02/21/2011
Disposition	AR01648614 will track the revision of plant documents to incorporate this additional detail.
Open	Yes
Corrective Action	AR01648614
Include in LAR/TR	Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.3.2 [Control of Ignition Sources on Smoking Limitations]	3.3.1.3.2 Smoking and other possible sources of ignition shall be restricted to properly designated and supervised safe areas of the plant.	Complies	Smoking and other possible sources of ignition are controlled and implemented by ACP 1412.3 and the Safe Practices Manual.
References	**Document ID**		
	ACP 1412.3 Rev. 25 - Control of Ignition Sources		
	FPLE Duane Arnold Energy Center Safe Practices Manual Rev. 12 -		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.3.3 [Control of Ignition Sources for Leak Testing]	3.3.1.3.3 Open flames or combustion-generated smoke shall not be permitted for leak or air flow testing	Comply	All methods of leak testing that utilize an open flame or combustion smoke are strictly forbidden at DAEC per ACP 1412.3 Section 3.2.
References	**Document ID**		
	ACP 1412.3 Rev. 25 [Section 3.2] - Control of Ignition Sources		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.1.3.4 [Control of Ignition Sources on Portable Heaters]	3.3.1.3.4* Plant administrative procedure shall control the use of portable electrical heaters in the plant. Portable fuel-fired heaters shall not be permitted in plant areas containing equipment important to nuclear safety or where there is a potential for radiological releases resulting from a fire.	Complies	Only UL listed or FM approved or other acceptable electric heaters are allowed inside buildings per ACP 1412.3

References	**Document ID**
	ACP 1412.3 Rev. 25 [Section 3.7] - Control of Ignition Sources

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.2 Structural.	3.3.2 Structural. Walls, floors, and components required to maintain structural integrity shall be of noncombustible construction, as defined in NFPA 220, Standard on Types of Building Construction.	Complies	Plant buildings are metal and concrete construction with fire walls and/or shield walls to isolate critical areas or equipment. Structural components consist of structural steel or reinforced concrete. In general, areas housing safety-related systems, equipment, and components are of concrete or masonry construction. The construction features within each fire zone are described in FHA-400.

References **Document ID**

FHA-400 Rev. 11 - Fire Protection Program-Fire Hazard Analysis

FHA-800 Rev. 6 [section D.1 (d)] - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

UFSAR/DAEC-1 Rev. 16 [9.5.1.5] - Fire Protection System

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.3 Interior Finishes	3.3.3 Interior Finishes. Interior wall or ceiling finish classification shall be in accordance with NFPA 101®, Life Safety Code®, requirements for Class A materials. Interior floor finishes shall be in accordance with NFPA 101 requirements for Class I interior floor finishes.	Complies	DAEC follows NEIL requirements for interior wall, ceiling, and floor finishes. These meet NFPA 101 Class A for wall and ceiling finishes and Class I for floor finishes. Plant coating program plan PCPP 1.1 requires that finishes meet DAEC fire protection commitments.
References	**Document ID** PCPP 1.1 Rev. 2 - Protective Coating Progam Plan		
		Submit for NRC Approval	Epoxy floor coverings at DAEC are not considered "interior finish" and are an exception to the interior finish requirement (see NG-03-0527 and the referenced NRC letter for prior disposition of epoxy floor paint). DAEC requests formal NRC approval of this exception. See Attachment L for further details on the request for NRC approval for interior finishes.
References	**Document ID** NG-03-0527 - Response to NRC Unresolved Item 50-331/03- 02-03 (DRS): Epoxy Floor Coatings (ML032190021) NRC letter dated July 12, 2005 from Burgess to Van Middlesworth - DAEC NRC Problem Identification and Resolution Inspection Report 05000331/2005009 (ML051940049)		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.4 Insulation Materials	3.3.4 Insulation Materials. Thermal insulation materials, radiation shielding materials, ventilation duct materials, and soundproofing materials shall be noncombustible or limited combustible.	Complies	Thermal insulation, shielding materials, ventilation duct materials and soundproofing materials are noncombustible or limited combustible.

References **Document ID**

BECH-MRS-M068 Rev. 6 [section 7.8.2] - Ventilation Duct Work

FHA-800 Rev. 6 [section D.1.(d)] - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.5 Electrical.	N/A	N/A	N/A - Section title, no techical requirements. See sub-sections for specific compliance statements and references.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.5.1 [Electrical Wiring Above Suspended Ceiling Limitations]	3.3.5.1 Wiring above suspended ceiling shall be kept to a minimum. Where installed, electrical wiring shall be listed for plenum use, routed in armored cable, routed in metallic conduit, or routed in cable trays with solid metal top and bottom covers.	Complies	Wiring above suspended ceilings is controlled by plant procedures and is kept to a minimum. Only electrical wiring in conduit is located above suspended ceilings.

References

Document ID

FHA-800 Rev. 6 [section D.1.(f)] - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

GMP-ELEC-33 Rev. 3 - Communication Cable Installation

SPEC-E503 Rev. 8 - Conduit and Tray Installation Engineering Specification for DAEC

SPEC-E512 Rev. 13 - Cable and Wire Installation Procedure

Attachment A
NEI 04-02 Table B-1 Transition of Fundamental FP Program & Design Elements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.5.2 [Electrical Raceway Construction Limits]	3.3.5.2 Only metal tray and metal conduits shall be used for electrical raceways. Thin wall metallic tubing shall not be used for power, instrumentation, or control cables. Flexible metallic conduits shall only be used in short lengths to connect components.	Complies	Galvanized steel cable trays are used per Spec-E503. Conduit is specified as rigid steel or electric metallic tubing (EMT). Spec-E503 clarifies that thin walled conduit (EMT) is not used for power, control, or instrumentation cables. Spec-E503 also stipulates only flexible metal conduit be used. Flexible conduit is only used for connections to equipment.
References	**Document ID** SPEC-E503 Rev. 8 [section 4.2] - Conduit and Tray Installation Engineering Specification for DAEC		
		Submit for NRC Approval	Embedded conduit is plastic. DAEC requests formal NRC approval of this exception. See Attachment L for further details on the request for NRC approval for interior finishes.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.5.3 [Electrical Cable Flame Propagation Limits]	3.3.5.3* Electric cable construction shall comply with a flame propagation test as acceptable to the AHJ.	Complies via previous NRC approval	DAEC addressed the requirement of BTP 9.5-1, which is that electric cable construction should as a minimum pass the current IEEE No. 383 flame test. In its letter to NRC dated 1-18-77, DAEC stated "the IEEE Standard 383 flame test was not in existence at the time the DAEC electrical cable was purchased. All cables were required to pass flame resistance tests. The tests were based on system design requirements and current industry standards for the application. For the bulk of the cable, these tests meet Section 6.19.6 of IPCEA Standard S-19-81." In SER No. 1, the NRC accepted the cable construction at DAEC as follows: "The electrical cables used in the plant consist mainly of ethylene-propylene insulation with a neoprene jacket. The flame test standard for cables, IEEE Std. 383, was not in effect at the time cables were purchased and installed at the facility. The fire protection system and proposed modifications gives due consideration to the combustibility of cables. We find that to retest cables to the current flame test standards would not provide information that would alter our conclusions on the adequacy of the fire protection program. Accordingly, we find that the electrical cables used at the facility are acceptable." Cable specifications were revised to meet the requirements of IEEE 383-1974, IEEE 323-1974 and applicable IPCEA standards. (DBD-A61-009)

References

Document ID

DBD-A61-009 Rev. 1 [Section 2.1] - Electrical Design Basis Document

IE-77-138 [Page III-1-25] - IELP letter from Liu to Rusche dated 1-18-1977 (4006006324)

SER No. 1 [section 4.8] - NRC Safety Evaluation Report dated June 1, 1978

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.6 Roofs.	3.3.6 Roofs. Metal roof deck construction shall be designed and installed so the roofing system will not sustain a self-propagating fire on the underside of the deck when the deck is heated by a fire inside the building. Roof coverings shall be Class A as determined by tests described in NFPA 256, Standard Methods of Fire Tests of Roof Coverings.	Complies with clarification	NFPA 256 was not an original design requirement for the plant, was not referenced in BTP 9.5-1 and was not a condition in previous NRC Safety Evaluation Reports. Therefore, DAEC was never evaluated to NFPA 256 but met the equivalent requirement in BTP 9.5-1, which is that metal deck roof construction should be non-combustible (see the building materials directory of the Underwriters' Laboratory, Inc.) or listed as Class I by Factory Mutual System Approval Guide (FM Class I is equivalent to NFPA 256 Class A). In its letter to NRC dated 1-18-77, DAEC stated "the control building, pumphouse, intake structure and the radwaste building have reinforced concrete slab roofs over metal decking. The reactor and turbine buildings are provided with a UL Class A roof." Replacement roofs are controlled under NEIL and are Class A.

References **Document ID**

FHA-800 Rev. 6 [section D.1.(e)] - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

IE-77-138 [Page III.1-10] - IELP letter from Liu to Rusche dated 1-18-1977 (4006006324)

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.7 Bulk Flammable Gas Storage.	3.3.7 Bulk Flammable Gas Storage. Bulk compressed or cryogenic flammable gas storage shall not be permitted inside structures housing systems, equipment, or components important to nuclear safety.	Complies	Bulk flammable gas storage (hydrogen and propane) is located outdoors detached by distance from components important to nuclear safety.

References	Document ID
	FHA-800 Rev. 6 [D.2.(b)] - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.7.1 [Bulk Flammable Gas Location Requirements]	3.3.7.1 Storage of flammable gas shall be located outdoors, or in separate detached buildings, so that a fire or explosion will not adversely impact systems, equipment, or components important to nuclear safety. NFPA 50A, Standard for Gaseous Hydrogen Systems at Consumer Sites, shall be followed for hydrogen storage.	Complies	Bulk flammable gas storage (hydrogen and propane) is located outdoors detached by distance from structures containing equipment important to safety. Hydrogen storage is in accordance with NFPA 55, which incorporated the requirements of NFPA 50A.

References

Document ID

EC 272305 - Temporary Modification 11-005 for Temporary H2 for Hydrogen Water Chemistry

FHA-800 Rev. 6 [D.2.(b)] - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.7.2 [Bulk Flammable Gas Container Restrictions]	3.3.7.2 Outdoor high-pressure flammable gas storage containers shall be located so that the long axis is not pointed at buildings.	Complies	The hydrogen tube trailer is orientated such that the long axis is not pointed at power block buildings.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.7.3 [Bulk Flammable Gas Cylinder Limitations]	3.3.7.3 Flammable gas storage cylinders not required for normal operation shall be isolated from the system.	Complies	Flammable gas cylinders that are not in use are isolated by plant procedures.
References	**Document ID**		
	ACP 1412.2 Rev. 37 [section 3.4.4] - Control of Combustibles		
	OI 563 Rev. 9 - Hydrogen Water Chemistry System		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.8 Bulk Storage of Flammable and Combustible Liquids.	3.3.8 Bulk Storage of Flammable and Combustible Liquids. Bulk storage of flammable and combustible liquids shall not be permitted inside structures containing systems, equipment, or components important to nuclear safety. As a minimum, storage and use shall comply with NFPA 30, Flammable and Combustible Liquids Code.	Complies via Engineering Evaluation	Review of bulk flammable and combustible liquid storage have been included in NFPA 30 code compliance evaluations of the fuel oil storage for the Standby Diesel Generators and the diesel fire pump (FPE-M06-001 and FPE-M08-001). The scope of NFPA 30 for the years of record does not include combustible liquids with flash points above 200F. Lube oil has a flash point of approximately 400F and Fyrquel, a fire resistive hydraulic fluid, has a flash point of approximately 475F. Therefore, the plant lube oil and hydraulic fluid systems, such as the hydrogen seal oil tank, the clean and dirty oil storage tank, the lube oil reservoir, the lube oil conditioner, lube oil storage in the warehouses, or the electro-hydraulic fluid power unit are not within the scope of this paragraph. The TSC emergency diesel storage tank is located outside north of the turbine building and does not expose any buildings containing equipment important to safety.

References

Document ID

FPE-M06-001 Rev. 1 - Standby Diesel Generator NFPA 30 and 37 Code Compliance Evaluation

FPE-M08-001 Rev. 0 - Flammable and Combustible Liquids Code NFPA 30-1969 Code Compliance Evaluation

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.9 Transformers.	3.3.9* Transformers. Where provided, transformer oil collection basins and drain paths shall be periodically inspected to ensure that they are free of debris and capable of performing their design function.	Complies	The Main, Auxiliary and Startup transformers are provided with concrete curb dikes that all drain to the open oil collection pit. Implementation item - The transformer suppression system flow test procedures will be updated to include inspection of the oil collection basin and drain paths. This will be done prior to the implementation date. See Implementation Item in Table S-2 of Attachment S.

Open Item ID	3.3.9
Description	The transformer suppression system flow test procedures will be updated to include inspection of the oil collection basin and drain paths.
Date Entered	08/20/2008
Disposition	AR01648614 will track the revision of plant documents to include these inspections.
Open	Yes
Corrective Action	AR01648614
Include in LAR/TR	Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.10 Hot Pipes and Surfaces.	3.3.10* Hot Pipes and Surfaces. Combustible liquids, including high flashpoint lubricating oils, shall be kept from coming in contact with hot pipes and surfaces, including insulated pipes and surfaces. Administrative controls shall require the prompt cleanup of oil on insulation.	Complies	Procedure ACP 1411.14 identifies the appropriate measures to minimize the risk of oil spills and other hazardous substances and the prompt responses to such spills. Procedure ACP 1412.2 adequately addresses the safeguards while working around hot surfaces.
References	**Document ID**		
	ACP 1411.14 Rev. 19 - Chemical/Oil Spill Response		
	ACP 1412.2 Rev. 37 [Section 3.4.2 (2)] - Control of Combustibles		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.11 Electrical Equipment	3.3.11 Electrical Equipment Adequate clearance, free of combustible material, shall be maintained around energized electrical equipment.	Complies	ACP 1412.2 has provisions for limiting the placement of combustibles next to plant equipment.
References	**Document ID**		
	ACP 1412.2 Rev. 37 [section 3.1] - Control of Combustibles		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.3.12 Reactor Coolant Pumps	3.3.12* Reactor Coolant Pumps. For facilities with non-inerted containments, reactor coolant pumps with an external lubrication system shall be provided with an oil collection system. The oil collection system shall be designed and installed such that leakage from the oil system is safely contained for off normal conditions such as accident conditions or earthquakes. All of the following shall apply. (1) The oil collection system for each reactor coolant pump shall be capable of collecting lubricating oil from all potential pressurized and nonpressurized leakage sites in each reactor coolant pump oil system. (2) Leakage shall be collected and drained to a vented closed container that can hold the inventory of the reactor coolant pump lubricating oil system. (3) A flame arrestor is required in the vent if the flash point characteristics of the oil present the hazard of a fire flashback. (4) Leakage points on a reactor coolant pump motor to be protected shall include but not be limited to the lift pump and piping, overflow lines, oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines, and the oil reservoirs, where such features exist on the reactor coolant pumps. (5) The collection basin drain line to the collection tank shall be large enough to accommodate the largest potential oil leak such that oil leakage does not overflow the basin.	N/A	DAEC has an inerted containment.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4 Industrial Fire Brigade.	N/A	N/A	N/A - Section title, no technical requirements. See sub-sections for specific compliance statements and references.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.1 On-Site Fire-Fighting Capability	3.4.1 On-Site Fire-Fighting Capability. All of the following requirements shall apply.	N/A	No techincal requirements. See subsections for compliance statements and references.

Attachment A
NEI 04-02 Table B-1 Transition of Fundamental FP Program & Design Elements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.1 On-Site Fire-Fighting Capability (a)	3.4.1 (a) A fully staffed, trained, and equipped fire-fighting force shall be available at all times to control and extinguish all fires on site. This force shall have a minimum complement of five persons on duty and shall conform with the following NFPA standards as applicable:	Complies	DAEC currently has a five person fire brigade comprised of personnel from the Operation, Chemistry, and Health Physics Departments. In accordance with the Fire Plan - Volume 1 and Fire Plan - Volume 2, the brigade is 4 members and a leader. This provides a total of 5 to respond to fire emergencies on site.

References

Document ID

DAEC Fire Plan - Volume 1 Rev. 58 [Sections 4.0 and 10.0] - Program

DAEC Fire Plan - Volume II Rev. 47 - Fire Brigade Organization

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.1 On-Site Fire-Fighting Capability (a)(1)	3.4.1 (a)(1) NFPA 600, Standard on Industrial Fire Brigades (interior structural fire fighting)	Complies via Engineering Evaluation	NFPA 600 code compliance is documented in FPE-M08-004. Implementation Item - The DAEC Fire Brigade program will be updated to comply with the requirements of NFPA 600. This will be done prior to the implementation date. See Implementation Item in Table S-2 of Attachment S

References **Document ID**

FPE-M08-004 Rev. 0 - Evaluation of NFPA 600 Industrial Fire Brigade

Open Item ID 3.4.1-0

Description The DAEC Fire Brigade program will be updated to comply with the requirements of NFPA 600.

Date Entered

Disposition AR01648614 will track the revision of the Fire Brigade program to incorporate the requirements of NFPA 600.

Open Yes

Corrective Action AR01648614

Include in LAR/TR Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.1 On-Site Fire-Fighting Capability (a)(2)	3.4.1 (a)(2) NFPA 1500, Standard on Fire Department Occupational Safety and Health Program	N/A	DAEC uses a fire brigade. NFPA 1500 does not apply.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.1 On-Site Fire-Fighting Capability (a)(3)	3.4.1 (a)(3) NFPA 1582, Standard on Medical Requirements for Fire Fighters and Information for Fire Department Physicians	N/A	DAEC uses a fire brigade. NFPA 1582 does not apply.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.1 On-Site Fire-Fighting Capability (b)	3.4.1 (b) * Industrial fire brigade members shall have no other assigned normal plant duties that would prevent immediate response to a fire or other emergency as required.	Complies	Department Supervisors are responsible for assigning Fire Brigade members each shift but written direction is not provided that members shall have no assigned duties that would prevent immediate response. Implementation Item - The DAEC Fire Brigade program documentation will be updated to clarify fire brigade members shall have no other assigned duties that would prevent immediate response. See Implementation Item in Table S-2 of Attachment S.

Open Item ID 3.4.1(b) -1

Description The DAEC Fire Brigade program documentation will be updated to clarify fire brigade members shall have no other assigned duties that would prevent immediate response.

Date Entered 04/05/2011

Disposition AR01648614 will track the revision of plant documents to clarify this requirement.

Open Yes

Corrective Action AR01648614

Include in LAR/TR Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.1 On-Site Fire-Fighting Capability (c)	3.4.1 (c) During every shift, the brigade leader and at least two brigade members shall have sufficient training and knowledge of nuclear safety systems to understand the effects of fire and fire suppressants on nuclear safety performance Exception: Sufficient training and knowledge shall be permitted to be provided by an operations advisor dedicated to industrial fire brigade support criteria.	Complies	The Fire Brigade Leader and one other member are from the Operations Department. Fire Brigade members respond to the fire under the direction of the Operations Shift Manager. The Operations Shift Manager is not dedicated to fire brigade support. Implementation Item - The DAEC Fire Brigade staffing will be updated to include a third person with knowledge and training of nuclear safety systems or assign a dedicated operations advisor. This will be done prior to the implementation date. See Implementation Item in Table S-2 of Attachment S.

References — **Document ID**

DAEC Fire Plan - Volume II Rev. 47 [Section 6.0] - Fire Brigade Organization

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Open Item ID 3.4.1(c)-1

Description The DAEC Fire Brigade staffing will be updated to include a third person with knowledge and training of nuclear safety systems or assign a dedicated operations advisor.

Date Entered 04/05/2011

Disposition AR01648614 will track the revision of the Fire Brigade program to incorporate this staffing requirement.

Open Yes

Corrective Action AR01648614

Include in LAR/TR Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.1 On-Site Fire-Fighting Capability (d)	3.4.1 (d) * The industrial fire brigade shall be notified immediately upon verification of a fire.	Complies	AOP 913 requires an immediate action to notify the fire brigade to respond in the event a fire.
References	**Document ID**		
	AOP-913 Rev. 62 - Fire		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.1 On-Site Fire-Fighting Capability (e)	3.4.1 (e) Each industrial fire brigade member shall pass an annual physical examination to determine that he or she can perform the strenuous activity required during manual fire-fighting operations. The physical examination shall determine the ability of each member to use respiratory protection equipment.	Complies	The Fire Brigade Training Program Description requires each member of the fire brigade to maintain a current annual physical that ensure the member is capable of performing strenuous activities and the ability to use respiratory protection equipment.
References	**Document ID**		
	DAEC Fire Protection Training Program Description Rev. 21 -		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.2 Pre-Fire Plans.	3.4.2* Pre-Fire Plans. Current and detailed pre-fire plans shall be available to the industrial fire brigade for all areas in which a fire could jeopardize the ability to meet the performance criteria described in Section 1.5.	Complies	Area Fire Plans (pre-fire plans) are provided for both safety related and non-safety related areas of the facility.
References	**Document ID**		
	AFP-01 through AFP-82 - Area Fire Plan		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.2.1 [Pre-Fire Plan Contents]	3.4.2.1* The plans shall detail the fire area configuration and fire hazards to be encountered in the fire area, along with any nuclear safety components and fire protection systems and features that are present.	Complies	Pre-fire plans detail the fire area configuration, fire hazards to be encountered and the fire protection systems and features present. The minimum available safe shutdown systems are in AOP-913. Implementation Item - The pre-fire plans will be reviewed and updated accordingly to reflect the performance based program. This includes review/inclusion of the following: • Components necessary to achieve the nuclear safety performance criteria which require entry to the affected fire area • The equipment and portions of the fire affected area where risk informed, performance-based analysis rely on assumptions that could be affected by fire brigade performance. This will done prior to the implemetation date. See Implementation Item in Table S-2 of Attachment S.

References **Document ID**

AFP-01 through AFP-82 - Area Fire Plan

AOP-913 Rev. 62 - Fire

Open Item ID 3.4.2.1-0

Description The pre-fire plans will be reviewed and updated accordingly to reflect the performance based program. This includes review/inclusion of the following:

•Components necessary to achieve the nuclear safety performance criteria which require entry to the affected fire area

• The equipment and portions of the fire affected area where risk informed, performance-based analysis rely on assumptions that could be affected by fire brigade performance.

Date Entered

Disposition AR01648614 will track the revision of the fire pre-plans to include the additional information determined to be necessary.

Open Yes

Corrective Action AR01648614

Include in LAR/TR Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.2.2 [Pre-Fire Plan Updates]	3.4.2.2 Pre-fire plans shall be reviewed and updated as necessary.	Complies	ACP 1203.53 requires fire protection program documents, including the Area Fire Plans, to be updated due to plant configuration changes, as necessary. Area Fire Plans are reviewed during training, drills, and inspections and may be updated as a result of these reviews.

References	Document ID
	ACP 1203.53 Rev. 14 - Fire Protection

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.2.3 [Pre-Fire Plan Locations]	3.4.2.3* Pre-fire plans shall be available in the control room and made available to the plant industrial fire brigade.	Complies	Pre-fire plan are located in the control room and the Fire Brigade Equipment Room. The copy in the Fire Brigade equipment room is available to the brigade and can be taken into the field as needed.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.2.4 [Pre-Fire Plan Coordination Needs]	3.4.2.4* Pre-fire plans shall address coordination with other plant groups during fire emergencies.	Complies with Clarification	Pre-fire plans are not used to address coordination between plant groups during fire emergencies. Standard Operating Guidelines are in the Fire Plan Volume II, which apply to three groups: the Operations Shift Manager, the Fire Brigade and the Nuclear Station Operating Engineers. The coordination between these groups and other plant groups is addressed here and in operating procedures (e.g., AOP 913).

References

Document ID

AOP-913 Rev. 62 - Fire

DAEC Fire Plan - Volume II Rev. 47 - Fire Brigade Organization

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills	3.4.3 Training and Drills. Industrial fire brigade members and other plant personnel who would respond to a fire in conjunction with the brigade shall be provided with training commensurate with their emergency responsibilities.	Complies	Training for fire brigade members is provided commensurate with their emergency responsibilities. There is no documented program for training of other plant personnel that may respond to support the fire brigade. The DAEC training program will be updated to include other plant personnel consistent with NFPA 600, Sections 4.4.4.4 and 4.4.7.1. See Implementation Item for Section 3.4.1(a)(1) above.
References	**Document ID**		
	DAEC Fire Protection Training Program Description Rev. 21 -		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (a)	Heading Only	N/A	N/A - Section title, no techical requirements. See sub-sections for specific compliance statements and references.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (a)(1)	3.4.3 (a) Plant Industrial Fire Brigade Training. All of the following requirements shall apply. (1) Plant industrial fire brigade members shall receive training consistent with the requirements contained in NFPA 600, Standard on Industrial Fire Brigades, or NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, as appropriate.	Complies via Engineering Evaluation	The DAEC training program will be updated in accordance with NFPA 600. See Implementation Item for Section 3.4.1(a)(1) above.
References	**Document ID**		
	FPE-M08-004 Rev. 0 - Evaluation of NFPA 600 Industrial Fire Brigade		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (a)(2)	3.4.3 (a)(2) Industrial fire brigade members shall be given quarterly training and practice in fire fighting, including radioactivity and health physics considerations, to ensure that each member is thoroughly familiar with the steps to be taken in the event of a fire.	Complies	Fire brigade members receive quarterly training and participate in quarterly fire drills. Live fire training occurs annually. Fire Brigade members receive instruction in radioactivity and health physics through annual General Employee Training and RadWorker training.
References	**Document ID**		
	DAEC Fire Plan - Volume II Rev. 47 - Fire Brigade Organization		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (a)(3)	3.4.3 (a)(3) A written program shall detail the industrial fire brigade training program.	Complies	The brigade training program is documented in the DAEC Fire Protection Training Program Description.
References	**Document ID**		
	DAEC Fire Protection Training Program Description Rev. 21 -		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (a)(4)	3.4.3 (a)(4) Written records that include but are not limited to initial industrial fire brigade classroom and hands-on training, refresher training, special training schools attended, drill attendance records, and leadership training for industrial fire brigades shall be maintained for each industrial fire brigade member.	Complies	All training and qualification records are collected and maintained in accordance with applicable Learning Academy procedures.
References	**Document ID**		
	DAEC Fire Protection Training Program Description Rev. 21 [Section 5.0] -		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (b)	3.4.3 (b) Training for Non-Industrial Fire Brigade Personnel. Plant personnel who respond with the industrial fire brigade shall be trained as to their responsibilities, potential hazards to be encountered, and interfacing with the industrial fire brigade.	Complies	There is no documented program for training of other plant personnel that may respond to support the fire brigade. The DAEC training program will be updated to include other plant personnel consistent with NFPA 600, Sections 4.4.4.4 and 4.4.7.1. See Implementation Item for Section 3.4.1 (a)(1) above.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (c)	Heading Only	N/A	N/A - Section title, no techical requirements. See sub-sections for specific compliance statements and references.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (c)(1)	3.4.3 (c) * Drills. All of the following requirements shall apply. (1) Drills shall be conducted quarterly for each shift to test the response capability of the industrial fire brigade.	Complies	Fire drills are performed quarterly for each of the six shift fire brigades. At least one drill per operating shift per year is conducted on a back shift (other than normal shift working hours 0700-1500). At least one drill per operating shift per year is unannounced, and conducted to primarily determine the readiness of the Fire Brigade. Back shift and unannounced fire drills may be conducted simultaneously to allow both unannounced and back shift drill requirements to be fulfilled during the same fire drill. The interval between each shift fire brigade may vary by 25% of a quarter where a quarter is defined as 92 days.
References	**Document ID**		
	DAEC Fire Plan - Volume II Rev. 47 [Section 9.0] - Fire Brigade Organization		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (c)(2)	3.4.3 (c)(2) Industrial fire brigade drills shall be developed to test and challenge industrial fire brigade response, including brigade performance as a team, proper use of equipment, effective use of pre-fire plans, and coordination with other groups. These drills shall evaluate the industrial fire brigade's abilities to react, respond, and demonstrate proper fire-fighting techniques to control and extinguish the fire and smoke conditions being simulated by the drill scenario.	Complies	Fire drill scenarios are pre-planned, and specific fire drill objectives determined for each drill. Fire drills are generally developed, conducted and critiqued by a member of management staff (Fire Marshal). At three year intervals, fire drills are observed and critiqued by qualified individuals who are independent of the plant management staff.
References	**Document ID**		
	DAEC Fire Protection Training Program Description Rev. 21 [Section 3.5.4] -		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (c)(3)	3.4.3 (c)(3) Industrial fire brigade drills shall be conducted in various plant areas, especially in those areas identified to be essential to plant operation and to contain significant fire hazards.	Complies	The area and type of fire chosen for fire drills is varied such that Fire Brigade members are trained in fighting fires in plant areas which contain equipment required for safe shutdown, and plant areas which contain a significant amount of combustible materials which could present a challenge to the Fire Brigade.

References	Document ID
	DAEC Fire Protection Training Program Description Rev. 21 [Section 3.5.5] -

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (c)(4)	3.4.3 (c)(4) Drill records shall be maintained detailing the drill scenario, industrial fire brigade member response, and ability of the industrial fire brigade to perform as a team.	Complies	All training and qualification records are collected and maintained in accordance with applicable Learning Academy procedures.
References	**Document ID**		
	DAEC Fire Protection Training Program Description Rev. 21 [Section 5.0] -		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.3 Training and Drills (c)(5)	3.4.3 (c)(5) A critique shall be held and documented after each drill.	Complies	A fire drill critique is conducted following each fire drill.
References	**Document ID**		
	DAEC Fire Protection Training Program Description Rev. 21 [Section 3.5.7] -		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.4 Fire-Fighting Equipment.	3.4.4 Fire-Fighting Equipment. Protective clothing, respiratory protective equipment, radiation monitoring equipment, personal dosimeters, and fire suppression equipment such as hoses, nozzles, fire extinguishers, and other needed equipment shall be provided for the industrial fire brigade. This equipment shall conform with the applicable NFPA standards.	Complies	Fire protection equipment, such as hose stations with nozzles and fire extinguishers are located throughout the plant for fire brigade use. PPE, radios, SCBA, fans, thermal imaging cameras, foam and other support equipment are located in the Fire Brigade Room. A secondary location provides additional PPE, radios, and SCBA.
References	**Document ID**		
	STPNS13004 Rev. 50 - Hose Trailer, Truck and Fire Brigade Inspection		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.5 Off-Site Fire Department Interface.	N/A	N/A	Section heading, no technical requirements. See subsections for specific compliance statements and references.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.5.1 Mutual Aid Agreement.	3.4.5.1 Mutual Aid Agreement. Off-site fire authorities shall be offered a plan for their interface during fires and related emergencies on site.	Complies	Off site initial fire fighting response would consist of the Palo Fire Department. A Letter of Agreement exist with the Palo Fire Department. The Palo Fire Department reports to the DAEC Fire Brigade Leader. The Palo Fire Department has entered into a mutual aid agreement with fire departments in Linn County, and could request and receive fire fighting assistance whenever needed. The Fire Plan Volume II and Volume III describe offsite assistance.

References

Document ID

DAEC Emergency Plan - Section A

DAEC Fire Plan - Volume II Rev. 47 [Section 10.0] - Fire Brigade Organization

DAEC Fire Plan Volume III Rev. 0 [Section 7.0] - Catastrophc Event Plan

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.5.2 Site-Specific Training.	3.4.5.2* Site-Specific Training. Fire fighters from the off-site fire authorities who are expected to respond to a fire at the plant shall be offered site-specific training and shall be invited to participate in a drill at least annually.	Complies	At least annually, the local off site fire department is invited to participate in a fire drill.
References	**Document ID**		
	DAEC Fire Plan - Volume II Rev. 47 [Section 9.3] - Fire Brigade Organization		
	DAEC Fire Protection Training Program Description Rev. 21 [Section 3.5.8 and Attachment E] -		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.5.3 Security and Radiation Protection.	3.4.5.3* Security and Radiation Protection. Plant security and radiation protection plans shall address off-site fire authority response.	Complies	The Security Shift Supervisor shall arrange for access, dosimetry and escorting of off site fire fighting assistance in accordance with the Security Plan and its implementing procedures.
References	**Document ID**		
	DAEC Fire Plan - Volume II Rev. 47 [Section 10.4] - Fire Brigade Organization		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.4.6 Communications.	3.4.6* Communications. An effective emergency communications capability shall be provided for the industrial fire brigade.	Complies	Communications would be through the use of the plant paging system, which is strategically located throughout the plant site or various radio-based equipment can be used for mobile communications to some areas of the plant and site.

References	Document ID
	FHA-300 Rev. 14 [Section 9.2] - Fire Protection Program - Fire Protection System Requirements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5 Water Supply	N/A	N/A	N/A - Section Heading, see sub-sections for specific compliance statements.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.1 [Water Supply Flow Code Requirements]	3.5.1 A fire protection water supply of adequate reliability, quantity, and duration shall be provided by one of the two following methods. (a) Provide a fire protection water supply of not less than two separate 300,000-gal (1,135,500-L) supplies. (b) Calculate the fire flow rate for 2 hours. This fire flow rate shall be based on 500 gpm (1892.5 L/min) for manual hose streams plus the largest design demand of any sprinkler or fixed water spray system(s) in the power block as determined in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, or NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection. The fire water supply shall be capable of delivering this design demand with the hydraulically least demanding portion of fire main loop out of service.	Complies	Complies via method (b). Fire water is obtained from a common 400,000-gal wet pit in the pump house. The wet pit has adequate capacity to meet the requirement of the fire water system. The storage capacity of the wet pit exceeds the capacity required for 2 hour operation of the largest sprinkler demand (sprinkler system #4 at 2,115 gpm) plus 500 gpm for hose streams.
References	**Document ID**		
	CAL-465-M-006 Rev. 2 - Hydraulic Calculation for Fire Protection System #4		
	FHA-300 Rev. 14 [Section 5] - Fire Protection Program - Fire Protection System Requirements		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.2 [Water Supply Tank Code Requirements]	3.5.2* The tanks shall be interconnected such that fire pumps can take suction from either or both. A failure in one tank or its piping shall not allow both tanks to drain. The tanks shall be designed in accordance with NFPA 22, Standard for Water Tanks for Private Fire Protection. Exception No. 1: Water storage tanks shall not be required when fire pumps are able to take suction from a large body of water (such as a lake), provided each fire pump has its own suction and both suctions and pumps are adequately separated. Exception No. 2: Cooling tower basins shall be an acceptable water source for fire pumps when the volume is sufficient for both purposes and water quality is consistent with the demands of the fire service.	Complies	Tanks are not used for the fire protection water supply and NFPA 22 is not required or applicable to DAEC. The fire pumps take suction from a wet pit, which is supplied from the Cedar River and by gravity flow from each of the two cooling tower basins. Exception No. 2 applies. The volume of water is sufficient for fire service. The storage capacity of the wet pit exceeds the capacity required for 2 hour operation of the largest sprinkler demand (sprinkler system #4 at 2,115 gpm) plus 500 gpm for hose streams. Water quality is provided by supply connections that are arranged to avoid mud and sediment and are provided with screens and strainers installed in an approved manner.

References **Document ID**

CAL-465-M-006 Rev. 2 - Hydraulic Calculation for Fire Protection System #4

FHA-300 Rev. 14 [Section 5] - Fire Protection Program - Fire Protection System Requirements

FPE-S08-003 Rev. 0 - Outside Fire Protection NFPA 24-1969 Code Compliance Evaluation

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.3 [Water Supply Pump Code Requirements]	3.5.3* Fire pumps, designed and installed in accordance with NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, shall be provided to ensure that 100 percent of the required flow rate and pressure are available assuming failure of the largest pump or pump power source.	Complies via Engineering Evaluation	The fire pumps provide 100% of the required flow and pressure. Design and installation were reviewed against the requirements of NFPA 20-1970 with justifications for minor deviations provided in the referenced evaluation.

References **Document ID**

FHA-300 Rev. 14 [section 5.2] - Fire Protection Program - Fire Protection System Requirements

FPE-S08-002 Rev. 0 - Electric and Diesel Fire Pumps NFPA 20-1970 Code Compliance Evaluation

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.4 [Water Supply Pump Diversity and Redundancy]	3.5.4 At least one diesel engine-driven fire pump or two more seismic Category I Class IE electric motor-driven fire pumps connected to redundant Class IE emergency power buses capable of providing 100 percent of the required flow rate and pressure shall be provided.	Complies	Two fire pumps are provided. One fire pump is driven by a diesel engine. The second pump is an electric motor-driven fire pump. The electric pump is supplied power from the normal ac power. Either pump can supply the largest fire service demand flow and pressure.
References	**Document ID**		
	FHA-300 Rev. 14 [Section 5.2] - Fire Protection Program - Fire Protection System Requirements		
	FPE-S08-002 Rev. 0 [Page 63] - Electric and Diesel Fire Pumps NFPA 20-1970 Code Compliance Evaluation		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.5 [Water Supply Pump Separation Requirements]	3.5.5 Each pump and its driver and controls shall be separated from the remaining fire pumps and from the rest of the plant by rated fire barriers.	Complies via previous NRC approval	The electric driven pump and its controls are not separated from the rest of the plant by rated barriers. This was previously approved by NRC. In its January 18, 1977 letter to NRC , DAEC stated "The electric motor-driven fire pump and controls are in a room common with the circulating and service water pumps. The diesel engine-driven fire pump and controls are in a separate 3-hour-rated closure. The diesel day tank is isolated in a separate 3-hour rated enclosure." The door to the diesel fire pump room is a non-rated flood control door. This door was discussed in the DAEC letter of February 21, 1978 in response to NRC questions. "PF.9 Diesel Fire Pump Room Door Staff Concern: A flood control door is provided at the entrance to the diesel fire pump room. The electrically driven fire pump is located in close proximity to the door. A fire in the diesel pump room could result in an exposure to the redundant fire pump if the access door is not closed. Staff Position: The door to the diesel fire pump room should be electrically supervised or a Class A fire door should be provided for the opening. Response: The door to the diesel fire pump room will be electrically supervised." Based on the descriptions above, the NRC accepted the fire pumps as stated in SER No.1, dated June 1, 1978, "We find that the fire pumps satisfy the objectives in Section 2.1 of this report and are, therefore, acceptable." No changes have been made to invalidate the basis for this approval.

References

Document ID

IE-77-138 - IELP letter from Liu to Rusche dated 1-18-1977 (4006006324)

IE-78-270 - IELP Letter to NRC, Liu to Lear

SER No. 1 [section 4.3.1 b.] - NRC Safety Evaluation Report dated June 1, 1978

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.6 [Water Supply Pump Start/Stop Requirements]	3.5.6 Fire pumps shall be provided with automatic start and manual stop only.	Complies	Both fire pumps start automatically when the pressure in the fire main drops. Fire pump shutdown is accomplished by manual means only. Also see NFPA 20 Code compliance evaluation for additional details.

References **Document ID**

FHA-300 Rev. 14 [Section 5.2] - Fire Protection Program - Fire Protection System Requirements

FPE-S08-002 Rev. 0 [Section 5.1.5] - Electric and Diesel Fire Pumps NFPA 20-1970 Code Compliance Evaluation

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.7 [Water Supply Pump Connection Requirements]	3.5.7 Individual fire pump connections to the yard fire main loop shall be provided and separated with sectionalizing valves between connections.	Complies	Each of the fire pumps has a separate 12 inch discharge line supplying the 12 inch underground loop. The connections to the yard fire main loop from each of the two fire pumps are spaced about 10 feet apart, separated by a divisional valve with additional valves arranged to isolate either connection.

References **Document ID**

FHA-300 Rev. 14 [section 5.3] - Fire Protection Program - Fire Protection System Requirements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.8 [Water Supply Pressure Maintenance Limitations]	3.5.8 A method of automatic pressure maintenance of the fire protection water system shall be provided independent of the fire pumps.	Complies	Pressure in the fire main system is automatically maintained by a small jockey pump that is supplied by the well water system.
References	**Document ID**		
	FHA-300 Rev. 14 [section 5.2] - Fire Protection Program - Fire Protection System Requirements		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.9 [Water Supply Pump Operation Notification]	3.5.9 Means shall be provided to immediately notify the control room, or other suitable constantly attended location, of operation of fire pumps.	Complies	Pump supervisory signals are annunciated in the control room.
References	**Document ID**		
	FHA-300 Rev. 14 [section 5.2] - Fire Protection Program - Fire Protection System Requirements		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.10 [Water Supply Yard Main Code Requirements]	3.5.10 An underground yard fire main loop, designed and installed in accordance with NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances, shall be installed to furnish anticipated water requirements.	Complies via Engineering Evaluation	The underground fire main loop was evaluated to the requirements of NFPA 24-1969.
References	**Document ID**		
	FPE-S08-003 Rev. 0 - Outside Fire Protection NFPA 24-1969 Code Compliance Evaluation		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.11 [Water Supply Yard Main Maintenance Issues]	3.5.11 Means shall be provided to isolate portions of the yard fire main loop for maintenance or repair without simultaneously shutting off the supply to both fixed fire suppression systems and fire hose stations provided for manual backup. Sprinkler systems and manual hose station standpipes shall be connected to the plant fire protection water main so that a single active failure or a crack to the water supply piping to these systems can be isolated so as not to impair both the primary and backup fire suppression systems.	Complies	Sectionalizing valves of the post indicator type are provided on the fire loop to provide flexibility during an impairment of the loop. Portions of the yard fire loop can be isolated for maintenance or repair without simultaneously isolating the supply to both the fixed fire suppression systems and fire hose stations, except for the common sprinklers/standpipe in the pumphouse and for the Control Building carbon filter deluge system on the standpipe header.
References	**Document ID** FHA-300 Rev. 14 [section 5.3] - Fire Protection Program - Fire Protection System Requirements FHA-800 Rev. 6 [section E.3.(a)] - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments M-133 [Sheets 1 thru 5] - P&ID Fire Protection		
		Submit for NRC Approval	The pumphouse standpipe and sprinklers are fed directly from the fire pumps via a common header. The Control Building carbon filters are provided with manual deluge systems connected to the standpipe system. See Attachment L for details regarding this request for approval.
References	**Document ID** M-133 [Sheet 3] - P&ID Fire Protection		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.12 [Water Supply Compatible Thread Connections]	3.5.12 Threads compatible with those used by local fire departments shall be provided on all hydrants, hose couplings, and standpipe risers. Exception: Fire departments shall be permitted to be provided with adapters that allow interconnection between plant equipment and the fire department equipment if adequate training and procedures are provided.	Complies	Hydrants, hose couplings and standpipe threads are compatible with the local fire department.
References	**Document ID**		
	FHA-300 Rev. 14 [section 5.3] - Fire Protection Program - Fire Protection System Requirements		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.13 [Water Supply Header Options]	3.5.13 Headers fed from each end shall be permitted inside buildings to supply both sprinkler and standpipe systems, provided steel piping and fittings meeting the requirements of ANSI B31.1, Code for Power Piping, are used for the headers (up to and including the first valve) supplying the sprinkler systems where such headers are part of the seismically analyzed hose standpipe system. Where provided, such headers shall be considered an extension of the yard main system. Each sprinkler and standpipe system shall be equipped with an outside screw and yoke (OS&Y) gate valve or other approved shutoff valve.	Complies	At DAEC there is only one header fed from both ends and it supplies both sprinklers and hose stations in the Low Level Radwaste Processing and Storage Facility (LLRPFS), Radwaste Building and the Railroad Airlock. This is not part of a seismically analyzed standpipe system and does not need to comply with ANSI B31.1. Each sprinkler and deluge system is provided with an OS&Y gate valve adjacent to the system automatic control or alarm valve. The branch connection into the building is provided with a post-indicator valve at the connection to the fire main loop. Each standpipe system is independently connected to the yard fire main loop with a post indicator valve at the point of connection.

References

Document ID

FHA-800 Rev. 6 [E.3(a)] - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

M-133 [Sheet 1] - P&ID Fire Protection

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.14 [Water Supply Control Valve Supervision]	3.5.14* All fire protection water supply and fire suppression system control valves shall be under a periodic inspection program and shall be supervised by one of the following methods. (a) Electrical supervision with audible and visual signals in the main control room or other suitable constantly attended location. (b) Locking valves in their normal position. Keys shall be made available only to authorized personnel. (c) Sealing valves in their normal positions. This option shall be utilized only where valves are located within fenced areas or under the direct control of the owner/operator.	Complies	All post indicator and OS&Y gate and butterfly valves in the fire water piping systems are in the owner controlled area and administratively controlled with the use of locks and/or seals. Periodic inspections verify that the valves are in the proper position.

References

Document ID

DAEC Fire Plan - Volume 1 Rev. 58 [section FPSR 12.1B.1.1] - Program

FHA-300 Rev. 14 [section 5.3] - Fire Protection Program - Fire Protection System Requirements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.15 [Water Supply Hydrant Code Requirements]	3.5.15 Hydrants shall be installed approximately every 250 ft (76 m) apart on the yard main system. A hose house equipped with hose and combination nozzle and other auxiliary equipment specified in NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances, shall be provided at intervals of not more than 1000 ft (305 m) along the yard main system. Exception: Mobile means of providing hose and associated equipment, such as hose carts or trucks, shall be permitted in lieu of hose houses. Where provided, such mobile equipment shall be equivalent to the equipment supplied by three hose houses.	Complies	Yard fire hydrants have been provided at approximately 250-ft intervals around the exterior of the plant.

References **Document ID**

FHA-300 Rev. 14 [section 5.3] - Fire Protection Program - Fire Protection System Requirements

FHA-800 Rev. 6 [section E.2.(g)] - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

		Compliance Statement	Compliance Basis
		Complies via Engineering Evaluation	DAEC utilizes the Exception. A hose trailer is provided at a central location and is equipped with hose, nozzles, adapters, and other fire-fighting tools, as documented in the NFPA 24 code compliance evaluation.

References **Document ID**

FPE-S08-003 Rev. 0 - Outside Fire Protection NFPA 24-1969 Code Compliance Evaluation

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.5.16 [Water Supply Dedicated Limits]	3.5.16* The fire protection water supply system shall be dedicated for fire protection use only. Exception No. 1: Fire protection water supply systems shall be permitted to be used to provide backup to nuclear safety systems, provided the fire protection water supply systems are designed and maintained to deliver the combined fire and nuclear safety flow demands for the duration specified by the applicable analysis. Exception No. 2: Fire protection water storage can be provided by plant systems serving other functions, provided the storage has a dedicated capacity capable of providing the maximum fire protection demand for the specified duration as determined in this section.	Complies with Clarification	DAEC complies via both Exceptions. Exception No. 1: The fire protection water system is identified as one of several alternate means of injection when normal injection systems are inadequate or unavailable for the purposes of restoring RPV level, flooding the RPV, proving a makeup water source to the SFP, spraying the primary containment atmosphere or flooding the primary containment. The fire water supply is provided by two fire pumps. One fire pump is sufficient for fire suppression demand flow. The second fire pump is sufficient to provide the demand flow for injection. Exception No. 2: Water supply to the fire pumps is obtained from a 400,000 gallon wet pit in the pumphouse. The wet pit also provides a common suction to the circulating service water system and the general service water system. The wet pit is supplied by gravity drain from the cooling tower basins in the circulating water system. Based on water level, makeup is provided to the wet pit from up to four 6,000 gpm River Water pumps. The well water system is a backup to the River Water system. The 400,000 gallon storage capacity of the wet pit exceeds the capacity required for 2 hour operation of the largest sprinkler demand (sprinkler system #4 at 2,115 gpm) plus 500 gpm for hose streams.

References	Document ID
	AIP 404 Rev. 8 - Injection with Fire Water
	CAL-465-M-006 Rev. 2 - Hydraulic Calculation for Fire Protection System #4
	FHA-300 Rev. 14 [Section 5] - Fire Protection Program - Fire Protection System Requirements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.6 Standpipe and Hose Stations.	N/A	N/A	N/A - Section Heading, see sub-sections for specific compliance statements.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.6.1 [Standpipe and Hose Station Code Requirements]	3.6.1 For all power block buildings, Class III standpipe and hose systems shall be installed in accordance with NFPA 14, Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems.	Complies via previous NRC approval	1-1/2" (Class II) interior hose stations, each equipped with between 50 and a maximum of 100 ft of 1.5-in. woven jacket rubber-lined hose, have been provided throughout the plant except in the primary containment and torus areas. One inch booster reels with low-capacity nozzles are provided at the entrance to the essential switchgear rooms and in the Control Room back panel area. The NRC accepted the fire hose stations as stated in SER No.1, "A total of 35 hose stations, each equipped with 50 or 75 feet of 1-1/2" of woven jacket rubber-lined hose have been provided throughout the plant except in the primary containment and torus areas. Various areas of the reactor building, turbine building, and control building cannot be reached by the existing hose stations. The licensee has proposed the addition of hose stations such that sufficient hose reach is provided to protect all areas of the reactor building, turbine building, and control building. "The licensee will install 1 inch booster reels with low capacity nozzles at the entrance to the control room and essential switchgear rooms. Hose nozzles in electrical equipment areas will be checked to ensure that the hoze nozzle goes from the off mode to the spray mode before the straight stream mode. Suitable nozzles will be provided where required. We find that subject to the implementation of the above described modifications, the interior fire hose stations satisfy the objectives in Section 2.1 of this report and are, therefore, acceptable." DAEC was required to implement the required modifications as a license condition. All modifications have been implemented and no changes have been made to invalidate the basis of this approval.

References **Document ID**

FHA-300 Rev. 14 [section 5.4] - Fire Protection Program - Fire Protection System Requirements

SER No. 1 [section 4.3.1 d.] - NRC Safety Evaluation Report dated June 1, 1978

		Complies via Engineering Evaluation	The standpipes were evaluated in accordance with NFPA 14, 1985 edition for a Class II system.

References **Document ID**

FPE-S08-001 Rev. 0 - Standpipe and Hose Systems NFPA 14-1985 Code Compliance Evaluation

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.6.2 [Standpipe and Hose Station Capability Limitations]	3.6.2 A capability shall be provided to ensure an adequate water flow rate and nozzle pressure for all hose stations. This capability includes the provision of hose station pressure reducers where necessary for the safety of plant industrial fire brigade members and off-site fire department personnel.	Complies via Engineering Evaluation	The standpipes have adequate flow and pressure, as evaluated in accordance with NFPA 14, 1985 edition.
References	**Document ID**		
	FPE-S08-001 Rev. 0 - Standpipe and Hose Systems NFPA 14-1985 Code Compliance Evaluation		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.6.3 [Standpipe and Hose Station Nozzle Restrictions]	3.6.3 The proper type of hose nozzle to be supplied to each power block area shall be based on the area fire hazards. The usual combination spray/straight stream nozzle shall not be used in areas where the straight stream can cause unacceptable damage or present an electrical hazard to fire-fighting personnel. Listed electrically safe fixed fog nozzles shall be provided at locations where high-voltage shock hazards exist. All hose nozzles shall have shutoff capability and be able to control water flow from full open to full closed.	Complies via Engineering Evaluation	The hose nozzles installed on the wet standpipe hose stations are adjustable fog nozzles with straight stream capability. The fire brigade training stresses the need to use only the spray pattern on fires involving energized electrical equipment. Because Class A combustibles may be present and often require a straight stream for effective extinguishment, it is desirable to have the straight stream capability. The nozzles for the hose stations outside the control room, however, have fog nozzles without the straight stream capability. Hose nozzles in the turbine building, reactor building, pump house, radwaste building, reactor building, railroad airlock, offgas recombiner room, machine shop, and the control building are equipped with a quick-acting ball straight-valve which allows the fire fighter to select the setting-fog, spray or straight stream-prior to discharging water.

References

Document ID

FHA-300 Rev. 14 [Section 5.4] - Fire Protection Program - Fire Protection System Requirements

FHA-800 Rev. 6 [E.3(e)] - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

FPE-S08-001 Rev. 0 - Standpipe and Hose Systems NFPA 14-1985 Code Compliance Evaluation

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
		Complies via previous NRC approval	DAEC hose station nozzles include a strait stream capability. This was found acceptable per SER No. 1. The NRC accepted the interior hose station configuration as stated in SER No.1, "Hose nozzles in electrical equipment areas will be checked to ensure that the hoze nozzle goes from the off mode to the spray mode before the straight stream mode. Suitable nozzles will be provided where required. We find that subject to the implementation of the above described modifications, the interior fire hose stations satisfy the objectives in Section 2.1 of this report and are, therefore, acceptable." DAEC was required to implement the required modifications as a license condition. All modifications/checks have been implemented and no changes have been made to invalidate the basis of this approval.

References

Document ID

SER No. 1 [Section 4.3.1 d.] - NRC Safety Evaluation Report dated June 1, 1978

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.6.4 [Standpipe and Hose Station Earthquake Provisions]	3.6.4 Provisions shall be made to supply water at least to standpipes and hose stations for manual fire suppression in all areas containing systems and components needed to perform the nuclear safety functions in the event of a safe shutdown earthquake (SSE).	Complies via previous NRC approval	There were no requirements during the original licensing of DAEC for any standpipes to be functional in the event of an SSE. To prevent flooding during a seismic event, fire protection system piping routed through the HVAC heat exchanger/chiller area, the waste tank corridor equipment hatch area, and the control building HVAC equipment room (including the system to the standby air filter rooms) is designed to Seismic Category I criteria. The portion of the system passing through the diesel-generator, HPCI, RCIC, RHR, and standby gas treatment system rooms is designed to Seismic Category I criteria; the remainder of this system is not designed to Seismic Category I criteria. The NRC accepted the fire hose stations as stated in SER No.1, "A total of 35 hose stations, each equipped with 50 or 75 feet of 1-1/2" of woven jacket rubber-lined hose have been provided throughout the plant except in the primary containment and torus areas. Various areas of the reactor building, turbine building, and control building cannot be reached by the existing hose stations. The licensee has proposed the addition of hose stations such that sufficient hose reach is provided to protect all areas of the reactor building, turbine building, and control building. "The licensee will install 1 inch booster reels with low capacity nozzles at the entrance to the control room and essential switchgear rooms. Hose nozzles in electrical equipment areas will be checked to ensure that the hoze nozzle goes from the off mode to the spreay mode before the straight stream mode. Suitable nozzles will be provided where required. We find that subject to the implementation of the above described modifications, the interior fire hose stations satisfy the objectives in Section 2.1 of this report and are, therefore, acceptable." DAEC was required to implement the required modifications as a license condition. The modifications were implemented and no changes have been made to invalidate the basis for this approval.

References | **Document ID**

FHA-300 Rev. 14 [section 5.6] - Fire Protection Program - Fire Protection System Requirements

SER No. 1 [section 4.3.1 d.] - NRC Safety Evaluation Report dated June 1, 1978

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.6.5 [Standpipe and Hose Station Seismic Connection Limitations]	3.6.5 Where the seismic required hose stations are cross-connected to essential seismic non-fire protection water supply systems, the fire flow shall not degrade the essential water system requirement.	N/A	There are no seismic required hose stations. See response to Section 3.6.4.
References	**Document ID**		
	BECH-M146 Rev. 81 - Service Water System Pumphouse		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.7 Fire Extinguishers.	3.7 Fire Extinguishers. Where provided, fire extinguishers of the appropriate number, size, and type shall be provided in accordance with NFPA 10, Standard for Portable Fire Extinguishers. Extinguishers shall be permitted to be positioned outside of fire areas due to radiological conditions.	Complies via Engineering Evaluation	Extinguishers were evaluated in accordance with NFPA 10, 1975 edition.
References	**Document ID**		
	FPE-S02-005 Rev. 3 - Fire Extinguisher Code Compliance		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.8 Fire Alarm and Detection Systems.	N/A	N/A	N/A - Section Heading, see sub-sections for specific compliance statements.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.8.1 Fire Alarm	3.8.1 Fire Alarm. Alarm initiating devices shall be installed in accordance with NFPA 72, National Fire Alarm Code®. Alarm annunciation shall allow the proprietary alarm system to transmit fire-related alarms, supervisory signals, and trouble signals to the control room or other constantly attended location from which required notifications and response can be initiated. Personnel assigned to the proprietary alarm station shall be permitted to have other duties. The following fire-related signals shall be transmitted: (1) Actuation of any fire detection device (2) Actuation of any fixed fire suppression system (3) Actuation of any manual fire alarm station (4) Starting of any fire pump (5) Actuation of any fire protection supervisory device (6) Indication of alarm system trouble condition	Complies via Engineering Evaluation	The fire detection and signaling system transmits alarms and supervisory signals to the Control Room. The alarm system also transmits indications of water flow from sprinkler and deluge systems, CO2 system activation, actuation of manual fire alarm pull boxes, and the status of the fire protection water system including fire pump running, fire pump trouble, and low fire water system pressure. Implementation item - DAEC will ensure all elements of the fire alarm system are evaluated in accordance the NFPA 72. This will be completed prior to the implementation date. See Implementation Item in Table S-2 of Attachment S.

References **Document ID**

FHA-300 Rev. 14 - Fire Protection Program - Fire Protection System Requirements

FHA-800 Rev. 6 - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

SD-513 Rev. 9 - System Description - Fire Protection System

Open Item ID 3.8.1

Description DAEC will ensure all elements of the fire alarm system are evaluated in accordance the NFPA 72.

Date Entered

Disposition AR01648614 will track the completion of the evaluation.

Open Yes

Corrective Action AR01648614

Include in LAR/TR Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.8.1.1 [Fire Alarm Communication Requirements]	3.8.1.1 Means shall be provided to allow a person observing a fire at any location in the plant to quickly and reliably communicate to the control room or other suitable constantly attended location.	Complies	Communication of a fire emergency is provided through the use of the plant paging PA system, the intra-plant telephone system, and radio-based mobile communication equipment
References	**Document ID**		
	UFSAR/DAEC-1, section 9.5.2 - Communication Systems		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.8.1.2 [Fire Alarm Prompt Notification Limits]	3.8.1.2 Means shall be provided to promptly notify the following of any fire emergency in such a way as to allow them to determine an appropriate course of action: (1) General site population in all occupied areas (2) Members of the industrial fire brigade and other groups supporting fire emergency response (3) Off-site fire emergency response agencies. Two independent means shall be available (e.g., telephone and radio) for notification of off-site emergency services	Complies	Notification of a fire emergency to all affected personnel is provided by the referenced implementing procedures. The primary line of notification to plant personnel and fire brigade would be through the use of the plant paging system, which is strategically located throughout the plant site. As a backup, the intra-plant telephone system would be used. This system allows direct dialing between all plant telephones. Additionally, various radio-based equipment can be used for mobile communications to some areas of the plant and site. Telephone, radio, and microwave communication is provided for off-site emergency services.
References	**Document ID**		
	AOP-913 Rev. 62 - Fire		
	DAEC Emergency Plan - Section A		
	UFSAR/DAEC-1, section 9.5.2 - Communication Systems		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.8.2 Detection.	3.8.2 Detection. If automatic fire detection is required to meet the performance or deterministic requirements of Chapter 4, then these devices shall be installed in accordance with NFPA 72, National Fire Alarm Code, and its applicable appendixes.	Complies via Engineering Evaluation	The adequacy of detector placement and spacing is evaluated in code evaluations FPE-S00-001, FPE-S00-002, FPE-S02-001, and FPE-S02-002. See Table 4-3 for required detection systems. Note: NFPA 72 did not exist at the time fire detection was installed. The governing code was NFPA 72E-1974.

References

Document ID

FPE-S00-001 Rev. 1 - Evaluation of Smoke Detector Installation in Fire Zone 10A (Battery Corridor)

FPE-S00-002 Rev. 1 - Evaluation of Smoke Detector Spacing and Location in the Control Room Back-Panel Area (Fire Zone 12A)

FPE-S02-001 Rev. 3 - Fire Detection Code Compliance Evaluation for Fire Plan Required and Fire PRA Higher Risk Areas

FPE-S02-002 Rev. 3 - Fire Detection Code Compliance Evaluation for Lower Risk and Non-Fire Plan Required Areas Inside Protected Area

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.9 Automatic and Manual Water-Based Fire Suppression Systems.	N/A	N/A	N/A - Section Heading, see sub-sections for specific compliance statements.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.9.1 [Fire Suppression System Code Requirements]	3.9.1* If an automatic or manual water-based fire suppression system is required to meet the performance or deterministic requirements of Chapter 4, then the system shall be installed in accordance with the appropriate NFPA standards including the following: (1) NFPA 13, Standard for the Installation of Sprinkler Systems (2) NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection (3) NFPA 750, Standard on Water Mist Fire Protection Systems (4) NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems	Complies via Engineering Evaluation	Sprinkler and deluge systems were reviewed against the requirements of NFPA 13 and NFPA 15 with justifications for minor deviations provided in the referenced evaluations. See Table 4-3 for required suppression systems. There are no Water Mist (NFPA 750) or Foam-Water (NFPA 16) systems at DAEC.

References **Document ID**

FPE-S06-001 Rev. 1 - Reactor Building Hatch Deluge System NFPA 15 Code Compliance Evaluation

FPE-S06-002 Rev. 1 - HPCI Deluge System NFPA 13 Code Compliance Evaluation

FPE-S06-003 Rev. 0 - Control Building HVAC Room Fire Zone 12B Sprinkler System #12 NFPA 13-1983 Code Compliance Evaluation

FPE-S06-004 Rev. 0 - Pumphouse 747 ft Elevation Fire Zone 16F Sprinkler System #21 NFPA 13-1996 Code Compliance Evaluation

FPE-S06-006 Rev. 0 - Emergency Diesel Generator Fire Zones 8F, 8G, 8H, and 8J Preaction Sprinkler Systems #2 and #3 NFPA 13-1978 Code Compliance Evaluation

FPE-S07-002 Rev. 0 - Turbine Building Outside EDG Rooms Fire Zone 8D Sprinkler System #9 NFPA 13-1976 Code Compliance Evaluation

FPE-S07-003 Rev. 0 - Reactor Feed Pumps, Fire Zone 07A, Deluge Systems #3 & #4, NFPA 13-1971 Code Compliance Evaluation

FPE-S07-004 Rev. 0 - Turbine Lube Oil Reservoir, Fire Zone 07C, Deluge System #7, NFPA 13-1971 Code Compliance Evaluation

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.9.2 [Fire Suppression System Flow Alarm]	3.9.2 Each system shall be equipped with a water flow alarm.	Complies	Each sprinkler, preaction, and deluge system is provided with a water flow alarm.

References **Document ID**

FHA-300 Rev. 14 - Fire Protection Program - Fire Protection System Requirements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.9.3 [Fire Suppression System Alarm Locations]	3.9.3 All alarms from fire suppression systems shall annunciate in the control room or other suitable constantly attended location.	Complies	Alarms from the fire suppression systems (sprinklers, preaction, and deluge systems) annunciate in the Control Room.
References	**Document ID**		
	FHA-300 Rev. 14 [Section 5.5] - Fire Protection Program - Fire Protection System Requirements		
	SD-513 Rev. 9 - System Description - Fire Protection System		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.9.4 [Fire Suppression System Diesel Pump Sprinkler Protection]	3.9.4 Diesel-driven fire pumps shall be protected by automatic sprinklers.	Complies	An automatic wet pipe sprinkler system is provided for the diesel fire pump and the associated fuel oil day tank.
References	**Document ID**		
	BECH M-133(5) Rev. 20 - P&ID Fire Protection Sprinkler Systems		

Attachment A
NEI 04-02 Table B-1 Transition of Fundamental FP Program & Design Elements

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.9.5 [Fire Suppression System Shutoff Controls]	3.9.5 Each system shall be equipped with an OS&Y gate valve or other approved shutoff valve.	Complies	The sprinkler, deluge and standpipe systems are equipped with approved shutoff valves.
References	**Document ID**		
	FHA-300 Rev. 14 - Fire Protection Program - Fire Protection System Requirements		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.9.6 [Fire Suppression System Valve Supervision]	3.9.6 All valves controlling water-based fire suppression systems required to meet the performance or deterministic requirements of Chapter 4 shall be supervised as described in 3.5.14.	Complies	All post indicator and OS&Y gate and butterfly valves in the fire water piping systems are in the owner controlled area and administratively controlled with the use of locks and/or seals.
References	**Document ID**		
	DAEC Fire Plan - Volume 1 Rev. 58 - Program		
	FHA-300 Rev. 14 - Fire Protection Program - Fire Protection System Requirements		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10 Gaseous Fire Suppression Systems.	N/A	N/A	N/A - Section Heading, see sub-sections for specific compliance statements.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10.1 [Gaseous Suppression System Code Requirements]	3.10.1 If an automatic total flooding and local application gaseous fire suppression system is required to meet the performance or deterministic requirements of Chapter 4, then the system shall be designed and installed in accordance with the following applicable NFPA codes: (1) NFPA 12, Standard on Carbon Dioxide Extinguishing Systems (2) NFPA 12A, Standard on Halon 1301 Fire Extinguishing Systems (3) NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems	Complies via Engineering Evaluation	The Cable Spreading Room CO2 system was evaluated in accordance with NFPA 12, 1975 edition. There are no other gaseous suppression systems in the power block. NFPA 12A and NFPA 2001 are not applicable.
References	**Document ID**		
	FPE-S07-001 Rev. 0 - NFPA 12 Code Compliance Evaluation		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10.2 [Gaseous Suppression System Alarm Location]	3.10.2 Operation of gaseous fire suppression systems shall annunciate and alarm in the control room or other constantly attended location identified.	Complies	The Cable Spreading Room CO2 system annuciates and alarms in the Main Control Room.
References	**Document ID**		
	SD-513 Rev. 9 - System Description - Fire Protection System		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10.3 [Gaseous Suppression System Ventilation Limitations]	3.10.3 Ventilation system design shall take into account prevention from over-pressurization during agent injection, adequate sealing to prevent loss of agent, and confinement of radioactive contaminants.	Complies	A full discharge test of the CO2 total flooding system in the Cable Spreading Room was conducted to demonstrate that timed closure of the balance damper in the exhaust duct successfully prevented room over-pressurization. Additionally, the CO2 system maintained an adequate fire extinguishing concentration in the room. Additionally, the Cable Spreading Room has no radiological concerns because it is outside the RCA. Therefore, there are no concerns with over-pressurization, loss of agent or radiological issues and the code recommendation has been satifactorily addressed at DAEC.

References **Document ID**

FPE-S07-001 Rev. 0 - NFPA 12 Code Compliance Evaluation

SpTP-174 Rev. 0 [Test Rev. 1] - Special Test Procedure-Cable Spreading Room Carbon Dioxide System Test

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10.4 [Gaseous Suppression System Single Failure Limits]	3.10.4* In any area required to be protected by both primary and backup gaseous fire suppression systems, a single active failure or a crack in any pipe in the fire suppression system shall not impair both the primary and backup fire suppression capability.	N/A	Fire hose stations are available as a backup fire suppression feature to the Cable Spreading Room CO2 system. Therefore, both primary and backup fire suppression capability are not provided by gaseous suppression systems.
References	**Document ID**		
	FHA-300 Rev. 14 [section 6.0] - Fire Protection Program - Fire Protection System Requirements		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10.5 [Gaseous Suppression System Disarming Controls]	3.10.5 Provisions for locally disarming automatic gaseous suppression systems shall be secured and under strict administrative control.	Complies	Disarming the CO2 system is under strict administrative control.
References	**Document ID**		
	OI513 Rev. 90 [Section 8.5] - Operating Instruction-Fire Protection		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10.6 [Gaseous Suppression System CO2 Limitations]	3.10.6* Total flooding carbon dioxide systems shall not be used in normally occupied areas.	Complies	The CO2 total flood system is in the Cable Spreading Room which is a normally unoccupied area.

References | **Document ID**

FHA-300 Rev. 14 [section 6.0] - Fire Protection Program - Fire Protection System Requirements

OI513 Rev. 90 - Operating Instruction-Fire Protection

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10.7 [Gaseous Suppression System CO2 Warnings]	3.10.7 Automatic total flooding carbon dioxide systems shall be equipped with an audible pre-discharge alarm and discharge delay sufficient to permit egress of personnel. The carbon dioxide system shall be provided with an odorizer.	Complies	Pre-discharge alarms and time delay in addition to an odorizer provide adequate warning of a pending CO2 discharge in the Cable Spreading Room.
References	**Document ID**		
	FPE-S07-001 Rev. 0 - NFPA 12 Code Compliance Evaluation		
	OI513 Rev. 90 - Operating Instruction-Fire Protection		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10.8 [Gaseous Suppression System CO2 Required Disarming]	3.10.8 Positive mechanical means shall be provided to lock out total flooding carbon dioxide systems during work in the protected space.	Complies	Positive mechanical means implemented by strict administrative controls ensure the CO2 in the Cable Spreading Room is secured during work in the room.
References	**Document ID**		
	FPE-S07-001 Rev. 0 - NFPA 12 Code Compliance Evaluation		
	OI513 Rev. 90 - Operating Instruction-Fire Protection		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10.9 [Gaseous Suppression System Cooling Considerations]	3.10.9 The possibility of secondary thermal shock (cooling) damage shall be considered during the design of any gaseous fire suppression system, but particularly with carbon dioxide.	Complies	A full discharge test of the CO2 total flooding system in the Cable Spreading Room did not result in any damage or detrimental effects due to room cooling by this gaseous agent. Therefore, this code recommendation is not a concern at DAEC.
References	**Document ID**		
	SpTP-174 Rev. 0 [Test Rev. 1] - Special Test Procedure-Cable Spreading Room Carbon Dioxide System Test		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.10.10 [Gaseous Suppression System Decomposition Issues]	3.10.10 Particular attention shall be given to corrosive characteristics of agent decomposition products on safety systems.	Complies	The Cable Spreading Room CO2 system is the only gaseous suppression system in the power block and CO2 does not produce corrosive decomposition products.
References	**Document ID**		
	NFPA Fire Protection Handbook [Chapter 17-1] - 20th Edition		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.11 Passive Fire Protection Features	3.11 Passive Fire Protection Features. This section shall be used to determine the design and installation requirements for passive protection features. Passive fire protection features include wall, ceiling, and floor assemblies, fire doors, fire dampers, and through fire barrier penetration seals. Passive fire protection features also include electrical raceway fire barrier systems (ERFBS) that are provided to protect cables and electrical components and equipment from the effects of fire.	N/A	N/A - Section Heading. No technical requirements. See sub-sections for specific compliance statements.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.11.1 Building Separation.	3.11.1 Building Separation. Each major building within the power block shall be separated from the others by barriers having a designated fire resistance rating of 3 hours or by open space of at least 50 ft (15.2 m) or space that meets the requirements of NFPA 80A, Recommended Practice for Protection of Buildings from Exterior Fire Exposures. Exception: Where a performance-based analysis determines the adequacy of building separation, the requirements of 3.11.1 shall not apply.	Complies	In general, buildings are separated by 3-hour fire resistance rated barriers or 50 feet of open space.
References	**Document ID**		
	FHA-300 Rev. 14 [section 10.0] - Fire Protection Program - Fire Protection System Requirements		
	FHA-400 Rev. 11 [Table 3-1] - Fire Protection Program-Fire Hazard Analysis		
		Complies via Engineering Evaluation	Where buildings are not separated by 3-hour fire resistance rated barriers or 50 feet of open space, an engineering evaluation determining the adequacy of the building separation is provided. The Fire Barrier Implementation Matrix (FBIM) in FHA-400 identifies the barrier requirements and any applicable engineering evaluations which demonstrate the capability to withstand the hazards in the area. The engineering evaluations have been reviewed and determined to meet applicable quality requirements.
References	**Document ID**		
	FHA-400 Rev. 11 - Fire Protection Program-Fire Hazard Analysis		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.11.2 Fire Barriers.	3.11.2 Fire Barriers. Fire barriers required by Chapter 4 shall include a specific fire-resistance rating. Fire barriers shall be designed and installed to meet the specific fire resistance rating using assemblies qualified by fire tests. The qualification fire tests shall be in accordance with NFPA 251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials, or ASTM E 119, Standard Test Methods for Fire Tests of Building Construction and Materials.	Complies	At DAEC, fire areas are generally enclosed by floors, walls, and ceilings which have a specific fire resistance rating. Although BTP 9.5-1 refers to NFPA 251 regarding the fire rating of a Cable Spreading Room, no specific reference to this NFPA code was made in the NRC Safety Evaluation Report nor DAEC correspondence. Therefore, no prior commitment for fire barrier tests was made to this code or ASTM E-119.
References	**Document ID**		
	FHA-400 Rev. 11 [section 3.2] - Fire Protection Program-Fire Hazard Analysis		
		Complies via Engineering Evaluation	The fire area boundaries at the DAEC are classified in one of the following ways: a. Rated barriers sufficient for the hazard with all penetrations sealed to the rating required of the barrier. b. Barriers evaluated sufficient for the hazard due to non-rated penetrants. c. Two non-rated but substantial barriers evaluated as equivalent to a rated barrier such as those surrounding a Buffer Area between two fire areas within the power block. d. Building exterior walls communicating with the yard or going to the underground. (Fire zones separated by building to building barriers in which a narrow expansion gap exists are not considered to communicate with the exterior area but with each other.) The Fire Barrier Implementation Matrix (FBIM) in FHA-400 identifies the barrier requirements and any applicable engineering evaluations which demonstrate the capability to withstand the hazards in the area. The engineering evaluations have been reviewed and determined to meet applicable quality requirements.
References	**Document ID**		
	FHA-400 Rev. 11 - Fire Protection Program-Fire Hazard Analysis		

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.11.3 Fire Barrier Penetrations.	3.11.3* Fire Barrier Penetrations. Penetrations in fire barriers shall be provided with listed fire-rated door assemblies or listed rated fire dampers having a fire resistance rating consistent with the designated fire resistance rating of the barrier as determined by the performance requirements established by Chapter 4. (See 3.11.3.4 for penetration seals for through penetration fire stops.) Passive fire protection devices such as doors and dampers shall conform with the following NFPA standards, as applicable: (1) NFPA 80, Standard for Fire Doors and Fire Windows (2) NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems (3) NFPA 101, Life Safety Code Exception: Where fire area boundaries are not wall-to-wall, floor-to-ceiling boundaries with all penetrations sealed to the fire rating required of the boundaries, a performance-based analysis shall be required to assess the adequacy of fire barrier forming the fire boundary to determine if the barrier will withstand the fire effects of the hazards in the area. Openings in fire barriers shall be permitted to be protected by other means as acceptable to the AHJ.	Complies	Doors and dampers in fire barriers required by Chapter 4 are generally listed fire-rated door assemblies and listed rated fire dampers having a fire resistance rating consistent with the designated fire resistance rating of the barrier.
References	**Document ID** FHA-300 Rev. 14 [section 10.0] - Fire Protection Program - Fire Protection System Requirements FHA-400 Rev. 11 - Fire Protection Program-Fire Hazard Analysis		
		Complies via Engineering Evaluation	Where doors and dampers in fire barriers required by Chapter 4 are not listed fire-rated door assemblies and listed rated fire dampers they have been evaluated to determine if the barrier will withstand the fire effects of the hazards in the area. The Fire Barrier Implementation Matrix (FBIM) in FHA-400 identifies the barrier requirements and any applicable engineering evaluations which demonstrate the capability to withstand the hazards in the area. The engineering evaluations have been reviewed and determined to meet applicable quality requirements. Fire doors have been evaluated in accordance with NFPA 80. Fire doors meet NFPA 101 to the extent that NFPA 101 Section 8.2.3.2.1(a) with regards to rated fire door assemblies refers to NFPA 80. There was no requirement in BTP 9.5-1 regarding NFPA 90A and DAEC did not address compliance in its original fire protection submittals. Implementation item - DAEC will perform a code evaluation for NFPA 90A. (NFPA 101 Section 9.2.1 with regards to rated dampers refers to NFPA 90A.) This will be completed prior to the implementation date. See Implementation Item in Table S-2 of Attachment S.

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
References	**Document ID**		
	FHA-400 Rev. 11 - Fire Protection Program-Fire Hazard Analysis		

Open Item ID	3.11.3-1
Description	A code evaluation for NFPA 90A will be performed.
Date Entered	
Disposition	AR01648614 will track completion of the evaluation.
Open	Yes
Corrective Action	AR01648614
Include in LAR/TR	Yes

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.11.4 Through Penetration Fire Stops.	3.11.4* Through Penetration Fire Stops. Through penetration fire stops for penetrations such as pipes, conduits, bus ducts, cables, wires, pneumatic tubes and ducts, and similar building service equipment that pass through fire barriers shall be protected as follows. (a) The annular space between the penetrating item and the through opening in the fire barrier shall be filled with a qualified fire-resistive penetration seal assembly capable of maintaining the fire resistance of the fire barrier. The assembly shall be qualified by tests in accordance with a fire test protocol acceptable to the AHJ or be protected by a listed fire-rated device for the specified fire-resistive period. (b) Conduits shall be provided with an internal fire seal that has an equivalent fire-resistive rating to that of the fire barrier through opening fire stop and shall be permitted to be installed on either side of the barrier in a location that is as close to the barrier as possible. Exception: Openings inside conduit 4 in. (10.2 cm) or less in diameter shall be sealed at the fire barrier with a fire-rated internal seal unless the conduit extends greater than 5 ft (1.5 m) on each side of the fire barrier. In this case the conduit opening shall be provided with noncombustible material to prevent the passage of smoke and hot gases. The fill depth of the material packed to a depth of 2 in. (5.1 cm) shall constitute an acceptable smoke and hot gas seal in this application.	Complies via Engineering Evaluation	Fire barrier penetrations are provided with seals with a fire rating consistent with the fire barrier requirement or an engineering equivalency evaluation has been performed to document that the barrier, including unrated penetrations, can withstand the hazards of the area. The Fire Barrier Implementation Matrix (FBIM) in FHA-400 identifies the barrier requirements and any applicable engineering evaluations which demonstrate the capability to withstand the hazards in the area. Internal conduit seals meet the requirements of CMEB 9.5-1, which are similar to these requirements, or have been evaluated to provide adequate protection.

References

Document ID

DBD-P72-001 Rev. 9 [Section 6.5.4.3] - Design Basis Document for Fire Protection

DES-STD-MECH-004 Rev. 3 - Penetration Seals

FHA-400 Rev. 11 - Fire Protection Program-Fire Hazard Analysis

FHA-800 Rev. 6 - BTP APCSB 9.5-1 Appendix A Regulatory Requirements and DAEC Commitments

NG-88-1314 - NRC Information Notice No 88-04, Inadequate Qualification and Documentation of Fire Barrier Penetration Seals

NG-91-0397 - NRC Information Notice No 88-04, Inadequate Qualification and Documentation of Fire Barrier Penetration Seals

SPEC-E503 Rev. 8 - Conduit and Tray Installation Engineering Specification for DAEC

SPF-155 - Special Project File

NFPA 805 Ch. 3 Reference	Requirements / Guidance	Compliance Statement	Compliance Basis
3.11.5 Electrical Raceway Fire Barrier Systems (ERFBS).	3.11.5* Electrical Raceway Fire Barrier Systems (ERFBS). ERFBS required by Chapter 4 shall be capable of resisting the fire effects of the hazards in the area. ERFBS shall be tested in accordance with and shall meet the acceptance criteria of NRC Generic Letter 86-10, Supplement 1, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Safe Shutdown Trains Within the Same Fire Area." The ERFBS needs to adequately address the design requirements and limitations of supports and intervening items and their impact on the fire barrier system rating. The fire barrier system's ability to maintain the required nuclear safety circuits free of fire damage for a specific thermal exposure, barrier design, raceway size and type, cable size, fill, and type shall be demonstrated. Exception No. 1: When the temperatures inside the fire barrier system exceed the maximum temperature allowed by the acceptance criteria of Generic Letter 86-10, "Fire Endurance Acceptance Test Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Training Within the Same Fire Area," Supplement 1, functionality of the cable at these elevated temperatures shall be demonstrated. Qualification demonstration of these cables shall be performed in accordance with the electrical testing requirements of Generic Letter 86-10, Supplement 1, Attachment 1, "Attachment Methods for Demonstrating Functionality of Cables Protected by Raceway Fire Barrier Systems During and After Fire Endurance Test Exposure." Exception No. 2: ERFBS systems employed prior to the issuance of Generic Letter 86-10, Supplement 1, are acceptable providing that the system successfully met the limiting end point temperature requirements as specified by the AHJ at the time of acceptance.	Complies	Limited amounts of Darmatt KM1 are utilized for ERFBS at DAEC. This product was tested to meet Generic Letter 86-10 Supplement 1.

References | **Document ID**

DCP 1560 - Upgrade Fire Zones 2A and 3A for Appendix R Compliance (includes installation of Darmatt Raceway Wrap)

FTCR/96/0003 - Report on the 3 Hour Fire and 5 Minute Hose Stream Testing of a Darmatt KM1 Five-Sided Box, Conduit Bundle Thermal Short, Individual Conduit Thermal Short, and Cable Tray Thermal Short

B. NEI 04-02 Table B-2 Nuclear Safety Capability Assessment Methodology Review

101 Pages Attached

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

A comprehensive list of systems and equipment and their interrelationships to be analyzed for a fire event shall be developed. The equipment list shall contain an inventory of those critical components required to achieve the nuclear safety performance criteria of Section 1.5. Components required to achieve and maintain the nuclear safety functions and components whose fire-induced failure could prevent the operation or result in the maloperation of those components needed to meet the nuclear safety criteria shall be included. Availability and reliability of equipment selected shall be evaluated.

NEI 00-01 Ref.
3 Deterministic Methodology

NEI 00-01 Guidance
This section discusses a generic deterministic methodology and criteria that licensees can use to perform a post-fire safe shutdown analysis to address regulatory requirements. The plant-specific analysis approved by NRC is reflected in the plant's licensing basis. The methodology described in this section is also an acceptable method of performing a post-fire safe shutdown analysis. This methodology is indicated in Figure 3-1. Other methods acceptable to NRC may also be used. Regardless of the method selected by an individual licensee, the criteria and assumptions provided in this guidance document may apply. The methodology described in Section 3 is based on a computer database oriented approach, which is utilized by several licensees to model Appendix R data relationships. This guidance document, however, does not require the use of a computer database oriented approach.

The requirements of Appendix R Sections III.G.1, III.G.2 and III.G.3 apply to equipment and cables required for achieving and maintaining safe shutdown in any fire area. Although equipment and cables for fire detection and suppression systems, communications systems and 8-hour emergency lighting systems are important features, this guidance document does not address them.
Additional information is provided in Appendix B to this document.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
This Table presents a line-by-line comparison of NEI 00-01, Revision 1, guidelines with the deterministic methodology used by DAEC to evaluate whether Nuclear Safety Performance Criteria are satisfied. The DAEC Post Fire Nuclear Safety Capability Assessment (NSCA) is supported by the NFPA-805 Database (referred to in this Table as the Database), Integrated Plant Logic Diagrams (IPLDs), and System Logic Diagrams (SLDs). The results of the assessment are presented in engineering report format by fire area. Except as noted in subsequent sub-sections, the DAEC methdology conforms to the applicable guidelines.

Reference
FPLDA013-PR-002 Rev. 0
NISYS-1286-TR001 Rev. 0

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1 [A, Intro] Safe Shutdown Systems and Path Development

NEI 00-01 Guidance
This section discusses the identification of systems available and necessary to perform the required safe shutdown functions. It also provides information on the process for combining these systems into safe shutdown paths. Appendix R Section III.G.1.a requires that the capability to achieve and maintain hot shutdown be free of fire damage. It is expected that the term "free of fire damage" will be further clarified in a forthcoming Regulatory Issue Summary. Appendix R Section III.G.1.b requires that repairs to systems and equipment necessary to achieve and maintain cold shutdown be completed within 72 hours. It is the intent of the NRC that requirements related to the use of manual operator actions will be addressed in a forthcoming rulemaking.

[Refer to hard copy of NEI 00-01 for Figure 3-1]

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
Systems necessary to perform safe shutdown functions credited in the DAEC At-Power analysis (discussed in Section 4.2.4) are identified on the IPLDs and SLDs that support the NSCA. Available systems and equipment necessary to achieve and maintain safe and stable conditions (as defined in Section 4.2.1.2) are combined into credited safe shutdown success paths for each fire area. Except as noted in subsequent sub-sections, the DAEC methdology conforms to the applicable guidelines.

Reference
FPLDA013-PR-003 Rev. 0
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1 [B, Goals] Safe Shutdown Systems and Path Development

NEI 00-01 Guidance
The goal of post-fire safe shutdown is to assure that a one train of shutdown systems, structures, and components remains free of fire damage for a single fire in any single plant fire area. This goal is accomplished by determining those functions important to achieve and maintain hot shutdown. Safe shutdown systems are selected so that the capability to perform these required functions is a part of each safe shutdown path. The functions important to post-fire safe shutdown generally include, but are not limited to the following:

Reactivity control
Pressure control systems
Inventory control systems
Decay heat removal systems
Process monitoring
Support systems
- Electrical systems
- Cooling systems

These functions are of importance because they have a direct bearing on the safe shutdown goal of being able to achieve and maintain hot shutdown which ensures the integrity of the fuel, the reactor pressure vessel, and the primary containment. If these functions are preserved, then the plant will be safe because the fuel, the reactor and the primary containment will not be damaged. By assuring that this equipment is not damaged and remains functional, the protection of the health and safety of the public is assured.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Credited safe shutdown success paths for each fire area include available systems and equipment necessary to achieve each of the post-fire safe shutdown functions.

Reference
FPLDA013-PR-003 Rev. 0
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1 [C, Spurious Operations] Safe Shutdown Systems and Path Development

NEI 00-01 Guidance
In addition to the above listed functions, Generic Letter 81-12 specifies consideration of associated circuits with the potential for spurious equipment operation and/or loss of power source, and the common enclosure failures. Spurious operations/actuations can affect the accomplishment of the post -fire safe shutdown functions listed above. Typical examples of the effects of the spurious operations of concern are the following:

- A loss of reactor pressure vessel/reactor coolant inventory in excess of the safe shutdown makeup capability
- A flow loss or blockage in the inventory makeup or decay heat removal systems being used for the required safe shutdown path.

Spurious operations are of concern because they have the potential to directly affect the ability to achieve and maintain hot shutdown, which could affect the fuel and cause damage to the reactor pressure vessel or the primary containment. Common power source and common enclosure concerns could also affect these and must be addressed.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Spurious operations are considered in selection of safe shutdown functions and systems as well as in analysis of cabling associated with components relied upon to achieve those functions. A special subset of components considered for spurious operation involves reactor coolant pressure boundary components whose spurious operation could result in a loss of reactor pressure vessel inventory through an interfacing system loss of coolant accident (i.e., pipe rupture in the low pressure piping). These components are defined as high/low pressure interface equipment and are identified as such on the SLDs and in the Database; they are subject to more stringent circuit analysis. This high/low pressure interface boundary valve definition is in alignment with that in Appendix C to NEI 00-01 and NEI 04-02 FAQ 06-0006, but is limited to those components whose spurious operation could lead to inventory loss that exceeds the available makeup capability.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1 Criteria / Assumptions

NEI 00-01 Guidance
The following criteria and assumptions may be considered when identifying systems available and necessary to perform the required safe shutdown functions and combining these systems into safe shutdown paths.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.1 [GE BWR Paths]

NEI 00-01 Guidance
[BWR] GE Report GE-NE-T43-00002-00-01-R01 entitled "Original Safe Shutdown Paths For The BWR" addresses the systems and equipment originally designed into the GE boiling water reactors (BWRs) in the 1960s and 1970s, that can be used to achieve and maintain safe shutdown per Section III.G.1 of 10CFR 50, Appendix R. Any of the shutdown paths (methods) described in this report are considered to be acceptable methods for achieving redundant safe shutdown.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Each of the DAEC success paths to shutdown (i.e., the functions used to take the plant from reactor power operation to safe and stable conditions (as defined in Section 4.2.1.2)) is described in GE Report GE-NE-T43-00002-00-01-R01.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.2 [SRVs / LP Systems]

NEI 00-01 Guidance
[BWR] GE Report GE-NE-T43-00002-00-03-R01 provides a discussion on the BWR Owners' Group (BWROG) position regarding the use of Safety Relief Valves (SRVs) and low pressure systems (LPCI/CS) for safe shutdown. The BWROG position is that the use of SRVs and low pressure systems is an acceptable methodology for achieving redundant safe shutdown in accordance with the requirements of 10CFR50 Appendix R Sections III.G.1 and III.G.2. The NRC has accepted the BWROG position and issued an SER dated Dec. 12, 2000.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The DAEC position conforms to the BWROG position accepted by the NRC.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.3 [Pressurizer Heaters]

NEI 00-01 Guidance
[PWR] Generic Letter 86-10, Enclosure 2, Section 5.3.5 specifies that hot shutdown can be maintained without the use of pressurizer heaters (i.e., pressure control is provided by controlling the makeup/charging pumps). Hot shutdown conditions can be maintained via natural circulation of the RCS through the steam generators. The cooldown rate must be controlled to prevent the formation of a bubble in the reactor head. Therefore, feedwater (either auxiliary or emergency) flow rates as well as steam release must be controlled.

Applicability
Not Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
DAEC is a BWR; this guidance is specific to PWRs.

Reference

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.4 [Alternative Shutdown Capability]

NEI 00-01 Guidance
The classification of shutdown capability as alternative shutdown is made independent of the selection of systems used for shutdown. Alternative shutdown capability is determined based on an inability to assure the availability of a redundant safe shutdown path. Compliance to the separation requirements of Sections III.G.1 and III.G.2 may be supplemented by the use of manual actions to the extent allowed by the regulations and the licensing basis of the plant, repairs (cold shutdown only), exemptions, deviations, GL 86-10 fire hazards analyses or fire protection design change evaluations, as appropriate. These may also be used in conjunction with alternative shutdown capability.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The NRC reviewed the DAEC alternative shutdown capability and concluded that the DAEC design meets the requirements of Sections III.G.3 and III.L of Appendix R to 10CFR50 with respect to safe shutdown (i.e., the alternative shutdown capability is independent of all cabling and equipment in the areas of the plant where fire may require evacuation of the Control Room). In all cases, alternate shutdown was proposed as a result of potential control room evacuation.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 3, 5]
NRC letter dated January 6, 1983

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.5 [Initial Conditions]

NEI 00-01 Guidance
At the onset of the postulated fire, all safe shutdown systems (including applicable redundant trains) are assumed operable and available for post-fire safe shutdown. Systems are assumed to be operational with no repairs, maintenance, testing, Limiting Conditions for Operation, etc. in progress. The units are assumed to be operating at full power under normal conditions and normal lineups.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Development of the DAEC safe shutdown equipment list and logics assumes the plant is operating at 100 percent power with systems functioning normally.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.6 [Other Events in Conjunction with Fire]

NEI 00-01 Guidance
No Final Safety Analysis Report accidents or other design basis events (e.g. loss of coolant accident, earthquake), single failures or non-fire induced transients need be considered in conjunction with the fire.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Development of the DAEC safe shutdown equipment list and logics assumes that design basis fires do not occur concurrently with non-fire related failures in safety systems, plant accidents, or the most severe natural phenomena.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.7 [Offsite Power]

NEI 00-01 Guidance
For the case of redundant shutdown, offsite power may be credited if demonstrated to be free of fire damage. Offsite power should be assumed to remain available for those cases where its availability may adversely impact safety (i.e., reliance cannot be placed on fire causing a loss of offsite power if the consequences of offsite power availability are more severe than its presumed loss). No credit should be taken for a fire causing a loss of offsite power. For areas where train separation cannot be achieved and alternative shutdown capability is necessary, shutdown must be demonstrated both where offsite power is available and where offsite power is not available for 72 hours.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Development of the DAEC safe shutdown equipment list and logics assumes that offsite power may or may not be available at the time of the postulated fire. Areas of the plant which rely on alternative or dedicated shutdown assume a Loss Of Offsite Power (LOOP) concurrent with the onset of the fire event. For non-Alternate Shutdown Capability fire areas, the DAEC position is that a LOOP can only occur concurrent with a fire event if fire induced damage results in spurious operations or other malfunctions which could result in a LOOP. Auxiliary contact evaluations assume plant conditions (e.g., LOOP) that may occur as a result of the fire; offsite power is assumed to not be available if it results in the worst case evaluation for the auxiliary contact under review. Compliance assessments assume that offsite power may or may not be available. The maximum duration of any LOOP event is assumed to be 72 hours.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 3, 4, 5]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.8 [Safety-Related Equipment]

NEI 00-01 Guidance
Post-fire safe shutdown systems and components are not required to be safety-related.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
The DAEC analysis does not specifically state this assumption; however, non-safety related equipment is included on the safe shutdown equipment list and logics.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

Comments
Examples include CV2080, CV2081, MO1998A, MO1998B, V29-system manual valves, V46-system manual valves, and offsite power (Function Code G10).

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.9 [72 Hour Coping]

NEI 00-01 Guidance
The post-fire safe shutdown analysis assumes a 72-hour coping period starting with a reactor scram/trip. Fire-induced impacts that provide no adverse consequences to hot shutdown within this 72-hour period need not be included in the post-fire safe shutdown analysis. At least one train can be repaired or made operable within 72 hours using onsite capability to achieve cold shutdown.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
The DAEC analysis does not specifically state this assumption; however, DAEC fire area compliance assessments assume that offsite power may or may not be available and that the maximum duration of any loss of offsite power (LOOP) event is 72 hours. NFPA 805 only requires maintaining the fuel in a safe and stable condition (i.e., no explicit requirement to achieve and maintain cold shutdown). Accordingly, the DAEC At-Power analysis (discussed in Section 4.2.4) has determined the capability to achieve and maintain safe and stable conditions (as defined in Section 4.2.1.2) without reference to a specific mission time or event coping duration.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.10 [Manual / Automatic Initiation of Systems]

NEI 00-01 Guidance
Manual initiation from the main control room or emergency control stations of systems required to achieve and maintain safe shutdown is acceptable where permitted by current regulations or approved by NRC; automatic initiation of systems selected for safe shutdown is not required but may be included as an option.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Where determined to be necessary and achievable, DAEC fire area compliance assessments incorporate operator activities (in the main control room or at primary control stations) for equipment required to achieve and maintain safe and stable conditions (as defined in Section 4.2.1.2). Where spurious operation as the result of an auxiliary contact may adversely impact automatic system operation, manual system operation from the main control room (i.e., repositioning handswitches) is specified.

Reference
FPE-R96-001 Rev. 3
FPE-R96-003 Rev. 2
FPE-R96-004 Rev. 12 [Attachment 3]
FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.1.11 [Multiple Affected Units]

NEI 00-01 Guidance
Where a single fire can impact more than one unit of a multi-unit plant, the ability to achieve and maintain safe shutdown for each affected unit must be demonstrated.

Applicability
Not Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
DAEC is a single-unit site.

Reference

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.2 Shutdown Functions

NEI 00-01 Guidance
The following discussion on each of these shutdown functions provides guidance for selecting the systems and equipment required for safe shutdown. For additional information on BWR system selection, refer to GE Report GE-NE-T43-00002-00-01-R01 entitled "Original Safe Shutdown Paths for the BWR."

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.2.1 Reactivity Control

NEI 00-01 Guidance
[BWR] Control Rod Drive System
The safe shutdown performance and design requirements for the reactivity control function can be met without automatic scram/trip capability. Manual scram/reactor trip is credited. The post-fire safe shutdown analysis must only provide the capability to manually scram/trip the reactor.

[PWR] Makeup/Charging
There must be a method for ensuring that adequate shutdown margin is maintained by ensuring borated water is utilized for RCS makeup/charging.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Reactivity control will be accomplished by insertion of the control rods and will result from an automatic reactor protection system (RPS) trip or from operator initiation of a manual trip. (Function Code A0)

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.2.2 Pressure Control Systems

NEI 00-01 Guidance
The systems discussed in this section are examples of systems that can be used for pressure control. This does not restrict the use of other systems for this purpose.

[BWR] Safety Relief Valves (SRVs)
The SRVs are opened to maintain hot shutdown conditions or to depressurize the vessel to allow injection using low pressure systems. These are operated manually. Automatic initiation of the Automatic Depressurization System is not a required function.

[PWR] Makeup/Charging
RCS pressure is controlled by controlling the rate of charging/makeup to the RCS. Although utilization of the pressurizer heaters and/or auxiliary spray reduces operator burden, neither component is required to provide adequate pressure control. Pressure reductions are made by allowing the RCS to cool/shrink, thus reducing pressurizer level/pressure. Pressure increases are made by initiating charging/makeup to maintain pressurizer level/pressure. Manual control of the related pumps is acceptable.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Six electrically-operated SRVs are installed; three out of the six SRVs are required for post-fire shutdown. SRV operation is controlled manually from the main control room or from the remote shutdown panel (1C388) to maintain the reactor at the desired pressure. Neither ADS logic nor Lo-Lo-Set logic is required for manual SRV actuation. (Function Code B0)

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.2.3 Inventory Control

NEI 00-01 Guidance
[BWR] Systems selected for the inventory control function should be capable of supplying sufficient reactor coolant to achieve and maintain hot shutdown. Manual initiation of these systems is acceptable. Automatic initiation functions are not required.

[PWR]: Systems selected for the inventory control function should be capable of maintaining level to achieve and maintain hot shutdown. Typically, the same components providing inventory control are capable of providing pressure control. Manual initiation of these systems is acceptable. Automatic initiation functions are not required.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
At DAEC, the systems required to achieve and maintain hot standby are reactivity control (SCRAM) and main steam isolation (MSIV closure). High pressure (RCIC or HPCI) or low pressure (Core Spray or RHR-low pressure coolant injection mode) systems provide sufficient makeup water to the reactor vessel to maintain safe and stable conditions (as defined in Section 4.2.1.2). If high pressure makeup systems are unavailable, SRVs are manually operated to reduce reactor pressure. Operation for each system can be manually initiated from the control room. (Function Codes B0, B1, B2, B3, B4, B7, B8)

Reference
FPLDA013-PR-007 Rev. 0 [Sections 3, 6]

Comments
Documentation that the "systems selected for the inventory control function" (i.e., those credited for Function Codes B1, B2, B3, B4, B7, and B8) are each "capable of supplying sufficient reactor coolant to achieve and maintain hot shutdown" (i.e., capable of meeting Appendix R III.L performance criteria) is provided in APED-A61-090.

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.2.4 Decay Heat Removal

NEI 00-01 Guidance
[BWR] Systems selected for the decay heat removal function(s) should be capable of:

- Removing sufficient decay heat from primary containment, to prevent containment over-pressurization and failure.
- Satisfying the net positive suction head requirements of any safe shutdown systems taking suction from the containment (suppression pool).
- Removing sufficient decay heat from the reactor to achieve cold shutdown.

[PWR] Systems selected for the decay heat removal function(s) should be capable of:

- Removing sufficient decay heat from the reactor to reach hot shutdown conditions. Typically, this entails utilizing natural circulation in lieu of forced circulation via the reactor coolant pumps and controlling steam release via the Atmospheric Dump valves.
- Removing sufficient decay heat from the reactor to reach cold shutdown conditions.

This does not restrict the use of other systems.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
In post-fire situations following the reactor scram, decay heat is removed initially by natural circulation within the reactor and operation of the SRVs. The SRVs are manually operated to relieve steam generated by core decay heat to the suppression pool, where the emerging steam is condensed. (Function Code B0)

To cool the suppression pool so that pool temperatures are within acceptable limits, RHR System operation is initiated in the suppression pool cooling mode manually as soon as possible after closure of the MSIVs. (Function Codes B5, B6)

Initiation of RHR in the suppression pool cooling mode does not imply that the plant would proceed all the way to cold shutdown. NFPA 805 only requires maintaining the fuel in a safe and stable condition (i.e., no explicit requirement to achieve and maintain cold shutdown). Accordingly, the DAEC At-Power analysis (discussed in Section 4.2.4) has determined the capability to achieve and maintain safe and stable conditions (as defined in Section 4.2.1.2) without placing RHR in the shutdown cooling mode.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.2.5 Process Monitoring

NEI 00-01 Guidance
The process monitoring function is provided for all safe shutdown paths. IN 84-09, Attachment 1, Section IX "Lessons Learned from NRC Inspections of Fire Protection Safe Shutdown Systems (10CFR50 Appendix R)" provides guidance on the instrumentation acceptable to and preferred by the NRC for meeting the process monitoring function. This instrumentation is that which monitors the process variables necessary to perform and control the functions specified in Appendix R Section III.L.1. Such instrumentation must be demonstrated to remain unaffected by the fire. The IN 84-09 list of process monitoring is applied to alternative shutdown (III.G.3). IN 84-09 did not identify specific instruments for process monitoring to be applied to redundant shutdown (III.G.1 and III.G.2). In general, process monitoring instruments similar to those listed below are needed to successfully use existing operating procedures (including Abnormal Operating Procedures).

BWR
- Reactor coolant level and pressure
- Suppression pool level and temperature
- Emergency or isolation condenser level
- Diagnostic instrumentation for safe shutdown systems
- Level indication for tanks needed for safe shutdown

PWR
- Reactor coolant temperature (hot leg / cold leg)
- Pressurizer pressure and level
- Neutron flux monitoring (source range)
- Level indication for tanks needed for safe shutdown
- Steam generator level and pressure
- Diagnostic instrumentation for safe shutdown systems

The specific instruments required may be based on operator preference, safe shutdown procedural guidance strategy (symptomatic vs. prescriptive), and systems and paths selected for safe shutdown.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The guidance provided in Information Notice No. 84-09 was considered in the identification of the minimum set of instruments required to monitor plant process variables at DAEC. Each train of the Process Monitoring System provides that minimum set of plant instrumentation required by the operator to monitor status of the reactor and primary containment. (Function Codes T1, T2)

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.2.6 Support Systems

NEI 00-01 Guidance
[Blank Heading - No specific guidance]

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
Support system requirements are addressed under the corresponding NEI 00-01 sub-section below.

Reference

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.2.6.1 Electrical Systems

NEI 00-01 Guidance
AC Distribution System

Power for the Appendix R safe shutdown equipment is typically provided by a medium voltage system such as 4.16 KV Class 1E busses either directly from the busses or through step down transformers/load centers/distribution panels for 600, 480 or 120 VAC loads. For redundant safe shutdown performed in accordance with the requirements of Appendix R Section III.G.1 and 2, power may be supplied from either offsite power sources or the emergency diesel generator depending on which has been demonstrated to be free of fire damage. No credit should be taken for a fire causing a loss of offsite power. Refer to Section 3.1.1.7.

DC Distribution System

Typically, the 125VDC distribution system supplies DC control power to various 125VDC control panels including switchgear breaker controls. The 125VDC distribution panels may also supply power to the 120VAC distribution panels via static inverters. These distribution panels typically supply power for instrumentation necessary to complete the process monitoring functions.
For fire events that result in an interruption of power to the AC electrical bus, the station batteries are necessary to supply any required control power during the interim time period required for the diesel generators to become operational. Once the diesels are operational, the 125 VDC distribution system can be powered from the diesels through the battery chargers.
[BWR] Certain plants are also designed with a 250VDC Distribution System that supplies power to Reactor Core Isolation Cooling and/or High Pressure Coolant Injection equipment.
The DC control centers may also supply power to various small horsepower Appendix R safe shutdown system valves and pumps. If the DC system is relied upon to support safe shutdown without battery chargers being available, it must be verified that sufficient battery capacity exists to support the necessary loads for sufficient time (either until power is restored, or the loads are no longer required to operate).

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The following systems provide electrical support to the primary shutdown systems selected to accomplish the previously defined safety functions in postulated fire scenarios:
* Redundant AC Distribution Systems supplied by offsite power or a standby diesel generator. (Function Codes G0, G1, G2, G10, J1, J2)
* Redundant 125V DC Power Systems and a single 250V DC Power Subsystem. (Function Codes H1, H2)
* Redundant Instrument AC Power Systems. (Function Codes Y1, Y2)

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.2.6.2 Cooling Systems [Main Section]

NEI 00-01 Guidance
Various cooling water systems may be required to support safe shutdown system operation, based on plant-specific considerations. Typical uses include:
- RHR/SDC/DH Heat Exchanger cooling water
- Safe shutdown pump cooling (seal coolers, oil coolers)
- Diesel generator cooling
- HVAC system cooling water

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The following fluid systems provide cooling support to the primary shutdown systems selected to accomplish the previously defined safety functions in postulated fire scenarios:
* River Water system. (Function Codes E1, E2)
* RHR Service Water System. (Function Codes D1, D2)
* Emergency Service Water system. (Function Codes F1, F2)
* RHRSW/ESW Discharge system. (Function Code D0)

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.2.6.2 [A] Cooling Systems [HVAC]

NEI 00-01 Guidance
HVAC Systems

HVAC Systems may be required to assure that safe shutdown equipment remains within its operating temperature range, as specified in manufacturer's literature or demonstrated by suitable test methods, and to assure protection for plant operations staff from the effects of fire (smoke, heat, toxic gases, and gaseous fire suppression agents).
HVAC systems may be required to support safe shutdown system operation, based on plant-specific configurations. Typical uses include:
- Main control room, cable spreading room, relay room
- ECCS pump compartments
- Diesel generator rooms
- Switchgear rooms

Plant-specific evaluations are necessary to determine which HVAC systems are essential to safe shutdown equipment operation.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The following HVAC systems provide cooling support to the primary shutdown systems selected to accomplish the previously defined safety functions in postulated fire scenarios:
* Control Building HVAC. (Function Codes N1, N2)
* RCIC,,HPCI, and Core Spray/RHR pump room cooling. (Function Codes L1, L2, Q1, Q2, R1, R2)
* Standby Gas Treatment System/Offgas Stack System. (Function Code P0)
* Diesel room ventilation. (Function Codes K1, K2)
* ESW/RHRSW pump room ventilation. (Function Codes M1, M2)
* Intake Structure ventilation. (Function Codes S1, S2)

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.3 Methodology for Shutdown System Selection

NEI 00-01 Guidance
Refer to Figure 3-2 for a flowchart illustrating the various steps involved in selecting safe shutdown systems and developing the shutdown paths.

The following methodology may be used to define the safe shutdown systems and paths for an Appendix R analysis:

[Refer to hard copy of NEI 00-01 for Figure 3-2]

Applicability
Not Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.3.1 Identify safe shutdown functions

NEI 00-01 Guidance
Review available documentation to obtain an understanding of the available plant systems and the functions required to achieve and maintain safe shutdown. Documents such as the following may be reviewed:

- Operating Procedures (Normal, Emergency, Abnormal)
- System descriptions
- Fire Hazard Analysis
- Single-line electrical diagrams
-Piping and Instrumentation Diagrams (P&IDs)

[BWR] GE Report GE-NE-T43-00002-00-01-R02 entitled "Original Shutdown Paths for the BWR"

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The DAEC safe shutdown systems were chosen to provide redundant means of accomplishing the required safe shutdown functions. Development of the DAEC safe shutdown equipment list and logics was accomplished by reviewing the following documents:
a) Operating Instructions
b) Emergency Operating Procedures
c) Abnormal Operating Procedures
d) Fire Hazard Analysis
e) Piping and Instrumentation Diagrams (P&IDs)
f) Single-Line Diagrams
g) Elementary Drawings
h) Instrument Loop Diagrams
j) System Descriptions

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.3.2 Identify Combinations of Systems that Satisfy Each Safe Shutdown Function

NEI 00-01 Guidance
Given the criteria/assumptions defined in Section 3.1.1, identify the available combinations of systems capable of achieving the safe shutdown functions of reactivity control, pressure control, inventory control, decay heat removal, process monitoring, and support systems such as electrical and cooling systems (refer to Section 3.1.2). This selection process does not restrict the use of other systems. In addition to achieving the required safe shutdown functions, consider spurious operations and power supply issues that could impact the required safe shutdown function.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The DAEC IPLD shows the interrelation of various systems essential for safe shutdown of the plant following an Appendix R event. These systems are organized by alpha-numeric function codes that identify the operational phase associated with the function and the divisional association of the system. Each component within a safe shutdown system that is essential for the system to perform its function is depicted on the SLD corresponding to the assigned function code. Components in the system flow paths that require operation/repositioning to allow the system to function, power supplies for components that require power to achieve their safe shutdown function, and components that could spuriously operate and impair safe shutdown are identified as safe shutdown components on the SLDs.

Reference
FPE-R96-002 Rev. 1
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.3.3 Define Combinations of Systems for Each Safe Shutdown Path

NEI 00-01 Guidance
Select combinations of systems with the capability of performing all of the required safe shutdown functions and designate this set of systems as a safe shutdown path. In many cases, safe shutdown paths may be defined on a divisional basis since the availability of electrical power and other support systems must be demonstrated for each path.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
The DAEC analysis does not designate sets of systems as safe shutdown paths; however, each fire area is evaluated for the availability of systems capable of meeting the performance criteria. This is accomplished using a report from the Database (which identifies equipment and cables located in the fire area), the SLDs (which are used to determine an available success path within a system), and the IPLD (which is used to determine an overall safe shutdown success path).

Reference
FPE-R96-002 Rev. 1
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.1.3.4 Assign Shutdown Paths to Each Combination of Systems

NEI 00-01 Guidance
Assign a path designation to each combination of systems. The path will serve to document the combination of systems relied upon for safe shutdown in each fire area. Refer to Attachment 1 to this document (NEI 00-01) for an example of a table illustrating how to document the various combinations of systems for selected shutdown paths.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
The DAEC analysis does not assign specific designations to the success path (s) chosen for each fire area; however, the primary shutdown division, a safe shutdown path (i.e., listing of credited function codes), and an overall area compliance strategy statement are recorded on the compliance assessment report for each fire area.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2 Safe Shutdown Equipment Selection

NEI 00-01 Guidance
The previous section described the methodology for selecting the systems and paths necessary to achieve and maintain safe shutdown for an exposure fire event (see Section 5.0 DEFINITIONS for "Exposure Fire"). This section describes the criteria/assumptions and selection methodology for identifying the specific safe shutdown equipment necessary for the systems to perform their Appendix R function. The selected equipment should be related back to the safe shutdown systems that they support and be assigned to the same safe shutdown path as that system. The list of safe shutdown equipment will then form the basis for identifying the cables necessary for the operation or that can cause the maloperation of the safe shutdown systems.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.1 Criteria / Assumptions

NEI 00-01 Guidance
Consider the following criteria and assumptions when identifying equipment necessary to perform the required safe shutdown functions:

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.1.1 [Primary Secondary Components]

NEI 00-01 Guidance
3.2.1.1Safe shutdown equipment can be divided into two categories. Equipment may be categorized as (1) primary components or (2) secondary components. Typically, the following types of equipment are considered to be primary components:
- Pumps, motor operated valves, solenoid valves, fans, gas bottles, dampers, unit coolers, etc.
- All necessary process indicators and recorders (i.e., flow indicator, temperature indicator, turbine speed indicator, pressure indicator, level recorder)
- Power supplies or other electrical components that support operation of primary components (i.e., diesel generators, switchgear, motor control centers, load centers, power supplies, distribution panels, etc.).

Secondary components are typically items found within the circuitry for a primary component. These provide a supporting role to the overall circuit function. Some secondary components may provide an isolation function or a signal to a primary component via either an interlock or input signal processor. Examples of secondary components include flow switches, pressure switches, temperature switches, level switches, temperature elements, speed elements, transmitters, converters, controllers, transducers, signal conditioners, hand switches, relays, fuses and various instrumentation devices.

Determine which equipment should be included on the Safe Shutdown Equipment List (SSEL). As an option, include secondary components with a primary component(s) that would be affected by fire damage to the secondary component. By doing this, the SSEL can be kept to a manageable size and the equipment included on the SSEL can be readily related to required post-fire safe shutdown systems and functions.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The DAEC safe shutdown equipment list is a report generated by the Database listing safe shutdown equipment sorted by function code. Each component within a system that is deemed necessary for safe shutdown is given the function code that is assigned to the overall system.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.1.2 [Fire Damage to Mechanical Components (not electrically supervised)]

NEI 00-01 Guidance
3.2.1.2Assume that exposure fire damage to manual valves and piping does not adversely impact their ability to perform their pressure boundary or safe shutdown function (heat sensitive piping materials, including tubing with brazed or soldered joints, are not included in this assumption). Fire damage should be evaluated with respect to the ability to manually open or close the valve should this be necessary as a part of the post-fire safe shutdown scenario.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliance assessments assume that piping (welded and flanged), tanks, heat exchangers, and pressure vessels remain functional during and after a fire. Components subject to fire damage (such as motors, check valves, safety relief valves or valve operators) are evaluated as necessary for post fire operability.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.1.3 [Manual Valve Positions]

NEI 00-01 Guidance
Assume that manual valves are in their normal position as shown on P&IDs or in the plant operating procedures.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliance assessments assume that manually-operated components (such as manual valves) remain in their pre-fire position.

Reference
FPLDA013-PR-007 Rev. 0 [Section 6]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.1.4 [Check Valves]

NEI 00-01 Guidance
Assume that a check valve closes in the direction of potential flow diversion and seats properly with sufficient leak tightness to prevent flow diversion. Therefore, check valves do not adversely affect the flow rate capability of the safe shutdown systems being used for inventory control, decay heat removal, equipment cooling or other related safe shutdown functions.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
Check valves that constitute system boundaries or provide single valve isolation of flow path integrity are included in the DAEC safe shutdown equipment list and logics. The DAEC analysis does not explicitly state the assumption that check valves are leak tight; however, it is inherent in their selection as system boundaries. Check valves in the flow path that allow flow in the desired direction are not included as safe shutdown components.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.1.5 [Instrument Failures]

NEI 00-01 Guidance
Instruments (e.g., resistance temperature detectors, thermocouples, pressure transmitters, and flow transmitters) are assumed to fail upscale, midscale, or downscale as a result of fire damage, whichever is worse. An instrument performing a control function is assumed to provide an undesired signal to the control circuit.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Circuit analyses presented in DAEC fire area compliance summaries assume that instrument cable damage will fail the instrument in the least desirable state (e.g., upscale, midscale, or downscale). Instruments performing control functions are associated with the safe shutdown component being controlled through either (a) selection of scheme cables or (b) tracking of auxiliary contacts. If spurious operation as the result of an auxiliary contact is possible (e.g., instrumentation failing off-scale low results in the auxiliary contacts changing state) and will place the safe shutdown component into an undesired or unacceptable condition, then either the cable(s) or the equipment associated with the auxiliary contact is tracked in the Database.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 4, 5]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.1.6 [Spurious Components]

NEI 00-01 Guidance
Identify equipment that could spuriously operate or mal-operate and impact the performance of equipment on a required safe shutdown path during the equipment selection phase. Consider Bin 1 of RIS 2004-03 during the equipment identification process.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Development of the DAEC safe shutdown equipment list and logics identified components that could spuriously operate and impair safe shutdown as safe shutdown components. Scenarios involving spurious operation of multiple components were incorporated into component selection based on the results of expert panel review (discussed in Attachment F).

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.1.7 [Instrument Tubing]

NEI 00-01 Guidance
Identify instrument tubing that may cause subsequent effects on instrument readings or signals as a result of fire. Determine and consider the fire area location of the instrument tubing when evaluating the effects of fire damage to circuits and equipment in the fire area.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Instrument tubing credited for safe shutdown indication and bi-stable actuation that could adversely affect safe shutdown at DAEC was identified and evaluated. Conclusions of the evaluation are incorporated into DAEC fire area compliance assessments.

Reference
FPE-R98-001 Rev. 3
FPLDA013-PR-007 Rev. 0 [Section 5]

Attachment B
NEI 04-02 Table B-2 Nuclear Safety Capability Assessment Methodology Review

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.2 Methodology for Equipment Selection

NEI 00-01 Guidance
Refer to Figure 3-3 for a flowchart illustrating the various steps involved in selecting safe shutdown equipment.

Use the following methodology to select the safe shutdown equipment for a post-fire safe shutdown analysis:

[Refer to hard copy of NEI 00-01 for Figure 3-3]

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.2.1 Identify the System Flow Path for Each Shutdown Path

NEI 00-01 Guidance
Mark up and annotate a P&ID to highlight the specific flow paths for each system in support of each shutdown path. Refer to Attachment 2 for an example of an annotated P&ID illustrating this concept.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
The DAEC analysis does not retain annotated P&IDs identifying credited flowpaths for safe shutdown systems; however, once the required systems and existing function codes are identified, the P&IDs and the existing SSEL are reviewed to identify all components in these systems that are necessary to support safe shutdown and function codes. This is performed by reviewing the flow paths for the systems and identifying systems boundaries.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.2.2 Identify the Equipment in Each Safe Shutdown System Flow Path Including Equipment That May Spuriously Operate and Affect System Operation

NEI 00-01 Guidance
Review the applicable documentation (e.g. P&IDs, electrical drawings, instrument loop diagrams) to assure that all equipment in each system's flow path has been identified. Assure that any equipment that could spuriously operate and adversely affect the desired system function(s) is also identified. If additional systems are identified which are necessary for the operation of the safe shutdown system under review, include these as systems required for safe shutdown. Designate these new systems with the same safe shutdown path as the primary safe shutdown system under review (Refer to Figure 3-1).

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
Components in the flow paths that require operation/repositioning to allow the system to function, and components which could spuriously operate and impair safe shutdown are verified/identified. Components (manual valves, heat exchangers, check valves, flow orifices etc.) in the flow path are also identified as necessary. Support systems are coded separately because their support role is needed at various times over the entire shutdown process. The DAEC analysis does not designate support systems with the same function code as the primary safe shutdown system under review; however, the IPLD shows the dependencies between main shutdown systems and the various support systems.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.2.3 Develop a List of Safe Shutdown Equipment and Assign the Corresponding System and Safe Shutdown Path(s) Designation to Each.

NEI 00-01 Guidance
Prepare a table listing the equipment identified for each system and the shutdown path that it supports. Identify any valves or other equipment that could spuriously operate and impact the operation of that safe shutdown system. Assign the safe shutdown path for the affected system to this equipment. During the cable selection phase, identify additional equipment required to support the safe shutdown function of the path (e.g., electrical distribution system equipment). Include this additional equipment in the safe shutdown equipment list. Attachment 3 to this document provides an example of a (SSEL). The SSEL identifies the list of equipment within the plant considered for safe shutdown and it documents various equipment-related attributes used in the analysis.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
The DAEC Safe Shutdown Equipment List is a sort of the Database listing safe shutdown equipment sorted by Function Code. The DAEC analysis does not assign sets of systems as safe shutdown paths; however, each component within a safe shutdown system that is essential for the system to perform its function is given the function code that is assigned to the overall system.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.2.4 Identify Equipment Information Required for the Safe Shutdown Analysis

NEI 00-01 Guidance
Collect additional equipment-related information necessary for performing the post-fire safe shutdown analysis for the equipment. In order to facilitate the analysis, tabulate this data for each piece of equipment on the SSEL. Refer to Attachment 3 to this document for an example of a SSEL. Examples of related equipment data should include the equipment type, equipment description, safe shutdown system, safe shutdown path, drawing reference, fire area, fire zone, and room location of equipment. Other information such as the following may be useful in performing the safe shutdown analysis: normal position, hot shutdown position, cold shutdown position, failed air position, failed electrical position, high/low pressure interface concern, and spurious operation concern.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
The DAEC analysis does not tabulate extensive equipment-related information for each piece of equipment on the Safe Shutdown Equipment List; however, adequate controlled data to support the SSA (obtained from the Plant Equipment Database, P&IDs, electrical elementaries, single line and/or loop drawings, general arrangement drawings, existing analyses, plant walkdowns, SLDs, FHA-M series drawings, etc.) is recorded in the Database for each safe shutdown component.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 3, 4]

2.4.2.1 Nuclear Safety Capability System and Equipment Selection

NEI 00-01 Ref.
3.2.2.5 Identify Dependencies Between Equipment, Supporting Equipment, Safe Shutdown Systems and Safe Shutdown Paths.

NEI 00-01 Guidance
In the process of defining equipment and cables for safe shutdown, identify additional supporting equipment such as electrical power and interlocked equipment. As an aid in assessing identified impacts to safe shutdown, consider modeling the dependency between equipment within each safe shutdown path either in a relational database or in the form of a Safe Shutdown Logic Diagram (SSLD). Attachment 4 provides an example of a SSLD that may be developed to document these relationships.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The DAEC SSA is supported by the Database, IPLDs, and SLDs. The Appendix R Safe Shutdown Equipment is represented on the SLDs and is also tracked in the Database. The IPLDs show the dependencies between main shutdown systems and various support systems; they are also used as an analysis tool to ensure that each and every support system needed for a safe shutdown path is accounted for and available.

Reference
FPE-R96-002 Rev. 1
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

2.4.2.2.1 Circuits Required in Nuclear Safety Functions. Circuits required for the nuclear safety functions shall be identified. This includes circuits that are required for operation, that could prevent the operation, or that result in the maloperation of the equipment identified in 2.4.2.1. This evaluation shall consider fire-induced failure modes such as hot shorts (external and internal), open circuits, and shorts to ground, to identify circuits that are required to support the proper operation of components required to achieve the nuclear safety performance criteria, including spurious operation and signals. This will ensure that a comprehensive population of circuitry is evaluated.
2.4.2.2.2 Other Required Circuits. Other circuits that share common power supply and/or common enclosure with circuits required to achieve nuclear safety performance criteria shall be evaluated for their impact on the ability to achieve nuclear safety performance criteria.

(a) Common Power Supply Circuits. Those circuits whose fire-induced failure could cause the loss of a power supply required to achieve the nuclear safety performance criteria shall be identified. This situation could occur if the upstream protection device (i.e., breaker or fuse) is not properly coordinated with the downstream protection device.
(b) Common Enclosure Circuits. Those circuits that share enclosures with circuits required to achieve the nuclear safety performance criteria and whose fire-induced failure could cause the loss of the required components shall be identified. The concern is that the effects of a fire can extend outside of the immediate fire area due to fire-induced electrical faults on inadequately protected cables or via inadequately sealed fire area boundaries.

NEI 00-01 Ref.
3.3 Safe Shutdown Cable Selection and Location

NEI 00-01 Guidance
This section provides industry guidance on the recommended methodology and criteria for selecting safe shutdown cables and determining their potential impact on equipment required for achieving and maintaining safe shutdown of an operating nuclear power plant for the condition of an exposure fire. The Appendix R safe shutdown cable selection criteria are developed to ensure that all cables that could affect the proper operation or that could cause the maloperation of safe shutdown equipment are identified and that these cables are properly related to the safe shutdown equipment whose functionality they could affect. Through this cable-to-equipment relationship, cables become part of the safe shutdown path assigned to the equipment affected by the cable.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.1 Criteria / Assumptions

NEI 00-01 Guidance
To identify an impact to safe shutdown equipment based on cable routing, the equipment must have cables that affect it identified. Carefully consider how cables are related to safe shutdown equipment so that impacts from these cables can be properly assessed in terms of their ultimate impact on safe shutdown system equipment.
Consider the following criteria when selecting cables that impact safe shutdown equipment:

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.1.1 [Cable Selection]

NEI 00-01 Guidance
The list of cables whose failure could impact the operation of a piece of safe shutdown equipment includes more than those cables connected to the equipment. The relationship between cable and affected equipment is based on a review of the electrical or elementary wiring diagrams. To assure that all cables that could affect the operation of the safe shutdown equipment are identified, investigate the power, control, instrumentation, interlock, and equipment status indication cables related to the equipment. Consider reviewing additional schematic diagrams to identify additional cables for interlocked circuits that also need to be considered for their impact on the ability of the equipment to operate as required in support of post-fire safe shutdown. As an option, consider applying the screening criteria from Section 3.5 as a part of this section. For an example of this see Section 3.3.1.4.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
The DAEC analysis does not determine cable selection through application of extensive screening criteria and detailed investigation; however, detailed circuit analysis is performed as part of fire area compliance assessment if required to demonstrate availability of an individual component. All cables associated with a DAEC component (scheme) are identified as safe shutdown cables with the exception of those that are associated with (a) motor or compartment space heater circuits, (b) plant computer inputs, and (c) annunciator system inputs. Although not all of the remaining scheme cables will necessarily impact the ability of the component to perform its safe shutdown function, their inclusion is conservative. If the scheme includes auxiliary contacts that could adversely impact the equipment under evaluation, then either the cables or equipment associated with the auxiliary contacts are tracked. Any other additional cables whose fire induced failure can prevent the safe shutdown component from performing its function (including those identified as a result of High Impedance Fault or Breaker Coordination Studies) are also identified.

Reference
FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.1.2 [Cables Affecting Multiple Components]

NEI 00-01 Guidance
In cases where the failure (including spurious actuations) of a single cable could impact more than one piece of safe shutdown equipment, include the cable with each piece of safe shutdown equipment.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
Required cables are linked with the evaluated component in the Database through direct association (i.e., scheme cables), power supply dependencies, or auxiliary contact evaluations. The DAEC analysis has demonstrated that tracking of cables or equipment associated with auxiliary contacts is not required in the Database if the auxiliary contact is associated with equipment appearing on the same SLD as the evaluated component.

Reference
FPE-R96-002 Rev. 1
FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.1.3 [Isolation Devices]

NEI 00-01 Guidance
Electrical devices such as relays, switches and signal resistor units are considered to be acceptable isolation devices. In the case of instrument loops, review the isolation capabilities of the devices in the loop to determine that an acceptable isolation device has been installed at each point where the loop must be isolated so that a fault would not impact the performance of the safe shutdown instrument function.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliance assessments may incorporate analysis demonstrating that a particular device in the circuit provides acceptable isolation. If the device requires operator activity (e.g., to place a switch in a specific position), the analysis demonstrates that an open circuit, hot short, or short to ground on the isolated portion prior to the operator activity will not adversely impact operation of the component once the handswitch is placed in the 'isolated' position.

Reference
DGC-E100 Rev. 4 [Section 5.2.1]
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.1.4 [Identify "Not Required" Cables]

NEI 00-01 Guidance
Screen out cables for circuits that do not impact the safe shutdown function of a component (i.e., annunciator circuits, space heater circuits and computer input circuits) unless some reliance on these circuits is necessary. However, they must be isolated from the component's control scheme in such a way that a cable fault would not impact the performance of the circuit.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Cables associated with (a) motor or compartment space heater circuits, (b) plant computer inputs, and (c) annunciator system inputs are excluded from the DAEC analysis. Computer and annunciator inputs are isolated from DAEC safe shutdown schemes. Space heater circuits are powered separately from the associated safe shutdown components and have been determined unnecessary for supporting safe shutdown functions.

Reference
FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.1.5 [Identification of Power Supplies]

NEI 00-01 Guidance
For each circuit requiring power to perform its safe shutdown function, identify the cable supplying power to each safe shutdown and/or required interlock component. Initially, identify only the power cables from the immediate upstream power source for these interlocked circuits and components (i.e., the closest power supply, load center or motor control center). Review further the electrical distribution system to capture the remaining equipment from the electrical power distribution system necessary to support delivery of power from either the offsite power source or the emergency diesel generators (i.e., onsite power source) to the safe shutdown equipment. Add this equipment to the safe shutdown equipment list. Evaluate the power cables for this additional equipment for associated circuits concerns.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The power supply (i.e., the MCC or distribution panel identified on elementary, single line, and/or loop drawings; includes source of control power, as applicable) associated with each safe shutdown component is recorded in the Database. Each power supply is assigned the function code corresponding to the applicable power distribution system that provides electrical support to the primary shutdown systems. The IPLDs show the dependencies between main shutdown systems and various support systems.

Reference
FPLDA013-PR-007 Rev. 0 [Section 3]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.1.6 [ESFAS Initiation]

NEI 00-01 Guidance
The automatic initiation logics for the credited post-fire safe shutdown systems are not required to support safe shutdown. Each system can be controlled manually by operator actuation in the main control room or emergency control station. If operator actions outside the MCR are necessary, those actions must conform to the regulatory requirements on manual actions. However, if not protected from the effects of fire, the fire-induced failure of automatic initiation logic circuits must not adversely affect any post-fire safe shutdown system function.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliance assessments demonstrate that safe shutdown capability is not adversely affected by a fire in any plant area that disables automatic functions (including initiation logic). Partial operation of the function codes that have cable hits on Manual Scram, LOLO Set, RCIC, HPCI, Core Spray, RHR, Load Shed and 2nd Level UV logic schemes cannot be credited without a detailed evaluation to determine the impact on the associated components.

Reference
FPE-R96-002 Rev. 1
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.1.7 [Circuit Coordination]

NEI 00-01 Guidance
Cabling for the electrical distribution system is a concern for those breakers that feed associated circuits and are not fully coordinated with upstream breakers. With respect to electrical distribution cabling, two types of cable associations exist. For safe shutdown considerations, the direct power feed to a primary safe shutdown component is associated with the primary component. For example, the power feed to a pump is necessary to support the pump. Similarly, the power feed from the load center to an MCC supports the MCC. However, for cases where sufficient branch-circuit coordination is not provided, the same cables discussed above would also support the power supply. For example, the power feed to the pump discussed above would support the bus from which it is fed because, for the case of a common power source analysis, the concern is the loss of the upstream power source and not the connected load. Similarly, the cable feeding the MCC from the load center would also be necessary to support the load center.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Required cables are linked with the evaluated component in the Database through direct association (i.e., scheme cables), power supply dependencies, or auxiliary contact evaluations. Any other additional cables whose fire induced failure can prevent the safe shutdown component from performing its function (including those identified as a result of High Impedance Fault or Breaker Coordination Studies) are also identified. In those systems and portions of systems for which complete coordination cannot be demonstrated, the DAEC analysis associates all load feeder cables with the affected safe shutdown load center(s).

Reference
FPE-R97-002 Rev. 3
FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.2 Associated Circuit Cables

NEI 00-01 Guidance
Appendix R, Section III.G.2, requires that separation features be provided for equipment and cables, including associated nonsafety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve hot shutdown. The three types of associated circuits were identified in Reference 6.1.5 and further clarified in a NRC memorandum dated March 22, 1982 from R. Mattson to D. Eisenhut, Reference 6.1.6. They are as follows:
- Spurious actuations
- Common power source
- Common enclosure.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.2 [A] Associated Circuit Cables - Cables Whose Failure May Cause Spurious Actuations

NEI 00-01 Guidance
Safe shutdown system spurious actuation concerns can result from fire damage to a cable whose failure could cause the spurious actuation/mal-operation of equipment whose operation could affect safe shutdown. These cables are identified in Section 3.3.3 together with the remaining safe shutdown cables required to support control and operation of the equipment.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in sub-section 3.3.3.2.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.2 [B] Associated Circuit Cables - Common Power Source Cables

NEI 00-01 Guidance
The concern for the common power source associated circuits is the loss of a safe shutdown power source due to inadequate breaker/fuse coordination. In the case of a fire-induced cable failure on a non-safe shutdown load circuit supplied from the safe shutdown power source, a lack of coordination between the upstream supply breaker/fuse feeding the safe shutdown power source and the load breaker/fuse supplying the non-safe shutdown faulted circuit can result in loss of the safe shutdown bus. This would result in the loss of power to the safe shutdown equipment supplied from that power source preventing the safe shutdown equipment from performing its required safe shutdown function. Identify these cables together with the remaining safe shutdown cables required to support control and operation of the equipment. Refer to Section 3.5.2.4 for an acceptable methodology for analyzing the impact of these cables on post-fire safe shutdown.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in sub-section 3.5.2.4.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.2 [C] Associated Circuit Cables - Common Enclosure Cables

NEI 00-01 Guidance
The concern with common enclosure associated circuits is fire damage to a cable whose failure could propagate to other safe shutdown cables in the same enclosure either because the circuit is not properly protected by an isolation device (breaker/fuse) such that a fire-induced fault could result in ignition along its length, or by the fire propagating along the cable and into an adjacent fire area. This fire spread to an adjacent fire area could impact safe shutdown equipment in that fire area, thereby resulting in a condition that exceeds the criteria and assumptions of this methodology (i.e., multiple fires). Refer to Section 3.5.2.5 for an acceptable methodology for analyzing the impact of these cables on post-fire safe shutdown.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in sub-section 3.5.2.5.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.3 Methodology for Cable Selection and Location

NEI 00-01 Guidance
Refer to Figure 3-4 for a flowchart illustrating the various steps involved in selecting the cables necessary for performing a post-fire safe shutdown analysis.
Use the following methodology to define the cables required for safe shutdown including cables that may cause associated circuits concerns for a post-fire safe shutdown analysis:

[Refer to hard copy of NEI 00-01 for Figure 3-4]

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.3.1 Identify Circuits Required for the Operation of the Safe Shutdown Equipment

NEI 00-01 Guidance
For each piece of safe shutdown equipment defined in section 3.2, review the appropriate electrical diagrams including the following documentation to identify the circuits (power, control, instrumentation) required for operation or whose failure may impact the operation of each piece of equipment:
- Single-line electrical diagrams
- Elementary wiring diagrams
- Electrical connection diagrams
- Instrument loop diagrams.

For electrical power distribution equipment such as power supplies, identify any circuits whose failure may cause a coordination concern for the bus under evaluation.
If power is required for the equipment, include the closest upstream power distribution source on the safe shutdown equipment list. Through the iterative process described in Figures 3-2 and 3-3, include the additional upstream power sources up to either the offsite or the emergency power source.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The cable identification process for DAEC safe shutdown components uses the elementary diagrams, single line diagrams and/or loop diagrams to identify the pertinent circuit(s) required for operation of the subject equipment. All cables associated with a DAEC component (scheme) are identified as safe shutdown cables with the exception of those that are associated with (a) motor or compartment space heater circuits, (b) plant computer inputs, and (c) annunciator system inputs. Although not all of the remaining scheme cables will necessarily impact the ability of the component to perform its safe shutdown function, their inclusion is conservative.

Reference
FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.3.2 Identify Interlocked Circuits and Cables Whose Spurious Operation or Mal-operation Could Affect Shutdown

NEI 00-01 Guidance
In reviewing each control circuit, investigate interlocks that may lead to additional circuit schemes, cables and equipment. Assign to the equipment any cables for interlocked circuits that can affect the equipment.
While investigating the interlocked circuits, additional equipment or power sources may be discovered. Include these interlocked equipment or power sources in the safe shutdown equipment list (refer to Figure 3-3) if they can impact the operation of the equipment under consideration.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
If the component scheme includes auxiliary contacts that could adversely impact the equipment under evaluation, then either the cables or equipment associated with the auxiliary contacts are tracked.

Reference
FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.3.3.3 Assign Cables to the Safe Shutdown Equipment

NEI 00-01 Guidance
Given the criteria/assumptions defined in Section 3.3.1, identify the cables required to operate or that may result in maloperation of each piece of safe shutdown equipment.
Tabulate the list of cables potentially affecting each piece of equipment in a relational database including the respective drawing numbers, their revision and any interlocks that are investigated to determine their impact on the operation of the equipment. In certain cases, the same cable may support multiple pieces of equipment. Relate the cables to each piece of equipment, but not necessarily to each supporting secondary component.
If adequate coordination does not exist for a particular circuit, relate the power cable to the power source. This will ensure that the power source is identified as affected equipment in the fire areas where the cable may be damaged.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Adequate controlled data to support circuit analysis (obtained from the Plant Equipment Database, electrical elementaries, single line and/or loop drawings, existing analyses, SLDs, etc.) is recorded in the Database for each safe shutdown component.

Reference
FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5 Circuit Analysis and Evaluation

NEI 00-01 Guidance
This section on circuit analysis provides information on the potential impact of fire on circuits used to monitor, control and power safe shutdown equipment. Applying the circuit analysis criteria will lead to an understanding of how fire damage to the cables may affect the ability to achieve and maintain post-fire safe shutdown in a particular fire area. This section should be used in conjunction with Section 3.4, to evaluate the potential fire-induced impacts that require mitigation.
Appendix R Section III.G.2 identifies the fire-induced circuit failure types that are to be evaluated for impact from exposure fires on safe shutdown equipment. Section III.G.2 of Appendix R requires consideration of hot shorts, shorts-to-ground and open circuits.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.1 Criteria / Assumptions

NEI 00-01 Guidance
Apply the following criteria/assumptions when performing fire-induced circuit failure evaluations.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.1.1 [Circuit Failure Types and Impact]

NEI 00-01 Guidance
Consider the following circuit failure types on each conductor of each unprotected safe shutdown cable to determine the potential impact of a fire on the safe shutdown equipment associated with that conductor.
- A hot short may result from a fire-induced insulation breakdown between conductors of the same cable, a different cable or from some other external source resulting in a compatible but undesired impressed voltage or signal on a specific conductor. A hot short may cause a spurious operation of safe shutdown equipment.
- An open circuit may result from a fire-induced break in a conductor resulting in the loss of circuit continuity. An open circuit may prevent the ability to control or power the affected equipment. An open circuit may also result in a change of state for normally energized equipment. (e.g. [for BWRs] loss of power to the Main Steam Isolation Valve (MSIV) solenoid valves due to an open circuit will result in the closure of the MSIVs). Note that RIS 2004-03 indicates that open circuits, as an initial mode of cable failures, are considered to be of very low likelihood. The risk-informed inspection process will focus on failures with relatively high probabilities.
- A short-to-ground may result from a fire-induced breakdown of a cable insulation system, resulting in the potential on the conductor being applied to ground potential. A short-to-ground may have all of the same effects as an open circuit and, in addition, a short-to-ground may also cause an impact to the control circuit or power train of which it is a part.

Consider the three types of circuit failures identified above to occur individually on each conductor of each safe shutdown cable on the required safe shutdown path in the fire area.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The fire area compliance assessment report identifies all cables located in the fire area that may adversely affect safe shutdown equipment as a result of opens, shorts, or hot shorts. Where necessary to demonstrate availability of a credited safe shutdown function code, circuit analysis performed as part of the DAEC fire area compliance assessment considers the potential impact of hot shorts, open circuits, and shorts-to-ground on unprotected cables.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 4, 5]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.1.2 [Circuit Contacts and Operational Modes]

NEI 00-01 Guidance
Assume that circuit contacts are positioned (i.e., open or closed) consistent with the normal mode/position of the safe shutdown equipment as shown on the schematic drawings. The analyst must consider the position of the safe shutdown equipment for each specific shutdown scenario when determining the impact that fire damage to a particular circuit may have on the operation of the safe shutdown equipment.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC cable selection assumes all switch positions to be in the normal line up for 100% power operation based on the applicable Operating Instruction System electrical lineup. A high drywell pressure signal is assumed to be present if it results in the worst case evaluation for auxiliary contacts in the component scheme. If this signal does not result in the worst case condition, credit for the signal is not taken. Contacts are evaluated in both open and closed positions.

Reference
FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.1.3 [Duration of Circuit Failures]

NEI 00-01 Guidance
Assume that circuit failure types resulting in spurious operations exist until action has been taken to isolate the given circuit from the fire area, or other actions have been taken to negate the effects of circuit failure that is causing the spurious actuation. The fire is not assumed to eventually clear the circuit fault. Note that RIS 2004-03 indicates that fire-induced hot shorts typically self-mitigate after a limited period of time.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
The DAEC analysis does not specifically state this assumption; however, it is inherent in a deterministic analysis that the circuit fault exists until positive action is taken to clear it. Hot shorts resulting in spurious actuations are not assumed to self-mitigate after a limited period of time. Analyses of the postulated fire time line demonstrate that there is sufficient time to travel to each action location and perform the action required to support the associated shutdown function(s) such that an unrecoverable condition does not occur.

Reference
FPLDA013-PR-007 Rev. 0 [Section 6]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.1.4 [Cable Failure Configurations]

NEI 00-01 Guidance
When both trains are in the same fire area outside of primary containment, all cables that do not meet the separation requirements of Section III.G.2 are assumed to fail in their worst case configuration.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliance assessments initially assume that damage to any cable listed on the compliance assessment report results in failure of the associated component to accomplish its SSD function. Circuit analysis, if required to demonstrate availability of an individual component, is documented in a separate written summary during compliance assessment.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 4, 5]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.1.5 [A, Circuit Failure Risk Assessment Guidance]

NEI 00-01 Guidance
The following guidance provides the NRC inspection focus from Bin 1 of RIS 2004-03 in order to identify any potential combinations of spurious operations with higher risk significance. Bin 1 failures should also be the focus of the analysis; however, NRC has indicated that other types of failures required by the regulations for analysis should not be disregarded even if in Bin 2 or 3. If Bin 1 changes in subsequent revisions of RIS 2004-03, the guidelines in the revised RIS should be followed.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.1.5 [B, Cable Failure Modes]

NEI 00-01 Guidance
For multiconductor cables testing has demonstrated that conductor-to-conductor shorting within the same cable is the most common mode of failure. This is often referred to as "intra-cable shorting." It is reasonable to assume that given damage, more than one conductor-to-conductor short will occur in a given cable. A second primary mode of cable failure is conductor-to-conductor shorting between separate cables, commonly referred to as "inter-cable shorting." Inter-cable shorting is less likely than intra-cable shorting. Consistent with the current knowledge of fire-induced cable failures, the following configurations should be considered:

A. For any individual multiconductor cable (thermoset or thermoplastic), any and all potential spurious actuations that may result from intra-cable shorting, including any possible combination of conductors within the cable, may be postulated to occur concurrently regardless of number. However, as a practical matter, the number of combinations of potential hot shorts increases rapidly with the number of conductors within a given cable. For example, a multiconductor cable with three conductors (3C) has 3 possible combinations of two (including desired combinations), while a five conductor cable (5C) has 10 possible combinations of two (including desired combinations), and a seven conductor cable (7C) has 21 possible combinations of two (including desired combinations). To facilitate an inspection that considers most of the risk presented by postulated hot shorts within a multiconductor cable, inspectors should consider only a few (three or four) of the most critical postulated combinations.

B. For any thermoplastic cable, any and all potential spurious actuations that may result from intra-cable and inter-cable shorting with other thermoplastic cables, including any possible combination of conductors within or between the cables, may be postulated to occur concurrently regardless of number. (The consideration of thermoset cable inter-cable shorts is deferred pending additional research.)

C. For cases involving the potential damage of more than one multiconductor cable, a maximum of two cables should be assumed to be damaged concurrently. The spurious actuations should be evaluated as previously described. The consideration of more than two cables being damaged (and subsequent spurious actuations) is deferred pending additional research.

D. For cases involving direct current (DC) circuits, the potential spurious operation due to failures of the associated control cables (even if the spurious operation requires two concurrent hot shorts of the proper polarity, e.g., plus-to-plus and minus-to-minus) should be considered when the required source and target conductors are each located within the same multiconductor cable.

E. Instrumentation Circuits. Required instrumentation circuits are beyond the scope of this associated circuit approach and must meet the same requirements as required power and control circuits. There is one case where an instrument circuit could potentially be considered an associated circuit. If fire-induced damage of an instrument circuit could prevent operation (e.g., lockout permissive signal) or cause maloperation (e.g., unwanted start/stop/reposition signal) of systems necessary to achieve and maintain hot shutdown, then the instrument circuit may be considered an associated circuit and handled accordingly.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Circuit analysis presented in the DAEC fire area compliance summaries considered all potential fault consequences due to any combination of hot shorts (intracable or intercable), shorts to ground, or open circuits for multiconductor cables.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 4, 5]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.2 Types of Circuit Failures

NEI 00-01 Guidance
Appendix R requires that nuclear power plants must be designed to prevent exposure fires from defeating the ability to achieve and maintain post-fire safe shutdown. Fire damage to circuits that provide control and power to equipment on the required safe shutdown path and any other equipment whose spurious operation/mal-operation could affect shutdown in each fire area must be evaluated for the effects of a fire in that fire area. Only one fire at a time is assumed to occur. The extent of fire damage is assumed to be limited by the boundaries of the fire area. Given this set of conditions, it must be assured that one redundant train of equipment capable of achieving hot shutdown is free of fire damage for fires in every plant location. To provide this assurance, Appendix R requires that equipment and circuits required for safe shutdown be free of fire damage and that these circuits be designed for the fire-induced effects of a hot short, short-to-ground, and open circuit. With respect to the electrical distribution system, the issue of breaker coordination must also be addressed.
This section will discuss specific examples of each of the following types of circuit failures:
- Open circuit
- Short-to-ground
- Hot short.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.2.1 Circuit Failures Due to an Open Circuit

NEI 00-01 Guidance
This section provides guidance for addressing the effects of an open circuit for safe shutdown equipment. An open circuit is a fire-induced break in a conductor resulting in the loss of circuit continuity. An open circuit will typically prevent the ability to control or power the affected equipment. An open circuit can also result in a change of state for normally energized equipment. For example, a loss of power to the main steam isolation valve (MSIV) solenoid valves [for BWRs] due to an open circuit will result in the closure of the MSIV.

NOTE: The EPRI circuit failure testing indicated that open circuits are not likely to be the initial fire-induced circuit failure mode. Consideration of this may be helpful within the safe shutdown analysis. Consider the following consequences in the safe shutdown circuit analysis when determining the effects of open circuits:

Loss of electrical continuity may occur within a conductor resulting in de-energizing the circuit and causing a loss of power to, or control of, the required safe shutdown equipment.

In selected cases, a loss of electrical continuity may result in loss of power to an interlocked relay or other device. This loss of power may change the state of the equipment. Evaluate this to determine if equipment fails safe.

Open circuit on a high voltage (e.g., 4.16 kV) ammeter current transformer (CT) circuit may result in secondary damage.

Figure 3.5.2-1 shows an open circuit on a grounded control circuit.

[Refer to hard copy of NEI 00-01 for Figure 3.5.2-1]

Open circuit No. 1:
An open circuit at location No. 1 will prevent operation of the subject equipment.

Open circuit No. 2:
An open circuit at location No. 2 will prevent opening/starting of the subject equipment, but will not impact the ability to close/stop the equipment.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The fire area compliance assessment report identifies all cables located in the fire area that may adversely affect safe shutdown equipment as a result of opens, shorts, or hot shorts. Where necessary to demonstrate availability of a credited safe shutdown function code, circuit analysis performed as part of the DAEC fire area compliance assessment addresses the effects of an open circuit for the required component(s).

Reference
FPLDA013-PR-007 Rev. 0 [Sections 4, 5]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.2.2 Circuit Failures Due to a Short-to-Ground [A, General]

NEI 00-01 Guidance
This section provides guidance for addressing the effects of a short-to-ground on circuits for safe shutdown equipment. A short-to-ground is a fire-induced breakdown of a cable insulation system resulting in the potential on the conductor being applied to ground potential. A short-to-ground can cause a loss of power to or control of required safe shutdown equipment. In addition, a short-to-ground may affect other equipment in the electrical power distribution system in the cases where proper coordination does not exist.

Consider the following consequences in the post-fire safe shutdown analysis when determining the effects of circuit failures related to shorts-to-ground:
- A short to ground in a power or a control circuit may result in tripping one or more isolation devices (i.e. breaker/fuse) and causing a loss of power to or control of required safe shutdown equipment.

- In the case of certain energized equipment such as HVAC dampers, a loss of control power may result in loss of power to an interlocked relay or other device that may cause one or more spurious operations.

Applicability
Applicable

Alignment Statement	**Alignment Basis**	**Reference**
NOT REQUIRED	This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.	

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.2.2 Circuit Failures Due to a Short-to-Ground [B, Grounded Circuits]

NEI 00-01 Guidance
This section provides guidance for addressing the effects of a short-to-ground on circuits for safe shutdown equipment. A short-to-ground is a fire-induced breakdown of a cable insulation system resulting in the potential on the conductor being applied to ground potential. A short-to-ground can cause a loss of power to or control of required safe shutdown equipment. In addition, a short-to-ground may affect other equipment in the electrical power distribution system in the cases where proper coordination does not exist.
Short-to-Ground on Grounded Circuits

Typically, in the case of a grounded circuit, a short-to-ground on any part of the circuit would present a concern for tripping the circuit isolation device thereby causing a loss of control power.

Figure 3.5.2-2 illustrates how a short-to-ground fault may impact a grounded circuit.

[Refer to hard copy of NEI 00-01 Rev. 1 for Figure 3.5.2-2]

Short-to-ground No. 1:
A short-to-ground at location No. 1 will result in the control power fuse blowing and a loss of power to the control circuit. This will result an inability to operate the equipment using the control switch. Depending on the coordination characteristics between the protective device on this circuit and upstream circuits, the power supply to other circuits could be affected.

Short-to-ground No. 2:
A short-to-ground at location No. 2 will have no effect on the circuit until the close/stop control switch is closed. Should this occur, the effect would be identical to that for the short-to-ground at location No. 1 described above. Should the open/start control switch be closed prior to closing the close/stop control switch, the equipment will still be able to be opened/started.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The fire area compliance assessment report identifies all cables located in the fire area that may adversely affect safe shutdown equipment as a result of opens, shorts, or hot shorts. Where necessary to demonstrate availability of a credited safe shutdown function code, circuit analysis performed as part of the DAEC fire area compliance assessment addresses the effects of a short-to-ground on grounded circuits for the required component(s). In addition to spurious closing or opening of auxiliary contacts, the impact of a short-to-ground on cables from a different scheme that control the state of the contacts is evaluated.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 4, 5]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.2.2 Circuit Failures Due to a Short-to-Ground [C, Ungrounded Circuits]

NEI 00-01 Guidance
Short-to-Ground on Ungrounded Circuits

In the case of an ungrounded circuit, postulating only a single short-to-ground on any part of the circuit may not result in tripping the circuit isolation device. Another short-to-ground on the circuit or another circuit from the same source would need to exist to cause a loss of control power to the circuit.

Figure 3.5.2-3 illustrates how a short to ground fault may impact an ungrounded circuit.

[Refer to hard copy of NEI 00-01 Rev. 1 for Figure 3.5.2-3]

Short-to-ground No. 1: A short-to-ground at location No. 1 will result in the control power fuse blowing and a loss of power to the control circuit if short-to-ground No. 3 also exists either within the same circuit or on any other circuit fed from the same power source. This will result in an inability to operate the equipment using the control switch. Depending on the coordination characteristics between the protective device on this circuit and upstream circuits, the power supply to other circuits could be affected.

Short-to-ground No. 2:

A short-to-ground at location No. 2 will have no effect on the circuit until the close/stop control switch is closed. Should this occur, the effect would be identical to that for the short-to-ground at location No. 1 described above. Should the open/start control switch be closed prior to closing the close/stop control switch, the equipment will still be able to be opened/started.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The fire area compliance assessment report identifies all cables located in the fire area that may adversely affect safe shutdown equipment as a result of opens, shorts, or hot shorts. Where necessary to demonstrate availability of a credited safe shutdown function code, circuit analysis performed as part of the DAEC fire area compliance assessment addresses the effects of a short-to-ground on ungrounded circuits for the required component(s). In addition to spurious closing or opening of auxiliary contacts, the impact of a short-to-ground on cables from a different scheme that control the state of the contacts is evaluated.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 4, 5]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.2.3 Circuit Failures Due to a Hot Short [A, General]

NEI 00-01 Guidance
This section provides guidance for analyzing the effects of a hot short on circuits for required safe shutdown equipment. A hot short is defined as a fire-induced insulation breakdown between conductors of the same cable, a different cable or some other external source resulting in an undesired impressed voltage on a specific conductor. The potential effect of the undesired impressed voltage would be to cause equipment to operate or fail to operate in an undesired manner.

Consider the following specific circuit failures related to hot shorts as part of the post-fire safe shutdown analysis:

- A hot short between an energized conductor and a de-energized conductor within the same cable may cause a spurious actuation of equipment. The spuriously actuated device (e.g., relay) may be interlocked with another circuit that causes the spurious actuation of other equipment. This type of hot short is called a conductor-to-conductor hot short or an internal hot short.

- A hot short between any external energized source such as an energized conductor from another cable (thermoplastic cables only) and a de-energized conductor may also cause a spurious actuation of equipment. This is called a cable-to-cable hot short or an external hot short. Cable-to-cable hot shorts between thermoset cables are not postulated to occur pending additional research.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.2.3 Circuit Failures Due to a Hot Short [B, Grounded Circuits]

NEI 00-01 Guidance
A Hot Short on Grounded Circuits

A short-to-ground is another failure mode for a grounded control circuit. A short-to-ground as described above would result in de-energizing the circuit. This would further reduce the likelihood for the circuit to change the state of the equipment either from a control switch or due to a hot short. Nevertheless, a hot short still needs to be considered. Figure 3.5.2-4 shows a typical grounded control circuit that might be used for a motor-operated valve. However, the protective devices and position indication lights that would normally be included in the control circuit for a motor-operated valve have been omitted, since these devices are not required to understand the concepts being explained in this section. In the discussion provided below, it is assumed that a single fire in a given fire area could cause any one of the hot shorts depicted. The following discussion describes how to address the impact of these individual cable faults on the operation of the equipment controlled by this circuit.

[Refer to hard copy of NEI 00-01 Rev. 1 for Figure 3.5.2-4]

Hot short No. 1:
A hot short at this location would energize the close relay and result in the undesired closure of a motor-operated valve.

Hot short No. 2:
A hot short at this location would energize the open relay and result in the undesired opening of a motor-operated valve.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The fire area compliance assessment report identifies all cables located in the fire area that may adversely affect safe shutdown equipment as a result of opens, shorts, or hot shorts. Where necessary to demonstrate availability of a credited safe shutdown function code, circuit analysis performed as part of the DAEC fire area compliance assessment addresses the effects of a hot short on grounded circuits for the required component(s). In addition to spurious closing or opening of auxiliary contacts, the impact of a hot short on cables from a different scheme that control the state of the contacts is evaluated.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 4, 5]

2.4.2.2 Nuclear Safety Capability Circuit Analysis

NEI 00-01 Ref.
3.5.2.3 Circuit Failures Due to a Hot Short [C, Ungrounded Circuits]

NEI 00-01 Guidance
A Hot Short on Ungrounded Circuits

In the case of an ungrounded circuit, a single hot short may be sufficient to cause a spurious operation. A single hot short can cause a spurious operation if the hot short comes from a circuit from the positive leg of the same ungrounded source as the affected circuit.

In reviewing each of these cases, the common denominator is that in every case, the conductor in the circuit between the control switch and the start/stop coil must be involved.

Figure 3.5.2-5 depicted below shows a typical ungrounded control circuit that might be used for a motor-operated valve. However, the protective devices and position indication lights that would normally be included in the control circuit for a motor-operated valve have been omitted, since these devices are not required to understand the concepts being explained in this section.

In the discussion provided below, it is assumed that a single fire in a given fire area could cause any one of the hot shorts depicted. The discussion provided below describes how to address the impact of these cable faults on the operation of the equipment controlled by this circuit.

[Refer to hard copy of NEI 00-01 Rev. 1 for Figure 3.5.2-5]

Hot short No. 1:
A hot short at this location from the same control power source would energize the close relay and result in the undesired closure of a motor operated valve.

Hot short No. 2:
A hot short at this location from the same control power source would energize the open relay and result in the undesired opening of a motor operated valve.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The fire area compliance assessment report identifies all cables located in the fire area that may adversely affect safe shutdown equipment as a result of opens, shorts, or hot shorts. Where necessary to demonstrate availability of a credited safe shutdown function code, circuit analysis performed as part of the DAEC fire area compliance assessment addresses the effects of a hot short on ungrounded circuits for the required component(s). In addition to spurious closing or opening of auxiliary contacts, the impact of a hot short on cables from a different scheme that control the state of the contacts is evaluated.

Reference
FPLDA013-PR-007 Rev. 0 [Sections 4, 5]

2.4.2.3 Nuclear Safety Equipment and Cable Location.

Nuclear Safety Equipment and Cable Location. Physical location of equipment and cables shall be identified.

NEI 00-01 Ref.	**NEI 00-01 Guidance**	
3.3.3.4 Identify Routing of Cables	Identify the routing for each cable including all raceway and cable endpoints. Typically, this information is obtained from joining the list of safe shutdown cables with an existing cable and raceway database	
Applicability		
Applicable		
Alignment Statement	**Alignment Basis**	**Reference**
ALIGNS	The Cable/Raceway report (a compilation of Fire Zone/Fire Area, cable and raceway data input) contains data on all safe shutdown cables contained in the Database.	FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.3 Nuclear Safety Equipment and Cable Location.

NEI 00-01 Ref.
3.3.3.5 Identify Location of Raceway and Cables by Fire Area

NEI 00-01 Guidance
Identify the fire area location of each raceway and cable endpoint identified in the previous step and join this information with the cable routing data. In addition, identify the location of field-routed cable by fire area. This produces a database containing all of the cables requiring fire area analysis, their locations by fire area, and their raceway.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The as-built fire zone routing of each raceway for safe shutdown cables is identified using walkdowns or BECH-E3xx series drawings.

Reference
FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.3 Nuclear Safety Equipment and Cable Location.

NEI 00-01 Ref.
3.5.2.4 Circuit Failures Due to Inadequate Circuit Coordination

NEI 00-01 Guidance
The evaluation of associated circuits of a common power source consists of verifying proper coordination between the supply breaker/fuse and the load breakers/fuses for power sources that are required for safe shutdown. The concern is that, for fire damage to a single power cable, lack of coordination between the supply breaker/fuse and the load breakers/fuses can result in the loss of power to a safe shutdown power source that is required to provide power to safe shutdown equipment.

For the example shown in Figure 3.5.2-6, the circuit powered from load breaker 4 supplies power to a non-safe shutdown pump. This circuit is damaged by fire in the same fire area as the circuit providing power to from the Train B bus to the Train B pump, which is redundant to the Train A pump.

To assure safe shutdown for a fire in this fire area, the damage to the non-safe shutdown pump powered from load breaker 4 of the Train A bus cannot impact the availability of the Train A pump, which is redundant to the Train B pump. To assure that there is no impact to this Train A pump due to the associated circuits' common power source breaker coordination issue, load breaker 4 must be fully coordinated with the feeder breaker to the Train A bus.

[Refer to hard copy of NEI 00-01 Rev. 1 for Figure 3.5.2-6]

A coordination study should demonstrate the coordination status for each required common power source. For coordination to exist, the time-current curves for the breakers, fuses and/or protective relaying must demonstrate that a fault on the load circuits is isolated before tripping the upstream breaker that supplies the bus. Furthermore, the available short circuit current on the load circuit must be considered to ensure that coordination is demonstrated at the maximum fault level.

The methodology for identifying potential associated circuits of a common power source and evaluating circuit coordination cases of associated circuits on a single circuit fault basis is as follows:

- Identify the power sources required to supply power to safe shutdown equipment.
- For each power source, identify the breaker/fuse ratings, types, trip settings and coordination characteristics for the incoming source breaker supplying the bus and the breakers/fuses feeding the loads supplied by the bus.
- For each power source, demonstrate proper circuit coordination using acceptable industry methods.
- For power sources not properly coordinated, tabulate by fire area the routing of cables whose breaker/fuse is not properly coordinated with the supply breaker/fuse. Evaluate the potential for disabling power to the bus in each of the fire areas in which the associated circuit cables of concern are routed and the power source is required for safe shutdown. Prepare a list of the following information for each fire area:

  - Cables of concern.
  - Affected common power source and its path.
  - Raceway in which the cable is enclosed.
  - Sequence of the raceway in the cable route.
  - Fire zone/area in which the raceway is located.

For fire zones/areas in which the power source is disabled, the effects are mitigated by appropriate methods.

Develop analyzed safe shutdown circuit dispositions for the associated circuit of concern cables routed in an area of the same path as required by the power source. Evaluate adequate separation based upon the criteria in Appendix R, NRC staff guidance, and plant licensing bases.

Applicability
Applicable

2.4.2.3 Nuclear Safety Equipment and Cable Location.

Alignment Statement	Alignment Basis	Reference
ALIGNS	Coordination calculations are performed at DAEC on an as-needed basis using recognized computer applications. In those systems and portions of systems for which complete coordination cannot be demonstrated, the DAEC analysis associates all load feeder cables with the affected safe shutdown load center(s).	CAL-E08-006 Rev. 0 CAL-E08-007 Rev. 0 CAL-E08-008 Rev. 0 CAL-E08-010 Rev. 0 FPE-R97-002 Rev. 3 FPLDA013-PR-007 Rev. 0 [Section 4]

2.4.2.3 Nuclear Safety Equipment and Cable Location.

NEI 00-01 Ref.
3.5.2.5 Circuit Failures Due to Common Enclosure Concerns

NEI 00-01 Guidance
The common enclosure associated circuit concern deals with the possibility of causing secondary failures due to fire damage to a circuit either whose isolation device fails to isolate the cable fault or protect the faulted cable from reaching its ignition temperature, or the fire somehow propagates along the cable into adjoining fire areas.

The electrical circuit design for most plants provides proper circuit protection in the form of circuit breakers, fuses and other devices that are designed to isolate cable faults before ignition temperature is reached. Adequate electrical circuit protection and cable sizing are included as part of the original plant electrical design maintained as part of the design change process. Proper protection can be verified by review of as-built drawings and change documentation. Review the fire rated barrier and penetration designs that preclude the propagation of fire from one fire area to the next to demonstrate that adequate measures are in place to alleviate fire propagation concerns.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Common enclosure concerns are addressed by installing appropriately-sized protective devices specified through controlled analysis of power system configuration. Cables are sized based on the maximum fault current level and the circuit protection clearing time. Fire area barrier penetrations (including electrical penetrations) have a fire rating that is equivalent to the required rating of the fire area barrier. The fire area barrier must have a fire rating of three hours or be evaluated to be adequate for the hazard.

Reference
ACP 1203.59
DBD-A61-009 Rev. 1 [Section 4.1.1.1(c)]
FHA-400 Rev. 11 [Section 3.6]
LDR-82-180
NRC letter dated January 6, 1983

2.4.2.4 Fire Area Assessment.

Fire Area Assessment. An engineering analysis shall be performed in accordance with the requirements of Section 2.3 for each fire area to determine the effects of fire or fire suppression activities on the ability to achieve the nuclear safety performance criteria of Section 1.5. [See Chapter 4 for methods of achieving these performance criteria (performance-based or deterministic).

NEI 00-01 Ref.	NEI 00-01 Guidance
3.4 Fire Area Assessment and Compliance Assessment	By determining the location of each component and cable by fire area and using the cable to equipment relationships described above, the affected safe shutdown equipment in each fire area can be determined. Using the list of affected equipment in each fire area, the impacts to safe shutdown systems, paths and functions can be determined. Based on an assessment of the number and types of these impacts, the required safe shutdown path for each fire area can be determined. The specific impacts to the selected safe shutdown path can be evaluated using the circuit analysis and evaluation criteria contained in Section 3.5 of this document. Having identified all impacts to the required safe shutdown path in a particular fire area, this section provides guidance on the techniques available for individually mitigating the effects of each of the potential impacts.

Applicability
Applicable

Alignment Statement	Alignment Basis	Reference
NOT REQUIRED	This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.	

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.1 Criteria / Assumptions

NEI 00-01 Guidance
The following criteria and assumptions apply when performing fire area compliance assessment to mitigate the consequences of the circuit failures identified in the previous sections for the required safe shutdown path in each fire area.

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.1.1 [Number of Postulated Fires]

NEI 00-01 Guidance
Assume only one fire in any single fire area at a time.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliance assessments assume a fire involving either transient or in situ combustibles occurs in only one plant fire area at a time. Unrelated fires in two or more fire areas are assumed not to occur.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.1.2 [Damage to Unprotected Equipment and Cables]

NEI 00-01 Guidance
Assume that the fire may affect all unprotected cables and equipment within the fire area. This assumes that neither the fire size nor the fire intensity is known. This is conservative and bounds the exposure fire that is required by the regulation.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliance assessments assume that all equipment listed on the compliance assessment report is potentially affected by fire. Components can be affected by (a) location in the fire area, (b) auxiliary contact cables/equipment located in the fire, (c) loss of a power supply component, (d) cable damage, and (e) common power supply concerns.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.1.3 [Assess Impacts to Required Components]

NEI 00-01 Guidance
Address all cable and equipment impacts affecting the required safe shutdown path in the fire area. All potential impacts within the fire area must be addressed. The focus of this section is to determine and assess the potential impacts to the required safe shutdown path selected for achieving post-fire safe shutdown and to assure that the required safe shutdown path for a given fire area is properly protected.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliance assessments document a compliance strategy for each component listed on the assessment report (i.e., equipment potentially affected by the fire) that forms part of a function code used in the overall success path for Safe Shutdown. Individual component compliance strategies provide the basis for equipment operation or the acceptability of non-operation for a fire in the fire area.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.1.4 [Manual Actions]

NEI 00-01 Guidance
Use manual actions where appropriate to achieve and maintain post-fire safe shutdown conditions in accordance with NRC requirements.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliance assessments may take credit for operator activities (in the main control room or at primary control stations) as required to achieve and maintain safe and stable conditions (as defined in Section 4.2.1.2) if such action can mitigate the consequences of the loss of the subject component.

Reference
FPE-R96-004 Rev. 12
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.1.5 [Repairs]

NEI 00-01 Guidance
Where appropriate to achieve and maintain cold shutdown within 72 hours, use repairs to equipment required in support of post fire shutdown.

Applicability
Applicable

Alignment Statement
ALIGNS WITH INTENT

Alignment Basis
NFPA 805 only requires maintaining the fuel in a safe and stable condition (i.e., no explicit requirement to achieve and maintain cold shutdown). Accordingly, the DAEC At-Power analysis (discussed in Section 4.2.4) has determined the capability to achieve and maintain safe and stable conditions (as defined in Section 4.2.1.2) without taking credit for repairs to cold shutdown equipment.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.1.6 [Assess Compliance with Deterministic Criteria]

NEI 00-01 Guidance
Appendix R compliance requires that one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage (III.G.1.a). When cables or equipment, including associated circuits, are within the same fire area outside primary containment and separation does not already exist, provide one of the following means of separation for the required safe shutdown path(s):
- Separation of cables and equipment and associated nonsafety circuits of redundant trains within the same fire area by a fire barrier having a 3-hour rating (III.G.2.a)
- Separation of cables and equipment and associated nonsafety circuits of redundant trains within the same fire area by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area (III.G.2.b).
- Enclosure of cable and equipment and associated non-safety circuits of one redundant train within a fire area in a fire barrier having a one-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area (III.G.2.c).

For fire areas inside noninerted containments, the following additional options are also available:
- Separation of cables and equipment and associated nonsafety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards (III.G.2.d);
- Installation of fire detectors and an automatic fire suppression system in the fire area (III.G.2.e); or
- Separation of cables and equipment and associated non-safety circuits of redundant trains by a noncombustible radiant energy shield (III.G.2.f).

Use exemptions, deviations and licensing change processes to satisfy the requirements mentioned above and to demonstrate equivalency depending upon the plant's license requirements.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliance assessments may rely on equipment specific compliance strategies that credit separation, cable protection, suppression/detection, existing exemption requests, engineering evaluations, or analysis. A written summary (listing use of suppression systems, spatial separation, or fire barrier material) documents the component and overall compliance strategies for each fire area and provides reference to any supporting exemption request, engineering evaluation, or analysis.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.1.7 [Consider Additional Equipment]

NEI 00-01 Guidance
Consider selecting other equipment that can perform the same safe shutdown function as the impacted equipment. In addressing this situation, each equipment impact, including spurious operations, is to be addressed in accordance with regulatory requirements and the NPP's current licensing basis.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
DAEC fire area compliances assessments may take credit for full system operation or partial system operation as required to achieve and maintain safe and stable conditions (as defined in Section 4.2.1.2). Both the "Shutdown From MCR" and "Shutdown from RSP" sections of the IPLD are used to identify additional systems (which may be available in the event of MCR evacuation) for fire areas that use alternative shutdown from the remote shutdown panels as the compliance strategy. The IPLD is reviewed to ensure all systems supporting the safety functions have been addressed, with consideration both for achievement of safe shutdown and positive control of spurious operations that could adversely affect safe shutdown.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.1.8 [Consider Instrument Tubing Effects]

NEI 00-01 Guidance
Consider the effects of the fire on the density of the fluid in instrument tubing and any subsequent effects on instrument readings or signals associated with the protected safe shutdown path in evaluating post-fire safe shutdown capability. This can be done systematically or via procedures such as Emergency Operating Procedures.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Instrument tubing (credited for safe shutdown indication and bi-stable actuation that could adversely affect safe shutdown at DAEC) was evaluated in FPE-R98-001. In guidance for performing fire area compliance assessments, DAEC analysts are referred to this evaluation for consideration of fire effects on instrumentation tubing.

Reference
FPE-R98-001 Rev. 3
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.2 Methodology for Fire Area Assessment

NEI 00-01 Guidance
Refer to Figure 3-5 for a flowchart illustrating the various steps involved in performing a fire area assessment. Use the following methodology to assess the impact to safe shutdown and demonstrate Appendix R compliance:

[Refer to hard copy of NEI 00-01 for Figure 3-5]

Applicability
Applicable

Alignment Statement
NOT REQUIRED

Alignment Basis
This paragraph provides introductory information but contains no specific guidance for comparison. Discussion is provided in subsequent sub-sections.

Reference

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.2.1 Identify the Affected Equipment by Fire Area

NEI 00-01 Guidance
Identify the safe shutdown cables, equipment and systems located in each fire area that may be potentially damaged by the fire. Provide this information in a report format. The report may be sorted by fire area and by system in order to understand the impact to each safe shutdown path within each fire area (see Attachment 5 for an example of an Affected Equipment Report).

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The compliance assessment report is a printout of the Database sorted by function code that identifies all safe shutdown equipment and cables potentially affected by a fire in the area being evaluated and the reason for their potential failure (including location of the equipment, scheme cables, or cables/equipment associated with auxiliary contacts in the affected fire area; loss of a power supply component; or common power supply concerns).

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.2.2 Determine the Shutdown Paths Least Impacted By a Fire in Each Fire Area

NEI 00-01 Guidance
Based on a review of the systems, equipment and cables within each fire area, determine which shutdown paths are either unaffected or least impacted by a postulated fire within the fire area. Typically, the safe shutdown path with the least number of cables and equipment in the fire area would be selected as the required safe shutdown path. Consider the circuit failure criteria and the possible mitigating strategies, however, in selecting the required safe shutdown path in a particular fire area. Review support systems as a part of this assessment since their availability will be important to the ability to achieve and maintain safe shutdown. For example, impacts to the electric power distribution system for a particular safe shutdown path could present a major impediment to using a particular path for safe shutdown. By identifying this early in the assessment process, an unnecessary amount of time is not spent assessing impacts to the frontline systems that will require this power to support their operation.
Based on an assessment as described above, designate the required safe shutdown path(s) for the fire area. Identify all equipment not in the safe shutdown path whose spurious operation or mal-operation could affect the shutdown function. Include these cables in the shutdown function list. For each of the safe shutdown cables (located in the fire area) that are part of the required safe shutdown path in the fire area, perform an evaluation to determine the impact of a fire-induced cable failure on the corresponding safe shutdown equipment and, ultimately, on the required safe shutdown path.
When evaluating the safe shutdown mode for a particular piece of equipment, it is important to consider the equipment's position for the specific safe shutdown scenario for the full duration of the shutdown scenario. It is possible for a piece of equipment to be in two different states depending on the shutdown scenario or the stage of shutdown within a particular shutdown scenario. Document information related to the normal and shutdown positions of equipment on the safe shutdown equipment list.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Annotation on the SLDs is used to indicate the fire induced failure mode(s) for each potentially affected component listed on the compliance assessment report. Each function code which has potential equipment failures (as identified on the associated SLDs) is annotated on the IPLD to determine any impact on supported function codes.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.2.3 Determine Safe Shutdown Equipment Impacts

NEI 00-01 Guidance
Using the circuit analysis and evaluation criteria contained in Section 3.5 of this document, determine the equipment that can impact safe shutdown and that can potentially be impacted by a fire in the fire area, and what those possible impacts are.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Using the marked-up SLDs, IPLDs and the compliance assessment report, an overall success path for Safe Shutdown is determined with consideration for not only the achievement of safe shutdown but the positive control of spurious operations which could adversely affect safe shutdown. The IPLD is reviewed to ensure all systems supporting the safety functions have been addressed. The success path may take credit for full system operation, partial system operation, and operator activities (in the main control room or at primary control stations) as required to achieve and maintain safe and stable conditions (as defined in Section 4.2.1.2).

Reference
FPE-R96-001 Rev. 3
FPE-R96-002 Rev. 1
FPE-R96-003 Rev. 2
FPE-R97-002 Rev. 3
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.2.4 Develop a Compliance Strategy or Disposition to Mitigate the Effects Due to Fire Damage to Each Required Component or Cable

NEI 00-01 Guidance
The available deterministic methods for mitigating the effects of circuit failures are summarized as follows (see Figure 1-2):
- Provide a qualified 3-fire rated barrier.
- Provide a 1-hour fire rated barrier with automatic suppression and detection.
- Provide separation of 20 feet or greater with automatic suppression and detection and demonstrate that there are no intervening combustibles within the 20 foot separation distance.
- Reroute or relocate the circuit/equipment, or perform other modifications to resolve vulnerability.
- Provide a procedural action in accordance with regulatory requirements.
- Perform a cold shutdown repair in accordance with regulatory requirements.
- Identify other equipment not affected by the fire capable of performing the same safe shutdown function.
- Develop exemptions, deviations, Generic Letter 86-10 evaluation or fire protection design change evaluations with a licensing change process.

Additional options are available for non-inerted containments as described in 10 CFR 50 Appendix R section III.G.2.d, e and f.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
Once an overall compliance strategy for the fire area under evaluation is determined, individual compliance strategies (which provide the basis for equipment operation or the acceptability of non-operation for a fire in the fire area) are selected for any component listed on the assessment report that forms part of a function code used in the safe shutdown path.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.4.2.5 Document the Compliance Strategy or Disposition Determined to Mitigate the Effects Due to Fire Damage to Each Required Component or Cable

NEI 00-01 Guidance
Assign compliance strategy statements or codes to components or cables to identify the justification or mitigating actions proposed for achieving safe shutdown. The justification should address the cumulative effect of the actions relied upon by the licensee to mitigate a fire in the area. Provide each piece of safe shutdown equipment, equipment not in the path whose spurious operation or mal-operation could affect safe shutdown, and/or cable for the required safe shutdown path with a specific compliance strategy or disposition. Refer to Attachment 6 for an example of a Fire Area Assessment Report documenting each cable disposition.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The results of the DAEC fire area compliance assessments are presented in report format by fire area. Each fire area compliance assessment summary report documents all decisions used in developing the component and overall compliance strategies, listing all assumptions, open items, proposed operator activities (in the main control room or at primary control stations), proposed use of suppression systems, spatial separation or use of fire barrier material, and all evaluations performed.

Reference
FPLDA013-PR-007 Rev. 0 [Section 5]

2.4.2.4 Fire Area Assessment.

NEI 00-01 Ref.
3.5.1.5 [C, Likelihood of Undesired Consequences]

NEI 00-01 Guidance
Determination of the potential consequence of the damaged associated circuits is based on the examination of specific NPP piping and instrumentation diagrams (P&IDs) and review of components that could prevent operation or cause maloperation such as flow diversions, loss of coolant, or other scenarios that could significantly impair the NPP's ability to achieve and maintain hot shutdown. When considering the potential consequence of such failures, the [analyst] should also consider the time at which the prevented operation or maloperation occurs. Failures that impede hot shutdown within the first hour of the fire tend to be most risk significant in a first-order evaluation. Consideration of cold-shutdown circuits is deferred pending additional research.

Applicability
Applicable

Alignment Statement
ALIGNS

Alignment Basis
The time available to perform operator activities (in the main control room or at primary control stations) is derived from existing thermal hydraulic analysis, from calculations performed to support the DAEC SSA, or from analysis supporting development and implementation of the Emergency Operating Procedures. Those events that are deemed necessary to assure the availability of systems required to shutdown the reactor, control inventory loss, and initiate controlled reactor depressurization are included in the Time Critical Operator Action Program. This program evaluates actions that must be accomplished within the first hour of the fire event. Each safe shutdown component associated with these systems is given the function code assigned to the overall system.

Reference
ACP 103.10 Rev. 3
FPE-R96-004 Rev. 12 [Sections 5.2, 5.3]
FPLDA013-PR-007 Rev. 0 [Section 3]

E. NEI 04-02 Radioactive Release Transition

17 Pages Attached

Compartment Control Building

Compartment Selection and Justification Basis

The Control Building compartment consists of those fire areas that are not part of the radiologically controlled area of the plant. These areas do not store or contain radioactive material that could result in the potential for a radioactive release. As a result, this area screens out of the radioactive release evaluation.

Control Building Fire Area(s)		Control Building Area Fire Plan(s)	
CB1	Cable Spreading Room, Control Room and HVAC Area	AFP-23	Control Building, 1D-2, 1D-4, 1D-1 Battery Rms and Battery Corridor
CB2	West Essential Switchgear Room and 125VDC Battery	AFP-24	Control Building, 1-A4, 1A-3 Essential Switchgear Rooms
CB3	East Essential Switchgear Room and 125VDC Battery	AFP-25	Control Building, Cable Spreading Room
CB4	Battery Corridor and 250VDC Battery Room	AFP-26	Control Building, Control Room Complex
		AFP-27	Control Building, Control Room HVAC Room

Smoke and By Products of Combustion- Airborne Effluent Evaluation

Non-RCA - Screens out of Radioactive Release Review.

Fire Suppressant Run Off- Liquid Effluent Evaluation

Non-RCA - Screens out of Radioactive Release Review.

Administrative Controls - Pre-Plans, Procedures, and Guidelines to Minimize the Risk of Radioactive Release

Non-RCA - Screens out of Radioactive Release Review.

Fire Brigade Training to Minimize Radioactive Release

Non-RCA - Screens out of Radioactive Release Review.

Non-Power Operations

Non-RCA - Screens out of Radioactive Release Review.

Conclusion

Non-RCA - Screens out of Radioactive Release Review.

Compartment ISFSI

Compartment Selection and Justification Basis

ISFSI is outside of the scope of NFPA 805 and this review. 10CFR72.122 establishes the criteria for "protection against fires and explosions". ISFSI has been included within this document to show each fire area was considered during the Radioactive Release Evaluation.

ISFSI Fire Area(s)	ISFSI Area Fire Plan(s)
EX1 Exterior Areas	AFP-79 Spent Fuel Storage Facility, (ISFSI)

Smoke and By Products of Combustion- Airborne Effluent Evaluation

ISFSI is outside of the scope of NFPA 805.

Fire Suppressant Run Off- Liquid Effluent Evaluation

ISFSI is outside of the scope of NFPA 805.

Administrative Controls - Pre-Plans, Procedures, and Guidelines to Minimize the Risk of Radioactive Release

ISFSI is outside of the scope of NFPA 805.

Fire Brigade Training to Minimize Radioactive Release

ISFSI is outside of the scope of NFPA 805.

Non-Power Operations

ISFSI is outside of the scope of NFPA 805.

Conclusion

ISFSI is outside of the scope of NFPA 805.

Compartment Low Level Radwaste Processing Facility

Compartment Selection and Justification Basis

The Low Level Radwaste Processing Facility(LLRPF) has defined boundaries and engineering controls. The ventilation system is the determining factor for defining this compartment. LLRPSF floor drains are similar throughout the areas.

Low Level Radwaste Processing Facility Fire Area(s)		Low Level Radwaste Processing Facility Area Fire Plan(s)	
BA	Buffer Areas	AFP-40	LLRPSF, Process and Gym Area 757'-6"
		AFP-41	LLRPSF, Access Area, Truck Bay, DAW Storage, Resin Storage and Future Storage Areas
		AFP-42	LLRPSF, MET Lab, Mezzanine, and HVAC Electrical Equip EL. 774' 2"
		AFP-43	LLRPSF, Mezzanine Access and Future EXP Upper Level EL. 773' 6" AND 798'

Smoke and By Products of Combustion- Airborne Effluent Evaluation

The LLRPSF is served by five ventilating systems. These five system serve the storage area, the office area, the processing area, the future expansion area, and the equipment room. The exhaust fans from each individual system discharge to a common exhaust plenum which is continually monitored for radiation. Any signal from a smoke detector will align dampers to purge the facility through particulate filters.

Fire Suppressant Run Off- Liquid Effluent Evaluation

Floor drains from this compartment drain to the Radwaste and Conveyor Floor Drain Sumps. The respective floor drain sump will pump to the Floor Drain Collector Tank. The Floor Drain Collector Tank is processed and low-purity liquid waste is transferred to a sample tank for sampling and analysis. Excess liquid may be discharged in accordance with the plant technical specifications.

Administrative Controls - Pre-Plans, Procedures, and Guidelines to Minimize the Risk of Radioactive Release

Area Fire Plans will highlight potential release paths for smoke and water run off. Additional standard operating guidelines will address fire in locations where smoke and water run off has the potential to escape from the building prior to proper monitoring.

Fire Brigade Training to Minimize Radioactive Release

The current fire brigade training program has no objective that relates to the control of radiological release. The brigade relies on the support of the health physics group to address these issues.

Training, including fire drills, will be modified to include objectives for identifying potential radioactive release points as well as actions to take

Compartment Low Level Radwaste Processing Facility

during fire suppression activities to limit the likelihood of radioactive release.

Non-Power Operations

Ventilation and drainage engineering controls are not affected by the unit operating condition. However, the likelihood of doors and hatches being open during outage time periods is much greater. Administrative guidance for the fire brigade will drive actions to prevent uncontrolled radioactive release in this scenario.

Conclusion

Using installed engineering controls combined with pre-fire plans, training and procedures provides reasonable assurance that fire suppression activities will not cause a radioactive release that exceeds the requirements of NFPA 805, 2001 edition.

Compartment Non-RCA

Compartment Selection and Justification Basis

The Non-RCA Areas compartment consists of those Fire Area/Fire Zones that are not part of the radiologically controlled area of the unit. These areas do not store or contain radioactive material that could result in the potential for a radioactive release.

Non-RCA Fire Area(s)

BA	Buffer Areas
EX1	Exterior Areas
IS1	Intake Structure Division I Pump Room
IS2	Intake Structure Division II Pump Room
PH1	Division II RHRSW/ESW Pump Room and Piping Area
PH2	Division I RHRSW/ESW Pump Room

Non-RCA Area Fire Plan(s)

AFP-28	Pump House, ESW/RHRSW Pump Rms and Main Pump Rm
AFP-29	Pump House, Fire Pump and Fire Pump Day Tank Rms
AFP-30	Pump House, Safety Related Piping Area
AFP-31	Intake Structure, Pump Rooms EL. 767'-0"
AFP-32	Intake Structure, Traveling Screen Areas
AFP-44	Data Acquisition Center, First Floor, TSC
AFP-45	Data Acquisition Center, First Floor Mechanical Rooms DAC-131 - 132
AFP-46	Data Acquisition Center, First Floor Office Areas (EXC. TSC)
AFP-47	Data Acquisition Center, I & C Shop, Second Floor
AFP-48	Data Acquisition Center, Mechanical Room DAC-225, Second Floor
AFP-49	Data Acquisition Center, Computer rooms, Second Floor
AFP-50	Data Acquisition Center, Office Areas, Second Floor
AFP-52	Administration Building, Second Floor
AFP-54	Security Building, First Floor
AFP-55	Security Building, Second Floor
AFP-56	Plant Support Center,
AFP-57	Training Center,
AFP-58	Badging Center,
AFP-59	Construction Support Center,
AFP-60	Mechanical Maintenance Shop,
AFP-61	Civil Shop,
AFP-62	Civil Shop Annex,

Compartment	Non-RCA	
	AFP-63	Electrical Maintenance Shop Annex,
	AFP-64	Instrument Air Compressor Building,
	AFP-65	Breathing Air Compressor Building,
	AFP-66	Oil Storage Building,
	AFP-67	East Warehouse, North Storage and South Office and Storage Areas
	AFP-68	West Warehouse, North and South Storage Areas
	AFP-69	Yard, Main Transformer 1X1
	AFP-70	Yard, Standby Transformer 1X4
	AFP-71	Yard, Startup Transformer 1X3
	AFP-72	Yard, Auxiliary Transformer 1X2
	AFP-73	Cooling Tower, 1E69A AND 1E69B
	AFP-74	Switchyard,
	AFP-77	Well Houses,
	AFP-78	Waste Treatment Building,
	AFP-80	South Warehouse,
	AFP-81	Temporary Maintenance Buildings,
	AFP-82	Facilities Support Center,

Smoke and By Products of Combustion- Airborne Effluent Evaluation

Non-RCA - Screens out of Radioactive Release Review.

Fire Suppressant Run Off- Liquid Effluent Evaluation

Non-RCA - Screens out of Radioactive Release Review.

Administrative Controls - Pre-Plans, Procedures, and Guidelines to Minimize the Risk of Radioactive Release

Non-RCA - Screens out of Radioactive Release Review.

Fire Brigade Training to Minimize Radioactive Release

Non-RCA - Screens out of Radioactive Release Review.

Compartment Non-RCA

Non-Power Operations

Non-RCA - Screens out of Radioactive Release Review.

Conclusion

Non-RCA - Screens out of Radioactive Release Review.

Compartment Offgas Retention Building

Compartment Selection and Justification Basis

The Offgas Retention Area is a defined area of the plant. Although the ventilation routes are similar to other areas of the RCA, the floor drain system has separate components.

Offgas Retention Building Fire Area(s)		Offgas Retention Building Area Fire Plan(s)	
BA	Buffer Areas	AFP-38	Offgas Building, OFF-GAS Prefilter Rm and Condenser Area - EL. 739' 6"
		AFP-39	Offgas Building, OFF-GAS Control and Glycol Area, EL. 757' 6"

Smoke and By Products of Combustion- Airborne Effluent Evaluation

The exhaust ventilation for the Offgas Retention Building discharges to the torus area of the Reactor Building. From this point smoke or effluent would be exhausted through the Reactor Building Exhaust system. This system monitors radioactive release limits to ensure technical specification requirements are not exceeded.

The normal access paths to and from this area are located within the RCA. This provides an additional natural barrier to prevent smoke from escaping prior to being monitored.

Fire Suppressant Run Off- Liquid Effluent Evaluation

Floor drains from this compartment drain to the Offgas Floor Drain Sump. The floor drain sump will pump to the Floor Drain Collector Tank. The Floor Drain Collector Tank is processed and low-purity liquid waste is transferred to a sample tank for sampling and analysis. Excess liquid may be discharged in accordance with the plant technical specifications.

Administrative Controls - Pre-Plans, Procedures, and Guidelines to Minimize the Risk of Radioactive Release

Area Fire Plans will highlight potential escape routes for smoke and water run off. Additional standard operating guidelines will address fire in locations where smoke and water run off has the potential to escape from the building prior to proper monitoring.

Fire Brigade Training to Minimize Radioactive Release

The current fire brigade training program has no objective that relates to the control of radiological release. The brigade relies on the support of the health physics group to address these issues.

Training, including fire drills, will be modified to include objectives for identifying potential radioactive release points as well as actions to take during fire suppression activities to limit the likelihood of radioactive release.

Compartment Offgas Retention Building

Non-Power Operations

Ventilation and drainage engineering controls are not affected by the unit operating condition. However, the likelihood of doors and hatches being open during outage time periods is much greater. Administrative guidance for the fire brigade will drive actions to prevent uncontrolled radioactive release in this scenario.

Conclusion

Using installed engineering controls combined with pre-fire plans, training and procedures provides reasonable assurance that fire suppression activities will not cause a radioactive release that exceeds the requirements of NFPA 805, 2001 edition.

Compartment Radwaste Building

Compartment Selection and Justification Basis

The Radwaste Building is in place to process radioactive waste. By design the ventilation and drainage engineering controls supports evaluation as one common compartment.

Radwaste Building Fire Area(s)		Radwaste Building Area Fire Plan(s)	
BA	Buffer Areas	AFP-34	Radwaste Building, Drum Filling, Storage, and Shipping EL. 757' 6"
		AFP-35	Radwaste Building, Treatment And Access Area - EL. 773' 6"
		AFP-36	Radwaste Building, Precoat And Access Area - El. 786', Control Rm and HVAC Equipment Rm
		AFP-37	Machine Shop - EL. 757' 6",

Smoke and By Products of Combustion- Airborne Effluent Evaluation

The Radwaste Building exhaust system maintains a negative pressure throughout the building. The exhaust system discharges to the torus area of the Reactor Building where it becomes part of the Reactor Building atmosphere. The area surrounding the torus is the suction location for the Reactor Building Exhaust Plenum.

Fire Suppressant Run Off- Liquid Effluent Evaluation

Floor drains from this area drain to the Radwaste Floor Drain Sump. The floor drain sump will pump to the Floor Drain Collector Tank. The Floor Drain Collector Tank is processed and low-purity liquid waste is transferred to a sample tank for sampling and analysis. Low-purity waste that meets plant water-quality specifications is returned to the condensate storage tank for reuse. Water that does not meet the required specification is returned to the processing cycle. Excess liquid may be discarded in accordance with the plant technical specifications.

Administrative Controls - Pre-Plans, Procedures, and Guidelines to Minimize the Risk of Radioactive Release

Area Fire Plans will highlight potential escape routes for smoke and water run off. Additional standard operating guidelines will address fire in locations where smoke and water run off has the potential to escape from the building prior to proper monitoring.

Fire Brigade Training to Minimize Radioactive Release

The current fire brigade training program has no objective that relates to the control of radiological release. The brigade relies on the support of the health physics group to address these issues.

Compartment Radwaste Building

Training, including fire drills, will be modified to include objectives for identifying potential radioactive release points as well as actions to take during fire suppression activities to limit the likelihood of radioactive release.

Non-Power Operations

Ventilation and drainage engineering controls are not affected by the unit operating condition. However, the likelihood of doors and hatches being open during outage time periods is much greater. Administrative guidance for the fire brigade will drive actions to prevent uncontrolled radioactive release in this scenario.

Conclusion

Using installed engineering controls combined with pre-fire plans, training and procedures provides reasonable assurance that fire suppression activities will not cause a radioactive release that exceeds the requirements of NFPA 805, 2001 edition.

Compartment Reactor Building

Compartment Selection and Justification Basis

The Reactor Building is the envelope for secondary containment at DAEC. By design, the building will contain smoke and water runoff. Engineered features will aid in processing the smoke and water if operable. The building provides a common boundary to evaluate the control of radioactive material that has a potential for release during a fire. The reactor building has common drainage and ventilation features throughout.

Reactor Building Fire Area(s)		Reactor Building Area Fire Plan(s)	
BA	Buffer Areas	AFP-01	Reactor Building, TORUS Area and North Corner Rms
DRY	Drywell	AFP-02	Reactor Building, TORUS Area and South Corner Rms
RB1	757 Elevation Reactor Building and NW Torus Area	AFP-03	Reactor Building, HPCI, RCIC & Radwaste Tank Rms
RB2	SE Torus Area, RCIC Room and Southeast Corner Room	AFP-04	Reactor Building, North CRD Module Area, CRD Repair and CRD Cable Rooms
RB3	786 Elevation Reactor Building and Above	AFP-05	Reactor Building, South CRD Module Area and Offgas Recombiner Rms and Railroad Airlock
RB4	Northeast Corner Room	AFP-05A	Reactor Building, Drywell
		AFP-06	Reactor Building, RHR Valve Room EL. 757'-6"
		AFP-07	Reactor Building, Laydown Area, Corridor and Waste Tank Area and Spent Resin Tank Room El. 786'-0"
		AFP-08	Reactor Building, Standby Gas Treatment System and MG Set Rms
		AFP-09	Reactor Building, RBCCW Heat Exchanger Area, Equipment Hatch Area and Jungle Rm El. 812'-0"
		AFP-10	Reactor Building, Main Exhaust Fan Rm, Heating Hot Water Pump Rm and the Plant Air Supply Fan Rm
		AFP-11	Reactor Building, Laydown Area - EL. 833'-6"
		AFP-12	Reactor Building, Decay Tank and Condensate Phase Separator Rms
		AFP-13	Reactor Building, Refueling Floor EL. 855"-0"

Smoke and By Products of Combustion- Airborne Effluent Evaluation

The Reactor Building exhaust is monitored prior to release through the Reactor Building Exhaust Plenum. Upon receipt of a high radiation alarm in the exhaust ventilation, the normal exhaust ventilation will stop, dampers will isolate the system and cause the stand-by gas treatment system to start. The stand-by gas treatment can be routed to the plant vent stack after filtering and monitoring the discharge effluent.

Compartment Reactor Building

Fire Suppressant Run Off- Liquid Effluent Evaluation

Floor drains from this compartment drain to the respective floor drain sump, Reactor Building Floor Drain Sump or the Drywell Floor Drain Sump. The floor drain sumps will pump to the Floor Drain Collector Tank. The Floor Drain Collector Tank is processed and low-purity liquid waste is transferred to a sample tank for sampling and analysis. Low-purity waste that meet plant water-quality specifications are returned to the condensate storage tank for reuse. Water that does not meet the required specification is returned to the processing cycle. Excess liquid may be discarded in accordance with the plant tech specs.

Administrative Controls - Pre-Plans, Procedures, and Guidelines to Minimize the Risk of Radioactive Release

Area Fire Plans will highlight potential escape routes for smoke and water run off. Additional standard operating guidelines will address fire in locations where smoke and water run off has the potential to escape from the building prior to proper monitoring.

Fire Brigade Training to Minimize Radioactive Release

The current fire brigade training program has no objective that relates to the control of radiological release. The brigade relies on the support of the health physics group to address these issues.

Training, including fire drills, will be modified to include objectives for identifying potential radioactive release points as well as actions to take during fire suppression activities to limit the likelihood of radioactive release.

Non-Power Operations

Ventilation and drainage engineering controls are not affected by the unit operating condition. However, the likelihood of doors and hatches being open during outage time periods is much greater. Administrative guidance for the fire brigade will drive actions to prevent uncontrolled radioactive release in this scenario.

Conclusion

Using installed engineering controls combined with pre-fire plans, training and procedures provides reasonable assurance that fire suppression activities will not cause a radioactive release that exceeds the requirements of NFPA 805, 2001 edition.

Compartment Turbine Building

Compartment Selection and Justification Basis

The Turbine Building has defined boundaries and engineering controls. The ventilation system is a determining factor for defining this compartment. Building drainage does have two separate flow paths. Both are contained and monitored prior to release.

Turbine Building Fire Area(s)		Turbine Building Area Fire Plan(s)	
TB1	Turbine Building	AFP-14	Turbine Building, Basement Reactor Feed Pump Area and Turbine Lube Oil Tank Area
		AFP-16	Turbine Building, Condensate Pump Area 734'-0"
		AFP-17	Turbine Building, Condenser Bay, Heater Bay and Steam Tunnel
		AFP-18	Turbine Building, North Turbine Ground Floor
		AFP-19	Turbine Building, South Turbine Ground Floor
		AFP-20	Aux Boiler Room, Emergency Diesel Generator Rms and Day Tank Rms EL. 757'6"
		AFP-21	Turbine Building, North Turbine Operating Floor
		AFP-22	Turbine Building, Operating Floor EL. 780'-0"

Smoke and By Products of Combustion- Airborne Effluent Evaluation

The Turbine Building Ventilation exhaust system consists of three, 50% exhaust fans. The exhaust system is equipped with radiation monitors and interlocks to stop exhaust in the event radiation levels are higher than acceptable in accordance with station technical specifications.

Fire Suppressant Run Off- Liquid Effluent Evaluation

Floor drains from this area drain to the Turbine Building Floor Drain Sump. The floor drain sump will pump to the Floor Drain Collector Tank. Water is processed as liquid radwaste and can be monitored and discarded in accordance with technical specification limits.

The diesel generator areas and air intake ventilation room are typically free of contamination. Floor drains in these areas route to the Transformer Deluge Pit in the protected area of the yard. This containment system, the Transformer Deluge Pit, is sampled for radioactive material and oil prior to release.

Administrative Controls - Pre-Plans, Procedures, and Guidelines to Minimize the Risk of Radioactive Release

Area Fire Plans will highlight potential escape routes for smoke and water run off. Additional standard operating guidelines will address fire in locations where smoke and water run off has the potential to escape from the building prior to proper monitoring.

Compartment Turbine Building

Fire Brigade Training to Minimize Radioactive Release

The current fire brigade training program has no objective that relates to the control of radiological release. The brigade relies on the support of the health physics group to address these issues.

Training, including fire drills, will be modified to include objectives for identifying potential radioactive release points as well as actions to take during fire suppression activities to limit the likelihood of radioactive release.

Non-Power Operations

Ventilation and drainage engineering controls are not affected by the unit operating condition. However, the likelihood of doors and hatches being open during outage time periods is much greater. Administrative guidance for the fire brigade will drive actions to prevent uncontrolled radioactive release in this scenario.

Conclusion

Using installed engineering controls combined with pre-fire plans, training and procedures provides reasonable assurance that fire suppression activities will not cause a radioactive release that exceeds the requirements of NFPA 805, 2001 edition.

Compartment Yard- RCA

Compartment Selection and Justification Basis

The Yard-RCA compartment captures those locations that contain transient radioactive material or do not fall under a specific compartment. The Administration Building locations include the control point and a storage closet. Other areas are the dike and CST in the yard. Land-sea containers and other radioactive materials handling equipment that is transient to the yard area is addressed by this compartment.

Yard- RCA Fire Area(s)		Yard- RCA Area Fire Plan(s)	
EX1	Exterior Areas	AFP-51	Administration Building, First Floor
		AFP-53	Administration Building, Third Floor
		NEW	Develop a new Area Fire Plan or incorporate concerns into an existing AFP,

Smoke and By Products of Combustion- Airborne Effluent Evaluation

No engineering controls are available outside of the buildings to contain or control the release of smoke in the event of a fire. Administrative controls will be used to ensure compliance with NFPA 805 Radioactive Release requirements.

Fire Suppressant Run Off- Liquid Effluent Evaluation

A storm drain system has been installed in the yard area. A limited number of storm drains on the south and east side of the Low Level Radwaste Processing Facility discharge to a retention pond located south of the security fence. The pond connects to a drainage ditch which runs to the Cedar River via the plant discharge canal. A sluice gate structure is in place at the outlet of the retention pond to control the release of any radioactive liquid to the Cedar River. The sluice gate is normally closed which will, in the event of an inadvertent radioactive liquid spill, work to hold the contents of the spill to the retention pond.

The remainder of the storm drains discharge to the Cedar River via two outfall ditches.

Administrative Controls - Pre-Plans, Procedures, and Guidelines to Minimize the Risk of Radioactive Release

A new Area Fire Plan will be created for the yard RCA locations. Additional guidance for fires involving radioactive materials in the yard will be provided. This guidance will outline the use of smoke scrubbing to help reduce the likelihood of a release that would exceed, 10CFR20 guidelines.

Fire Brigade Training to Minimize Radioactive Release

The current fire brigade training program has no objective that relates to the control of radiological release. The brigade relies on the support of the health physics group to address these issues.

Compartment Yard- RCA

Training, including fire drills, will be modified to include objectives for identifying potential radioactive release points as well as actions to take during fire suppression activities to limit the likelihood of radioactive release.

Non-Power Operations

Yard area RCA locations are not affected by the plant operating condition. No change in the methods of controlling and preventing radioactive release will take place during non-power operations.

Conclusion

Using installed engineering controls combined with pre-fire plans, training and procedures provides reasonable assurance that fire suppression activities will not cause a radioactive release that exceeds the requirements of NFPA 805, 2001 edition.

F. Fire-Induced Multiple Spurious Operations Resolution

5 Pages Attached

MSO Process Summary

The following provides the process from FAQ 07-0038 and results of implementing that process.

Step 1 – Identify potential MSOs of concern

Information sources used as input included:

- Post-fire safe shutdown analysis (NEI 00-01, Revision 1, Chapter 3)
- Generic lists of MSOs (e.g., from Owners Groups and/or later versions of NEI 00-01, if endorsed by NRC for use in assessing MSOs)
- Self assessment results (e.g., NEI 04-06 assessments performed to addressed RIS 2004-03)
- PRA insights (e.g., NEI 00-01 Revision 1, Appendix F)
- Operating Experience (e.g., licensee event reports, NRC Inspection Findings, etc.)

Results of Step 1:

The following information sources were used to identify the potential DAEC MSOs of concern:

- Post-fire safe shutdown analysis
- BWROG generic MSO list
- Fire PRA work completed at the time of expert panels
- Internal events PRA insights

The DAEC staff participants provided extensive DAEC experience and plant specific considerations. Following the initial expert panel of 2008, additional reviews were performed of the updated BWROG generic MSO list associated with NEI 00-01, Revision 2.

Step 2 – Conduct an expert panel to assess plant specific vulnerabilities (e.g., per NEI 00-01, Revision 1 Section F.4.2).

The expert panel focused on system and component interactions that could impact nuclear safety. This information was used in later tasks to identify cables and potential locations where vulnerabilities could exist.

The documentation of the results of the expert panel included:

- How the expert panel was conducted including the members of the expert panel, their experience, education, and areas of expertise
- The list of MSOs reviewed as well as the source for each MSO
- The list of the MSOs that were included in the PRA and NSCA
- The list of MSOs that were not kept for further analysis (and the reasons for rejecting these MSOs for further analysis)
- Description of the expert panel meeting process (e.g., when it was held, what training was provided to the panel members, what analyses were reviewed to

identify MSOs, how was consensus achieved on which MSOs to keep and any dispute resolution process criteria used in decision process, etc.).

[Note: The physical location of the cables of concern (e.g., fire zone/area routing of the identified MSO cables), if known, may be used at this step in the process to focus the scope of the detailed review in further steps.]

Results of Step 2:

Initial Expert Panel 2008

The initial expert panel consisted of a two day meeting at the DAEC site with representatives from DAEC fire protection and post-fire safe shutdown, DAEC Operations, DAEC PRA, and supporting contract staff. The panel conducted document reviews, and held discussions on potential fire-induced spurious operations that could potentially impact plant safety. Documents that were used as guidance included:

- Boiling Water Reactor Owners Group (BWROG) Draft Working MSO list [file named *BWR+Generic+MSO+List+rev+02D-no-names.xls (file dated 3-25-08)* from the NEI MSO Webboard]
- NFPA 805 FAQ 07-0038, Lessons Learned on Multiple Spurious Operations, Revision 1

Training for the initial 2008 expert panel was conducted in the form of an introductory overview. Topics discussed included:

- Purpose and scope of the safe shutdown
- PRA overview
- Overview training on the MSO issue, including
  - Background on Fire-Induced MSOs
  - Types of circuit failures that can occur and result in spurious operations
  - Results of the Fire Testing (EPRI/NEI Testing)
  - Role of the MSO resolution in NFPA 805 Transition

Key points of the training included:

- The proposed scenarios should not have presupposed limits on the number of fire-induced hot shorts or spurious operations (e.g., do not assume only one or two, one at a time, etc.).
- The focus should not be on individual fire area locations, but rather on a system/component approach, in order to allow the analysis following the expert panel (e.g., PRA model and scenario development) to determine the vulnerability of the proposed interactions to credible fires.

A pre-job brief was conducted by a conference call in August 2008 with most of the expert panel participants to address the topics described above. The topics were reviewed again at the beginning of the onsite expert panel meeting.

The first day of the expert panel focused on a review of the BWROG scenarios. The BWROG generic MSO list includes scenarios related to the following functions. These

reviews considered system flowpaths and addressed items such as deadheading of pumps, pump runout, and flow diversion:

- Reactivity Control
- RCS Inventory Control (Makeup)
- RCS Pressure Control
- Decay Heat Removal
- Support Functions

By using the BWROG generic MSO list as guidance, a step-by-step discussion was held, typically by reviewing P&IDs, postulating scenarios, discussing the potential consequences and likelihood, discussing operator response, and recommending additional courses of action. Key considerations, in addition to consequences were:

- Whether the scenario of concern was currently modeled in the DAEC SSA
- Whether the scenario of concern was currently modeled in the DAEC Internal Events PRA
- Whether procedures addressed the potential scenarios of concern
- Additional analyses or justification that may be necessary to document exclusion of a particular scenario

Consensus was achieved in the expert panel process by discussing individual scenarios, reaching a conclusion, and asking for any dissenting opinions.

Follow-on Expert Panel 2010

The follow-on expert panel meeting in March 2010 utilized the same information, but with an updated BWROG generic MSO list from NEI 00-01 Revision 2 and current lessons learned from the MSO process in FAQ 07-0038 and NFPA 805 pilot plants.

A brief overview training was conducted since all of the participants were familiar with the process and had previously participated in the earlier MSO expert panel meetings.

The follow-on meeting in 2010 consisted of a review of outstanding action items and a review of items that had been added or changed from the BWROG generic MSO list from NEI 00-01, Revision 2.

Consensus was achieved in the expert panel process by discussing individual scenarios, reaching a conclusion, and asking for any dissenting opinions.

Step 3 – Update the Fire PRA model and NSCA to include the MSOs of concern.

This includes the:

- Identification of equipment (NUREG/CR-6850 Task 2)
- Identification of cables that, if damaged by fire, could result in the spurious operation (NUREG/CR-6850 Task 3, Task 9)
- Identify routing of the cables identified above, including associating that routing with fire areas, fire zones and/or Fire PRA physical analysis units, as applicable

Include the equipment/cables of concern in the NSCA. Including the equipment and cable information in the NSCA does not necessarily imply that the interaction is possible

since separation/protection may exist throughout the plant fire areas such that the interaction is not possible).

Note: Instances may exist where conditions associated with MSOs do not require update of the Fire PRA and NSCA analysis. For example, Fire PRA analysis in NUREG/CR-6850 Task 2, Component Selection, may determine that the particular interaction may not lead to core damage, or pre-existing equipment and cable routing information may determine that the particular MSO interaction is not physically possible. In other instances, the update of the PRA may not be warranted if the contribution is negligible. The rationale for exclusion of identified MSOs from the Fire PRA and NSCA should be documented and the configuration control mechanisms should be reviewed to provide reasonable confidence that the exclusion basis will remain valid.

Results of Step 3:

The NSCA and Fire PRA were updated to reflect the treatment of applicable MSO scenarios. This included the identification of equipment, identification of cables, and the routing of cables by plant locations. The DAEC Results are documented in:

- NSCA - DAEC Post-Fire Safe Shutdown Analysis (report entitled, Table B-3 – NFPA 805 Chapter 4 Nuclear Safety Transition Fire Area Assessment)
- Fire PRA - DAEC Fire PRA Documentation (report entitled, Model Development)

Step 4 – Evaluate for NFPA 805 Compliance

The MSO combinations included in the NSCA should be evaluated with respect to compliance with the deterministic requirements of NFPA 805, as discussed in Section 4.2.3 of NFPA 805. For those situations in which the MSO combination does not meet the deterministic requirements of NFPA 805 (VFDR), the issue with the components and associated cables should be mitigated by other means (e.g., performance-based approach per Section 4.2.4 of NFPA 805, plant modification, etc.).

The performance-based approach may include the use of feasible and reliable recovery actions. The use of recovery actions to demonstrate the availability of a success path for the nuclear safety performance criteria requires that the additional risk presented by the use of these recovery actions be evaluated (NFPA 805 Section 4.2.4).

Results of Step 4:

The MSO combination components of concern were also evaluated as part of the DAEC NSCA. For cases where the pre-transition MSO combination components did not meet the deterministic compliance, the MSO combination components were added to the scope of the fire risk evaluations. The process and results for Fire Risk Evaluations are summarized in Section 4.5 of the Transition Report.

Step 5 - Document Results

The results of the process should be documented. The results should provide a detailed description of the MSO identification, analysis, disposition, and evaluation results (e.g., references used to identify MSOs; the composition of the expert panel, the expert panel process, and the results of the expert panel process; disposition and evaluation results for each MSO, etc.). High level methodology utilized as part of the

transition process should be included in the 10 CFR 50.48(c) License Amendment Request/Transition Report.

Results of Step 5:

The DAEC Results are documented in:

- MSO Expert Panel Report (report entitled, Expert Panel for Addressing Multiple Spurious Operations)
- NSCA - DAEC Post-Fire Safe Shutdown Analysis (report entitled, NFPA 805 Chapter 4 Nuclear Safety Transition Fire Area Assessment)
- Fire PRA - DAEC Fire PRA Documentation (report entitled, Model Development)
- DAEC Fire Risk Evaluations - See NEI 04-02 Table B-3 (Attachment C)

H. NFPA 805 Frequently Asked Question Summary Table

1 Page Attached

Note: The NFPA 805 FAQ process will continue through the transition of non-pilot NFPA 805 transition plants. Final closure of the FAQs will occur when RG 1.205, which endorses the new revision of NEI 04-02, is approved by the NRC. It is expected that additional FAQs will be written and existing FAQs will be revised as the industry transition process continues.

This table includes the approved FAQs that have not been incorporated into the current endorsed revision of NEI 04-02 and utilized in this submittal:

Table H-1 - NEI 04-02 FAQs Utilized in LAR Submittal

No.	Rev	Title	FAQ Ref	Closure Memo
06-0008	9	NFPA 805 Fire Protection Engineering Evaluations	ML090560170	ML073380976
06-0022	3	Acceptable Electrical Cable Construction Tests	ML090830220	Ml091240278
07-0030	5	Establishing Recovery Actions	ML103090602	ML110070485
07-0032	2	Clarification of 10 CFR 50.48(c), 50.48(a), and GDC 3	ML081300697	ML081400292
07-0035	2	Bus Duct Counting Guidance for High Energy Arcing Faults	ML091610189	ML091620572
07-0038	3	Lessons Learned on Multiple Spurious Operations	ML103090608	ML110140242
07-0039	2	Lessons Learned - NEI B-2 Table	ML091420138	ML091320068
07-0040	4	Non-Power Operations Clarification	ML082070249	ML082200528
08-0042	0	Fire Propagation from Electrical Cabinets	ML080230438 ML091460350	ML092110537
08-0043	1	Electrical Cabinet Fire Location	ML083540152 ML091470266	ML092120448
08-0044	0	Large Oil Fires	ML081200099 ML091540179	ML092110516
08-0046	0	Incipient Fire Detection Systems	ML081200120 ML093220197	ML093220426
08-0049	0	Cable Fires	ML081200309 ML091470242	ML092100274
08-0050	0	Non Suppression Probability	ML081200318 ML092510044	ML092190555
08-0051	0	Hot Short Duration	ML083400188 ML100820346	ML100900052
08-0052	0	Transient Fire Growth Rate and Control Room Non-Suppression	ML081500500 ML091590505	ML092120501
07-0054*	1	Demonstrating Compliance with Chapter 4 of NFPA 805	ML103510379	ML110140183
09-0056	2	Radioactive Release Transition	ML102810600	ML102920405
10-0059	1	NFPA 805 Monitoring	ML111180481	Note 1

* Note: The FAQ submittal number was 08-0054 but the NRC closure memo for the FAQ was listed as 07-0054. 07-0054 was used to be consistent with the Closure Memo.

Note 1: FAQ 10-0059 has been submitted to the NRC for review/comment.

I. Definition of Power Block

1 Page Attached

For the purposes of establishing the structures included in the Fire Protection program in accordance with 10 CFR 50.48(c) and NFPA 805, plant structures listed in the following table are considered to be part of the power block.

Table I-1 – Power Block Definition

Power Block Structures	Fire Area(s)
Reactor Building[a] [b]	RB1, RB3, RB4, DRY, part of BA
Turbine Building[a] [b]	TB1
Offgas Stack[a]	Part of EX1
Radwaste Building[b]	Part of BA
Control Building[a]	CB1, CB2, CB3, CB4
Pump House[a] [b]	PH1, PH2, part of BA
Intake Structure[a]	IS1, IS2
Cooling Towers[a]	Part of EX1
Machine Shop[b]	Part of BA
Offgas Retention Building[b]	Part of BA
Low-Level Radwaste Processing and Storage Facility[b]	Part of BA
Air Compressor Building[a]	Part of BA
Outside Underground structures (Divisional Manholes, Diesel Fuel Oil Supply) [a]	Part of EX1
Outside Aboveground structures (Switchyard, Transformers) [a]	Part of EX1

NOTE: Annotations [a] and [b] in Table I-1 indicate potential impact on (a) nuclear safety and (b) radioactive release criteria (respectively) for fire in the listed structure.

J. Fire Modeling V&V

9 Pages Attached

Plant specific fire modeling consists of the following:

- Main control room abandonment report in support of the Fire Probabilistic Risk Assessment (Fire PRA); and
- Generic fire modeling treatments used as applicable to develop Zones of Influence (ZOI) for use in the Fire PRA.

Main Control Room Abandonment Report

The goal of the main control room abandonment report is to compute the time operators would abandon the main control room using the NUREG/ CR 6850 [2005] abandonment criteria. The abandonment times are assessed for various electronic equipment fires and for ordinary combustible fires as defined by the discretized frequency distributions presented in NUREG/CR 6850 [2005]. Fires are postulated in various areas of the main control room envelope boundary; however, fires within the main control room area yield the most conservative abandonment times. The abandonment time in the main control room is estimated by calculating the time to reach threshold values for temperature and visibility as identified by NUREG/CR 6850 [2005] and NUREG 0700 [2002]. The focus of this evaluation is on the first twenty-five minutes after ignition only. All calculations are performed using the zone fire model Consolidated Fire and Smoke Transport (CFAST).

The main control room area and fire parameters are within the verification and validation basis for CFAST as documented in NUREG 1824 / EPRI 1011999, volume 5 [2007]; National Institute of Standards and Technology (NIST) Special Publication (SP) 1026 [2009], and NIST Special Publication 1041 [2008]. Although multiple spaces are used to define the main control room envelope, surrounding spaces primarily act as smoke reservoirs and the conditions within them are not a direct factor in determining the abandonment time. The report entitled, Fire Scenario, provides benchmark and validation simulations for CFAST as applicable to the main control room area for DAEC. In particular, the control room tests documented in NUREG/CR 4527, volume 2 [1988], are used to refine the validation basis for main control room applications. Table J-1 provides a summary of the validation and verification basis for CFAST as applied in the report.

Generic Fire Modeling Treatments

The generic fire modeling treatments, revision 0 and supplements 1 and 2 [Hughes, 2008; Hughes, 2011; Hughes, 2011] are used to establish zones of influence for specific classes of ignition sources and primarily serve as a screening calculation under NUREG/CR 6850, Sections 8 and 11. The generic treatments are based on a collection of empirical and algebraic models and correlations as well as generic enclosure fire modeling performed using the zone model CFAST. The verification basis and results sensitivity for the generic treatments are provided in the document itself. The validation basis is summarized in Tables J-1 and J-2.

Table J-1 V & V Basis for Fire Models / Model Correlations Used: Main Control Room Abandonment and Generic Treatments

Document	Application	V & V Basis	Discussion
Main CR Abandonment	Calculation of operator abandonment times in the Main Control Room.	NUREG 1824 / EPRI 1011999, volume 5 NIST Special Publication 1026 NIST Special Publication 1041 NUREG/CR 4527, volume 2	The abandonment time in the main control room is determined by computing the time for the visibility and temperature to reach thresholds as specified in NUREG/CR 6850 [2005]. CFAST has been validated for certain configurations in terms of predicting the temperature increase in an enclosure in accordance with NUREG 1824 / EPRI 1011999, volume 5. NUREG 1934 / EPRI 1023259 provides a specific methodology for demonstrating the model application is within the validation parameter space. In addition, NUREG/CR 4527, volume 2 provides full scale test data of electrical panel fires in control room like structures. These tests are modeled using the CFAST and the results are documented in Report 1SPH02902.076. CFAST is found to provide a reasonable and conservative estimate of both the hot gas layer temperature and visibility as a function of time given the input fire size for a control room like enclosure. This information is documented in Appendix D of Report 1SPH02902.076.
Generic Fire Modeling Treatments, Revision 0; Supplement 1; Supplement 2.	Definition of zones of influence about specific classes of ignition sources for use in the FPRA.	NUREG 1824 / EPRI 1011999, volume 5 NIST Special Publication 1026 NIST Special Publication 1041	The generic treatments use CFAST in a simple geometry that minimizes the boundary heat losses given a volume. For the volume postulated, the configuration produces the most adverse result regardless of the actual dimensions used. The range of volumes is within the validation and verification basis as provided by NUREG 1824 / EPRI 1011999, volume 5 and NIST Special Publications 1026 and 1041. The ventilation characteristics are considered over a large range and include situations that fall outside the validation range. However, the most adverse ventilation, which typically means the air to fuel ratio is close to unity provides the most conservative result. This ratio is within the validation basis for CFAST.

Table J-2 V & V Basis for Fire Models / Model Correlations Used: Generic Treatment Correlations

Correlation	Location in Hughes [2008]	Original Reference	Application	Original Correlation Range	Subsequent Validation and Verification	Limits in Treatments
Flame Height	Page 18	Heskestad [1981]	Provides a limit on the use of the Zone of Influence (ZOI)	$-4 < \log_{10}\left(\frac{c_p^3 T_o \Delta T_f}{g^2 \rho_o^2}\right)\frac{\dot{m}^3}{\alpha \Delta H_c D^5} < 1$ In practice, wood and hydrocarbon fuels, momentum or buoyancy dominated, with diameters between 0.05 – 10 m (0.16 – 33 ft).	Directly NUREG 1824 / EPRI 1011999, volume 3 [2007] Indirectly NUREG 1824 / EPRI 1011999, volume 5 [2007] (Correlation used in CFAST)	$\frac{4\dot{m}\Delta H_c}{\pi D^2} < 3000$
Point Source Model	Page 19	Modak [1976]	Lateral extent of ZOI – comparison to other methods	Isotropic flame radiation. Compared with data for 0.37 m (1.2 ft) diameter PMMA pool fire and a target located at a Ro/R of 10.	NUREG 1824 / EPRI 1011999 volume 3 [2007]; Society of Fire Protection Engineers (SFPE) [1999]	Predicted heat flux at target is less than 5 kW/m² (0.4 4 Btu/s-ft²) per SFPE [1999].
Method of Shokri and Beyler	Page 19	Shokri et al. [1989]	Lateral extent of ZOI – comparison to other methods	Pool aspect ratio less than 2.5. Hydrocarbon fuel in pools with a diameter between 1 – 30 m (3.3 – 98 ft). Vertical target, ground level.	SFPE [1999]	Ground based vertical target.
Method of Mudan (and Croce)	Page 20	Mudan [1984]	Lateral extent of ZOI – comparison to other methods	Round pools; Hydrocarbon fuel in pools with a diameter between 0.5 – 80 m (1.64 – 262 ft).	SFPE [1999]	Total energy emitted by thermal radiation less than total heat released.
Method of Shokri and Beyler	Page 20	Shokri et al. [1989]	Lateral extent of ZOI	Round pools; Hydrocarbon fuel in pools with a diameter between 1 – 50 m (3.3 – 164 ft).	SFPE [1999] NUREG 1824 / EPRI 1011999 volume 3 [2007]	Predicted heat flux at target is greater than 5 kW/m² (0.44 Btu/s-ft²) per SFPE [1999]. Shown to produce most conservative heat flux over range of scenarios considered among all methods considered.

Table J-2 V & V Basis for Fire Models / Model Correlations Used: Generic Treatment Correlations

Correlation	Location in Hughes [2008]	Original Reference	Application	Original Correlation Range	Subsequent Validation and Verification	Limits in Treatments
Plume heat fluxes	Page 22	Wakamutsu et al. [1996]	Vertical extent of ZOI	Fires with an aspect ratio of about 1 and having a plan area less than 1 m^2 (0.09 ft^2).	Wakamatsu et al. [2003] (larger fires) SFPE Handbook, Section 2–14 [2008]	Area source fires with aspect ratio ~ 1. Used with plume centerline temperature correlation; most severe of the two is used as basis for the ZOI dimension.
Plume centerline temperature	Page 23	Yokoi [1960]; Beyler [1986]	Vertical extent of ZOI	Alcohol lamp assumed to effectively be a fire with a diameter ~0.1 m (0.33 ft).	NUREG 1824 / EPRI 1011999 Volume 3 [2007]; SFPE Handbook, Section 2–1 [2008]	Area source fires with aspect ratio ~ 1. Used with plume flux correlation; most severe of the two is used as basis for the ZOI dimension.
Hydrocarbon spill fire size	Page 51	SFPE Handbook, Section 2–15 [2002]	Determine heat release rate for unconfined hydrocarbon spill fires.	Hydrocarbon spill fires on concrete surfaces ranging from ~1 to ~10 m (3.3 – 33 ft) in diameter.	None. Based on limited number of observations.	None. Transition from unconfined spill fire to deep pool burning assumed to be abrupt.
Flame extension	Page 100	SFPE Handbook, Section 2–14 [2002]	Determine the fire offset for open panel fires.	Corner fires ranging from ~10 to ~1,000 kW (9.5 – 948 Btu/s). Fires included gas burners and hydrocarbon pans.	None. Based on limited number of observations.	None. Offset is assumed equal to the depth of the ceiling jet from the experiments.
Line source flame height	Page 101	Delichatsios [1984]	Determine the vertical extent of the ZOI	Theoretical development.	SFPE Handbook, Section 2–14 [2008]	None. Transition to area source assumed for aspect plan ratios less than 4. Maximum of area and line source predictions used in this region.

Table J-2 V & V Basis for Fire Models / Model Correlations Used: Generic Treatment Correlations

Correlation	Location in Hughes [2008]	Original Reference	Application	Original Correlation Range	Subsequent Validation and Verification	Limits in Treatments
Corner flame height	Page 108	SFPE Handbook, Section 2–14 [2002]	Determine the vertical extent of the ZOI	Corner fires ranging from ~10 to ~1,000 kW (9.5 – 948 Btu/s). Fires included gas burners and hydrocarbon pans.	None. Correlation form is consistent with other methods; comparison to dataset from SFPE Handbook, Section 2–14 [2002] provides basis.	None.
Air mass flow through opening	Page 140	Kawagoe [1958]	Compare mechanical ventilation and natural ventilation	Small scale, ⅓ scale, and full scale single rooms with concrete and steel boundaries. Vent sizes and thus opening factor varied. Wood crib fuels.	Drysdale [1999]; SFPE [2004]	None. SFPE [2004] spaces with a wide range of opening factors.
Line fire flame height	Page 210	Yuan et al. [1996]	Provides a limit on the use of the Zone of Influence (ZOI); Extent of ZOI for cable tray fires.	$0.002 < \frac{Z}{Q^{\&}} < 0.6$ In practice, from the base to several times the flame height from 0.15 – 0.5 m (0.5 – 1.64 ft) wide gas burners.	None. Correlation form is consistent with other methods; comparison to dataset from Yuan et al. [1996] provides basis.	None.
Cable heat release rate per unit area	Page 210	Lee [1985]	Provides assurance that the method used is bounding	Cables with heat release rates per unit area ranging from about 100 – 1000 kW/m² (8.8 – 88 Btu/s-ft²).	None.	Correlation predicts a lower heat release rate than assumed in the Treatments and is based on test data.

Table J-2 V & V Basis for Fire Models / Model Correlations Used: Generic Treatment Correlations

Correlation	Location in Hughes [2008]	Original Reference	Application	Original Correlation Range	Subsequent Validation and Verification	Limits in Treatments
Line fire plume centerline temperature	Page 212	Yuan et al. [1996]	Provides a limit on the use of the Zone of Influence (ZOI); Extent of ZOI for cable tray fires.	$0.002 < \frac{Z}{\dot{Q}} < 0.6$ In practice, from the base to several times the flame height from 0.15 – 0.5 m (0.15 – 1.64 ft) wide gas burners.	None. Correlation form is consistent with other methods; comparison to dataset from Yuan et al. [1996] provides basis.	None.
Ventilation limited fire size	Page 283	Babrauskas [1980]	Assessing the significance of vent position on the hot gas layer temperature	Ventilation factors between 0.06 – 7.51. Fire sizes between 11 – 2,800 kW (10 – 2,654 Btu/s) Wood, plastic, and natural gas fuels.	SFPE [2004]	None. Provides depth in the analysis of the selected vent positions.

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K. Existing Licensing Action Transition

24 Pages Attached

Attachment K
Existing Licensing Action Transition

Licensing Action	Exemption #01 (19830426), Appendix R Exemption from Fire Protection Requirements of III.G.2 for Division 1 and Division 2 Cables Supplying the Scram Valves for Reactor Building North and South CRD Module Areas (III.G.2 Criteria)
Required Post-Transition	No
Licensing Basis	The 6/22/82 IELP submittal letter to the NRC provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2. Specifically, IELP requested exemption for the lack of protection for the Division 1 and Division 2 cables supplying the scram valves for Reactor Building North and South CRD Module Areas. The exemption was approved by the NRC in an SER dated 4/26/83. This exemption is no longer required because the DAEC fire risk evaluation, 0027-0042-000-004, has found that the fire area is compliant with NFPA 805 Section 4.2.4.

Licensing Action	Exemption #02 (19830426), Appendix R Exemption from the Requirement to Provide Fixed Fire Suppression in the Control Room (III.G.3 Criteria)
Required Post-Transition	No
Licensing Basis	The 6/22/82 IELP submittal letter to the NRC provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.3 for installation of a fixed fire suppression system in an area for which an alternate shutdown capability is provided. Specifically, DAEC requested exemption from providing a fixed fire suppression system in the Main Control Room. The exemption was approved by the NRC in an SER dated 4/26/83. This exemption is no longer required because the DAEC fire risk evaluation, 0027-0042-000-004, has found that the fire area is compliant with NFPA 805 Section 4.2.4.

Attachment K
Existing Licensing Action Transition

Licensing Action	Exemption #03 (19831219), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less Than 3 Hour Fire Ratings Between Miscellaneous Doors and Dampers (III.G.2.a Criteria)

Required Post-Transition No

Licensing Basis

The 6/22/82 IELP submittal letter, as supplemented by the 1/10/83, 2/15/83, and 9/28/84 letters to the NRC, provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.a in an area where redundant trains of safe shutdown equipment are not separated by a fire barrier having a 3-hour rating. Specifically, IELP requested exemption for fire zone boundaries having communication paths with less than 3 hour fire ratings between miscellaneous doors and dampers (i.e. based on a boundary rating of at least 1½ hours and a fire loading less than half of the barrier rating). The exemption was approved by the NRC in an SER dated 12/19/83.

This exemption is no longer required because the subject boundaries either (1) were upgraded to a 3-hour rating, (2) no longer require a 3-hour rating, or (3) have been demonstrated adequate for the hazard in existing engineering equivalency evaluation(s).

Licensing Action	Exemption #04 (19831219), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less than 3 Hour Fire Ratings Between Zones (Equipment Hatch) (III.G.2.a Criteria)

Required Post-Transition Yes

Licensing Basis

The 1/10/83 IELP submittal letter, as supplemented by the 2/15/83 letter to the NRC, provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.a in an area where redundant trains of safe shutdown equipment are not separated by a fire barrier having a 3-hour rating. Specifically, IELP requested exemption for fire zone boundaries having communication paths with less than 3 hour fire ratings consisting of an open hatch in the floor at Elevation 786'-0" in the Reactor Building. The exemption was approved by the NRC in an SER dated 12/19/83. This exemption was evaluated as part of the Boundary Exemptions. The basis for the exemption includes:

- The separation and configuration of redundant cables.
- The low combustible loading.
- The intervening concrete floor.
- The partial suppression system.

The bases for acceptability remain valid, as documented in FPLDA013-PR-005.

Fire Areas

ID	Description
RB1	757 Elevation Reactor Building and Torus Area, RCIC Room, HPCI Room, and Southeast Corner Room
RB3	786 Elevation Reactor Building and Above

References

Document ID

1983-01-10 [Attachment 4, Section II, Item C] - IELP letter from Root to Denton, Appendix R, Fire Protection (NG-83-0092) (8301130033)

Evaluation

IELP had originally submitted an exemption request for this barrier to the NRC on 6/22/82; however, a draft SER from the NRC indicated the request would be denied. In response, this letter provided IELP's revised submittal and contained the following evaluation:

"C. An exemption request for a boundary penetration, which the NRC staff proposes to deny, involves a 360 sq. ft. hatchway between Zones 2-A/2-B and 3-A/3-B. This request is based on the combustible loading present in both areas (.38/.21 for 2-A/2-B and .39/.26 for 3-A/3-B) and the physical separation between cables for redundant trains located in the two zones in the vicinity of the opening. In Zone 2-B, one tier of three trays is routed horizontally below the north edge of the open equipment hatch, approximately 6 inches from the edge, 21'-24' above the Zone 2-B floor (El. 757'-6") for a distance of approximately ten feet. In Zone 3-B, one tier of four trays is routed horizontally above the hatch's eastern edge, approximately 6 feet from the edge, 16'-20' above the Zone 3-B floor (El. 786'-0") for the entire length. These cables are directly separated by the concrete floor which acts as a considerable heat sink for any fire involving the cables in Zone 2-B. Any fire involving cables in Zone 3-B is not likely to propagate downward through the hatch where no combustible path exists. The certain dissipating chimney effect of the open hatchways leading to plant levels at higher elevations provides additional protection. In order to harm redundant cables in Zone 3-B, fires involving cables in Zone 2-B (located on the north side of the hatch) would be required to propagate in a sideways direction as well as upward; such propagation would be substantially contrary to the strong upward draft that would be created by the open higher hatchways."

Document ID

1983-02-15 [Attachment 1, Section II, Item C] - IELP letter from Root to Denton, Appendix R Exemption Requests (NG-83-0560) (8302180471)

Licensing Action Exemption #04 (19831219), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less than 3 Hour Fire Ratings Between Zones (Equipment Hatch) (III.G.2.a Criteria)

Evaluation

This IELP letter provided additional information to the NRC to assist in review of the exemption request and contained the following evaluation:

"C. Iowa Electric will provide a fixed fire suppression system in the vicinity of the Division 1 cables routed near the equipment hatch at elevation 786'-0". This suppression system is depicted in Figures 10, 11, and 12. This system is designed to prevent propagation of a fire through the equipment hatch from Fire Zone 2-B to the cables in the vicinity of the hatch in Fire Zone 3-B."

Document ID

1983-12-19 [SER, Sections 6.0, 6.1, 6.2, and 6.3] - NRC letter from Vassallo to Liu, Exemption Requests, 10 CFR 50.48 Fire Protection and Appendix R to 10 CFR 50 (ML021890257)

Evaluation

The SER granting the exemption contained the following evaluation:

"6.0 Equipment Hatch, Elevation 786'-0"

6.1 Discussion

By letter dated January 10, 1983, the licensee requested an exemption from Section III.G for a 360 ft² vertical equipment hatch opening in the floor between the CRD Module Areas (Fire Areas 2A/2B) and the laydown areas (Fire Zones 3A/3B). In Zone 2-B, three Division 1 trays are routed horizontally below the edge of the open equipment hatch, approximately 6 inches from the edge, 21 feet - 24 feet above the floor (E1. 757'-6"). In Zone 3-B, one floor above four Division II trays are routed horizontally above the hatch's edge, approximately 6 feet from the edge, 16 feet - 20 feet above the Zone 3-B floor (El. 786'-0"). These cables are separated from the Division I cables by the concrete floor which acts as a considerable heat sink for any fire involving the cables in Zone 2-B, located below.

By letter dated February 15, 1983, the licensee proposed to provide a fixed fire suppression system in the vicinity of the Division I cables routed near the equipment hatch at elevation 786'-0". This suppression system is designed to prevent propagation of a fire through the equipment hatch from Fire Zone 2-B to the cables in the vicinity of the hatch in Fire Zone 3-B. The fire loading in both areas is low.

6.2 Evaluation

This area does not comply with Section III.G because complete automatic suppression is not provided throughout both areas. Based on the low combustible loading, the separation and configuration of redundant cables, and the intervening concrete floor and partial suppression system, it is our opinion that one train of cables needed for safe shutdown will be maintained free of fire damage in the time period needed for the fire brigade to respond and manually extinguish the fire.

6.3 Conclusion

The protection provided for the equipment hatch between the CRD Module areas and the laydown areas provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted."

Licensing Action	Exemption #05 (19831219), Appendix R Exemption from the Automatic Suppression Requirement for the Turbine Building Water Treatment and Condensate Pump Area (III.G.2.c Criteria)
Required Post-Transition	No
Licensing Basis	The 6/22/82 IELP submittal letter, as supplemented by the 1/10/83 and 2/15/83 letters to the NRC, provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.c in an area where redundant trains are not separated by a 1-hour rated fire barrier. Specifically, IELP requested exemption from the automatic suppression requirement for the Turbine Building Water Treatment and Condensate Pump Area. The exemption was approved by the NRC in an SER dated 12/19/83. This exemption is no longer required because the DAEC nuclear safety capability assessment, FPLDA013-PR-021, has found that the fire area is compliant with NFPA 805 Section 4.2.4.

Licensing Action	Exemption #06 (19831219), Appendix R Exemption from the Requirement for Full Coverage by Automatic Suppression Systems in the HVAC Heat Exchanger and Chiller Area (III.G.3 Criteria)
Required Post-Transition	No
Licensing Basis	The 6/22/82 IELP submittal letter, as supplemented by the 1/10/83 and 2/15/83 letters to the NRC, provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.3 for installation of a fixed fire suppression and detection system in an area for which an alternate shutdown capability is provided. Specifically, IELP requested exemption from full coverage by automatic suppression systems in the HVAC Heat Exchanger and Chiller Area. The exemption was approved by the NRC in an SER dated 12/19/83. This exemption is no longer required because the DAEC nuclear safety capability assessment, FPLDA013-PR-019, has found that the fire area is compliant with NFPA 805 Section 4.2.4.

Licensing Action	Exemption #07 (19850701), Appendix R Exemption from the 8-Hour Battery Requirement for the Control Room (III.J Criteria)
Required Post-Transition	No
Licensing Basis	The 1/2/85 IELP submittal letter to the NRC provides justification for exemption from requirements of 10 CFR Part 50 Appendix R Section III.J, for emergency lighting units with at least an 8 hour battery power supply in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto. Specifically, IELP requested exemption for 8-hour battery requirement of III.J for the Control Room. The exemption was approved by the NRC in an SER dated 7/1/85. This exemption is no longer required because NFPA 805 does not require 8 hour battery backed emergency lights.

Licensing Action	Exemption #08 (19871014), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less Than 3 Hour Fire Ratings Between Zones (Doors No. 202 and 203) (III.G.2.a Criteria)
Required Post-Transition	No
Licensing Basis	The 1/10/83 IELP submittal letter, as supplemented by 9/28/84 letter to the NRC, provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.a in an area where redundant trains of safe shutdown equipment are not separated by a fire barrier having a 3-hour rating. Specifically, IELP requested exemption for fire zone boundaries having communication paths with less than 3 hour fire ratings between zones (Door No. 202 and Door No. 203). The exemption was approved by the NRC in an SER dated 10/14/87. This exemption was evaluated as part of the Boundary Exemptions. This exemption is no longer required because the DAEC fire risk evaluation, 0027-0042-000-004, has found that the fire area is compliant with NFPA 805 Section 4.2.4.

Licensing Action	Exemption #09 (19871014), Appendix R Exemption from 3 Hour Rated Barrier in the Reactor Building Torus Area (III.G.2.a Criteria)
Required Post-Transition	No
Licensing Basis	The 9/28/84 IELP submittal letter to the NRC provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.a in an area where redundant trains of safe shutdown equipment are not separated by a fire barrier having a 3-hour rating. Specifically, IELP requested exemption from a 3 hour rated barrier in the Reactor Torus Areas. This exemption was approved by the NRC in an SER dated 10/14/87. This exemption is no longer required because the DAEC fire risk evaluation, 0027-0042-000-004, has found that the fire area is compliant with NFPA 805 Section 4.2.4.

Attachment K
Existing Licensing Action Transition

Licensing Action	Exemption #10 (19871014), Appendix R Exemption from Automatic Suppression and Detection in the Reactor Building Torus Area (III.G.2.b Criteria)

Required Post-Transition No

Licensing Basis

The 9/28/84 IELP submittal letter to the NRC provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.b in an area where redundant trains are not separated by a horizontal distance of 20 feet or greater with no intervening combustibles. Specifically, IELP requested exemption from automatic suppression and detection in the Reactor Building Torus Area. This exemption was approved by the NRC in an SER dated 10/14/87.

This exemption is no longer required because the DAEC fire risk evaluation, 0027-0042-000-004, has found that the fire area is compliant with NFPA 805 Section 4.2.4.

Licensing Action	Exemption #11 (19871014), Appendix R Exemption from the Requirement for 3 Hour Fire Barriers in the Laydown Area and RWCU Area (Fire Zone 3-A/3-B) (III.G.2.a Criteria)
Required Post-Transition	No
Licensing Basis	The 9/28/84 IELP submittal letter to the NRC provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.a in an area where redundant trains of safe shutdown equipment are not separated by a fire barrier having a 3-hour rating. Specifically, IELP requested exemption of separation of redundant trains of safe shutdown cables and equipment by 3 hour rated fire barriers for the installation of untested flexible conduit wrapping configuration associated with valves MO-2135 and MO-2137 and for the lack of fire barrier enclosures for valve motor operator MO-2135 in the Laydown Area and RWCU Area (Fire Zone 3-A/3-B). The exemption was approved by the NRC in an SER dated 10/14/87. This exemption is no longer required because the DAEC nuclear safety capability assessment, FPLDA013-PR-019, has found that the fire area is compliant with NFPA 805 Section 4.2.4.

Licensing Action	Exemption #12 (19871014), Appendix R Exemption from the Requirement for 3 Hour Fire Barriers in the Reactor Building RHR Valve Room (Fire Zone 2-D) (III.G.2.a Criteria)
Required Post-Transition	No
Licensing Basis	The 6/22/82 IELP submittal, as supplemented by the 9/28/84, 10/21/86 and 2/20/87 letters to the NRC, provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.a in an area where redundant trains of safe shutdown equipment are not separated by a fire barrier having a 3-hour rating. Specifically, IELP requested exemption for separation of redundant trains of safe shutdown cables and equipment by 3 hour rated fire barriers, for the installation of flexible conduit fire wrap in an untested configuration and the lack of fire barrier enclosures, for valves and valve motor in the Reactor Building RHR Valve Room. The exemption was approved by the NRC in an SER dated 10/14/87. This exemption is no longer required because the DAEC fire risk evaluation, 0027-0042-000-004, has found that the fire area is compliant with NFPA 805 Section 4.2.4.

Licensing Action	Exemption #13 (19871014), Appendix R Exemption from the Requirement for 3 Hour Rated Fire Barriers in the Equipment Hatch Between Fire Zones 3-B and 4-B (III.G.2.a Criteria)
Required Post-Transition	No
Licensing Basis	The 9/28/84 IELP submittal letter to the NRC provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.a in an area where redundant trains of safe shutdown equipment are not separated by a fire barrier having a 3-hour rating. Specifically, IELP requested exemption for the lack of 3 hour rated fire barriers of the equipment hatch between Fire Zones 3-B and 4-B. The exemption was approved by the NRC in an SER dated 10/14/87. This exemption was evaluated as part of the Boundary Exemptions. This exemption is no longer required because the DAEC nuclear safety capability assessment, FPLDA013-PR-019, has found that the fire area is compliant with NFPA 805 Section 4.2.4.

Licensing Action	Exemption #14 (19871014), Appendix R Exemption from the Requirement of Separation of Redundant Trains of Safe Shutdown Cables and Equipment by 3 Hour Rated Fire Barriers for the Ventilation Duct Fire Dampers (III.G.2.a Criteria)
Required Post-Transition	No
Licensing Basis	The 9/28/84 IELP submittal letter to the NRC provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.a in an area where redundant trains of safe shutdown equipment are not separated by a fire barrier having a 3-hour rating. Specifically, IELP requested exemption from 3 hour rated fire barriers for the ventilation duct fire dampers FD-010, FD-012, FD-021, and FD-111 which were not installed in accordance with the manufacturer's instructions. The exemption was approved by the NRC in an SER dated 10/14/87. This was evaluated as part of the Boundary Exemptions. The exemption was approved by the NRC in an SER dated 12/19/83. This exemption is no longer required because the subject boundaries either (1) no longer require a 3-hour rating or (2) have been demonstrated adequate for the hazard in existing engineering equivalency evaluation(s).

Licensing Action	Exemption #15 (19871014), Appendix R Exemption from the Requirement that Structural Steel Forming Part of or Supporting Fire Barriers be Protected to a Fire Resistance Equivalent to that of the Barrier (III.G.2.a Criteria)

Required Post-Transition Yes

Licensing Basis

The 9/28/84 IELP submittal, as supplemented by the 10/31/84 letter to the NRC, provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.a in an area where redundant trains of safe shutdown equipment are not separated by a fire barrier having a 3-hour rating. Specifically, IELP requested exemption from the requirement that structural steel forming part of or supporting fire barriers be protected to a fire resistance equivalent to that of the barrier. The exemption was approved by the NRC in an SER dated 10/14/87. The basis for the exemption includes:

- Two fire modeling methodologies are employed in the analysis: a fully developed enclosure fire model is used to evaluate the average gas mixture temperature in the enclosure; secondly, the local heating effects on steel members are assessed by flame and fire plume impingement calculations. These models formed the basis of the structural steel evaluation.
- If the steel temperature exceeds 1100°F within 3 hours, then IELP had committed to protect the steel with 3-hour rated fireproofing. If the steel temperature does not reach 1100°F, an exemption from the requirements to provide structural steel fireproofing was requested.
- IELP had committed to institute operational procedures to ensure that the combustible load limit assumed by the calculations is not exceeded.

Additional clarification is provided for the following fire zone boundary exemptions granted in the SER:

1. The current fire hazard analysis shows the fire zone boundary between fire zones 11A and 12A (both in Fire Area CB1) is no longer required to be fire rated.
2. Existing fire areas RB1 and RB2 will be combined and transition to an NFPA 805, Section 4.2.4 regulatory basis (Performance based approach utilizing deterministic methods for simplifying assumptions).

The boundary between fire zones 01D and 2A/2B (both in new Fire Area RB1) will no longer be required to be 3-hour rated. The exemption would therefore, be applicable to the following Fire Zone boundaries:

Boundary From	To	Description
1C	2A/2B	NE Corner room ceiling (RB)
1D	2A/2B	SE corner room ceiling (RB)
2D	3A/3B	RHR Valve Room Ceiling (RB)
10A	11A	Control Building Corridor Ceiling
10B	11A	Div 2 battery room ceiling
10D	11A	Div 1 battery room ceiling
11A	12A	Div 2 cable spreading room ceiling
16A	16B	Div 2 pump area (pumphouse) wall
16B	16A	Div 1 pump area wall (pumphouse)
16F	16A, 16B	Pumphouse sump ceiling
17A	17B	Div 1 pump room (intake structure)
17B	17A	Div 2 pump room (intake structure)
17C	17D	Div 1 screen area (intake structure)
17D	17C	Div 2 screen area (intake structure)

The bases for acceptability remain valid, as documented in FPLDA013-PR-005.

Fire Areas

ID	Description
CB1	Cable Spread Room, Control Room and HVAC Area
CB2	West Essential Switchgear Room and 125VDC Battery

Attachment K
Existing Licensing Action Transition

Licensing Action Exemption #15 (19871014), Appendix R Exemption from the Requirement that Structural Steel Forming Part of or Supporting Fire Barriers be Protected to a Fire Resistance Equivalent to that of the Barrier (III.G.2.a Criteria)

Fire Areas

ID	Description
CB3	East Essential Switchgear Room and 125VDC Battery
CB4	Battery Corridor and 250VDC Battery Room
IS1	Intake Structure Division I Pump Room
IS2	Intake Structure Division II Pump Room
PH1	Division II RHRSW/ESW Pump Room and Piping Area
PH2	Division I RHRSW/ESW Pump Room
RB1	757 Elevation Reactor Building and Torus Area, RCIC Room, HPCI Room, and Southeast Corner Room
RB3	786 Elevation Reactor Building and Above
RB4	Northeast Corner Room

References

Document ID

1984-09-28 [Section 3.0] - IELP letter from McGaughy to Denton, 10 CFR 50, Appendix R, Exemption Requests (NG-84-4135) (8410030374)

Evaluation

This letter was IELP's original exemption request submittal letter to the NRC. It contained the following evaluation:

"3.0 PROTECTION OF EXPOSED STRUCTURAL STEEL FOR RATED FIRE BARRIERS

Iowa Electric met with NRC (Chemical Engineering Branch) reviewers in Bethesda on September 5, 1984 to discuss the exemptions contained in this submittal. In that meeting, Iowa Electric proposed numerous exemptions from the requirement to protect structural steel forming part of or supporting required fire barriers. The basis for these proposed exemptions was that the peak temperature of the structural steel would not exceed the critical temperature of 1100° Fahrenheit when exposed to fires postulated in the DAEC Fire Hazards Analysis (Reference 2). The basis for the critical temperature of 1100°F is explained in NRC Generic Letter 83-33. Structural steel associated with required fire barriers and found to exceed 1100°F has already been protected.

However, the peak temperature calculations performed by Iowa Electric did not explicitly model local temperature effects due to the spatial relationship of combustible material to structural steel, flame plume effects, or fire zone ventilation. At the meeting, the NRC reviewers indicated that these local effects would need to be considered and that the approach used by Philadelphia Electric's Limerick Plant had been reviewed and found to be acceptable.

Iowa Electric is currently re-performing the peak steel temperature calculations using the Limerick methodology. The expected results are that the structural steel analyzed will not exceed the 1100°F critical temperature. If the calculations indicate that exposed structural steel forming part of or supporting required fire barriers will experience peak temperatures above 1100°F, that portion of the structural steel which exceeds 1100°F and is required to maintain fire barrier integrity will be protected. A report describing the method of calculating peak structural steel temperatures and summarizing the results of the structural steel evaluation will be sent to the NRC by October 31, 1984.

3.1 Exemption Requests: Protection of Structural Steel

Section III.G.2.a states that structural steel forming a part of or supporting fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier. Iowa Electric hereby requests exemptions from this requirement for the boundaries listed in Table 1.

Discussion

As described above, the exposed structural steel associated with these boundaries will be re-analyzed using the Limerick methodology. In many cases, the boundaries will be analyzed in one direction only because the steel is already protected on one side by concrete, as is the case with fire zone floors. If the re-analaysis indicates that structural steel required to maintain the boundaries listed in Table 1 will exceed 1100°F, Iowa Electric will protect that portion of the steel which exceeds 1100°F.

Licensing Action	Exemption #15 (19871014), Appendix R Exemption from the Requirement that Structural Steel Forming Part of or Supporting Fire Barriers be Protected to a Fire Resistance Equivalent to that of the Barrier (III.G.2.a Criteria)

Evaluation

These exemption requests are based upon the guidance of Generic Letter 83-33 and a method of analysis approved by the NRC. Considering the fact that structural steel that exceeds 1100°F will be protected, the remaining unprotected structural steel provides adequate assurance that the integrity of the fire barriers of Table 1 will be maintained and the exemptions are, therefore, justified.

Table 1
STRUCTURAL STEEL EXEMPTION SUMMARY

From	To	Description
1C	2A/2B	Partial first floor ceiling structure (northeast corner)
1D	2A/2B	Partial first floor ceiling structure (southeast corner)
2A/2B	3A/3B, 3C, 3D	Second floor ceiling structure
2D	3A/3B	Partial second floor ceiling structure
3A/3B	4A/4B	Third floor ceiling structure
7E	8F, 8G, 8H, 8J	Ceiling structure below diesel generators
8F, 8H	8H, 8F	Diesel generator room ceilings above common rated boundary (Note 1)
10B, 10C, 10D, 10E, 10F	11A	Essential switchgear and battery rooms. Ceiling structure
11A	12A	Cable spreading room ceiling structure
16A, B	16B, A	Pumphouse adjoining rooms, el 746'-6"
16F	16A, B	Pumphouse sump ceiling
17A, B	17B, A	Intake structure ceiling steel penetrating rated wall (Note 1)
17C, D	17D, C	Intake structure ceiling steel penetrating rated wall (Note 1)

Note 1: Wall in questions is 3-hour rated and the structural steel (if any) is protected. The concern is that the ceiling above could fail thereby causing the required fire barrier to fail. Exemption is being requested from protecting that structural steel supporting the ceiling above the wall which will not exceed 1100°F during the appropriate postulated fire."

Document ID

1984-10-31 [3.0 SUMMARY OF RESULTS] - Information Concerning Fire Protection of Structural Steel to Support Our Exemption Requests of September 28, 1984 (8411070115)

Evaluation

This letter provided technical analyses to support the fire protection exemptions requested by reference dated 9/28/84 and analysis which demonstrated the areas which required structural steel protection. Table 2 was not able to be duplicated so a summary of the temperature analysis is presented below. Refer to the reference for the actual and official Table 2 entries. This letter contained the following evaluation:

"3.0 SUMMARY OF RESULTS

Table 1 is reproduced from Iowa Electrics structural steel exemption request (Reference 2) and indicates the fire zone boundaries where structural steel has been reanalyzed using the Limerick plant methodology for peak room air temperature and localized heating.

Table 2 shows the results of the room air and structural steel peak temperatures for the boundaries listed in Table 1 and provides the principal justification for the exemption to protect structural steel. For each boundary, a case description is shown that describes whether the fire is ventilation controlled or fuel controlled. The fire durations listed correspond to the combustion rates used in the room temperature calculation. The maximum area temperatures are calculated based on the model described in Section 2.1.2. If there are no potential local heatup problems, "NO" is entered in the localized heating problem column. Where applicable, localized

Licensing Action Exemption #15 (19871014), Appendix R Exemption from the Requirement that Structural Steel Forming Part of or Supporting Fire Barriers be Protected to a Fire Resistance Equivalent to that of the Barrier (III.G.2.a Criteria)

Evaluation

heating interactions are specifically designated, e.g., cable tray, and the peak steel temperature is shown with the time of the peak value. In those cases where the steel temperature exceeds 1,100F, the time that the steel reached 1,100F is shown. The times and temperatures are calculated for each size structural member; however, only values characteristic of the limiting member are shown in the table.

For those cases where steel temperature exceeds 1,100F, the comment indicates that affected steel will be protected. Not all of the steel member sizes are specifically designated; in some cases, only certain steel members will be protected and, in others, only the portions adjacent to localized heating sources need be protected if room temperatures alone do not cause the steel to overheat. Steel that does not require protection is also identified."

Table 1
STRUCTURAL STEEL EXEMPTION SUMMARY

From	To	Description
1C	2A/2B	Partial first floor ceiling structure (northeast corner)
1D	2A/2B	Partial first floor ceiling structure (southeast corner)
2A/2B	3A/3B, 3C, 3D	Second floor ceiling structure
2D	3A/3B	Partial second floor ceiling structure
3A/3B	4A/4B	Third floor ceiling structure
7E	8F, 8G, 8H, 8J	Ceiling structure below diesel generators
8F, 8H	8H, 8F	Diesel generator room ceilings above common rated boundary (Note 1)
10B, 10C, 10D, 10E, 10F	11A	Essential switchgear and battery rooms. Ceiling structure
11A	12A	Cable spreading room ceiling structure
16A, B	16B, A	Pumphouse adjoining rooms, el 746'-6"
16F	16A, B	Pumphouse sump ceiling
17A, B	17B, A	Intake structure ceiling steel penetrating rated wall (Note 1)
17C, D	17D, C	Intake structure ceiling steel penetrating rated wall (Note 1)

Note 1: Wall in questions is 3-hour rated and the structural steel (if any) is protected. The concern is that the ceiling above could fail thereby causing the required fire barrier to fail. Exemption is being requested from protecting that structural steel supporting the ceiling above the wall which will not exceed 1100°F during the appropriate postulated fire.

(From Reference 2)"

For the complete summary of the actual structural steel temperature analysis refer to Table 2. Below is a summary extracted from the temperature analysis values presented in Table 2.These are the boundaries found in Table 2 which were shown not to require fire proofing protection due to temperatures which did not exceed 1100°F during the appropriate postulated fire. The exemption would therefore, be applicable to the following Fire Zone Boundaries:

Boundary From	To	Description
1C	2A/2B	NE Corner room ceiling (RB)
1D	2A/2B	SE corner room ceiling (RB)
2D	3A/3B	RHR Valve Room Ceiling (RB)
10A	11A	Control Building Corridor Ceiling
10B	11A	Div 2 battery room ceiling
10D	11A	Div 1 battery room ceiling
11A	12A	Div 2 cable spreading room ceiling
16A	16B	Div 2 pump area (pumphouse) wall

Licensing Action Exemption #15 (19871014), Appendix R Exemption from the Requirement that Structural Steel Forming Part of or Supporting Fire Barriers be Protected to a Fire Resistance Equivalent to that of the Barrier (III.G.2.a Criteria)

Evaluation

16B	16A	Div 1 pump area wall (pumphouse)
16F	16A, 16B	Pumphouse sump ceiling
17A	17B	Div 1 pump room (intake structure)
17B	17A	Div 2 pump room (intake structure)
17C	17D	Div 1 screen area (intake structure)
17D	17C	Div 2 screen area (intake structure)

Document ID

1987-10-14 [SER, Sections 7.1, 7.2, 7.3, & 7.4] - NRC letter from Cappucci to Liu, Exemption from Appendix R to 10 CFR Part 50 Concern Separating Redundant Trains by 3-Hour Fire Barriers and Providing Automatic Fire Suppression and Detection Systems (ML021900207, ML041000504)

Evaluation

The SER granting the exemption contained the following evaluation:

"7.1 Exemptions Requested

Exemptions were requested from Section III.G.2.a to the extent that it requires structural steel forming part of or supporting required fire barriers be protected to provide a fire resistance equivalent to that of the barrier.

7.2 Discussion

The licensee has identified several areas which do not meet the requirements of Section III.G.2.a because structural steel forming part of or supporting required fire barriers is not fireproofed.

The licensee met with the staff on September 5, 1984, to discuss several exemptions from the requirement to protect structural steel forming part of or supporting required fire barriers. The basis for the proposed exemptions was that the peak temperature of the structural steel would not exceed 1100°F when exposed to fires postulated in the licensee's fire hazards analysis. Structural steel associated with required fire barriers and found to exceed 1100°F had already been fireproofed. During the meeting, the staff indicated that the peak temperature calculations performed should explicitly model local temperature effects due to the spatial relationship of combustible materials and structural steel, flame plume effects, and fire zone ventilation.

By letter dated October 31, 1984, the licensee submitted an evaluation of the temperature response of structural steel based on peak temperature calculations. The evaluation uses a mathematical model to calculate the potential time-temperature profile of fires in each fire zone. Two fire modeling methodologies are employed in the analysis: a fully developed enclosure fire model is used to evaluate the average gas mixture temperature in the enclosure; secondly, the local heating effects on steel members are assessed by flame and fire plume impingement calculations. These models formed the basis of the structural steel evaluation.

If the peak temperature calculations show that the time-temperature profile in an area will exceed 1100°F within 3 hours, additional evaluation is performed to calculate the corresponding temperature response of the supporting structural steel. If the steel temperature exceeds 1100°F within 3 hours, the licensee has committed to protect the steel with 3-hour rated fireproofing. If the steel temperature does not reach 1100°F, an exemption from the requirements to provide structural steel fireproofing is requested.

The results of the reanalysis indicated that several specific structural steel members did not fail, i.e., did not attain the failure temperature of 1100°F when analyzed under localized heating effects model and the enclosure fire model. Those that failed would be fireproofed. The results of the reanalysis are summarized in Tables 1 and 2 of the licensee's October 31, 1984 letter.

The peak steel temperatures attained in certain fire zones were reduced below 1100°F by reducing or controlling the combustible loading within the area. The licensee has committed to institute operational procedures to ensure that the combustible load limit assumed by the calculations is not exceeded.

Licensing Action	Exemption #15 (19871014), Appendix R Exemption from the Requirement that Structural Steel Forming Part of or Supporting Fire Barriers be Protected to a Fire Resistance Equivalent to that of the Barrier (III.G.2.a Criteria)

Evaluation

7.3 Evaluation

The fire zone boundaries identified in Table 1 of the licensee's October 31, 1984 letter do not comply with the technical requirements of Section III.G.2.a of Appendix R because structural steel forming-part of or supporting fire barriers is not fireproofed.

The licensee has performed peak temperature calculations that explicitly model local temperature effects due to the spatial relationship of combustible material to structural steel, flame plume effects, and fire zone ventilation. The overall approach described and implemented by the licensee is technically sound. The fire models employed have been documented and the methodology employed represents a compromise between accuracy in real fire environment simulation and practicality of implementation. Our review indicates that this compromise results in a conservative evaluation. The approach used by the licensee is based on Limerick's methodology that has been previously submitted on other dockets and approved by the staff.

We were concerned that because of the lack of fireproofing on structural steel, a fire could lead to the structural failure of the steel and subsequently the required fire barrier. However, based on the licensee's evaluation, we have reasonable assurance that a fire in the identified fire zones would not affect required structural steel fire zone boundaries and prevent a safe plant shutdown. Also, there is unlikely to be a significant increase in fire loading due to transient activities in the identified fire zones.

7.4 Conclusion

Based on the above evaluation, the staff concludes that the results of the structural steel analysis provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, the exemption requests from fireproofing structural steel which does not reach 1100°F should be granted."

Licensing Action Exemption #16 (19910816), Appendix R Exemption from the 3-Hour Fire Barrier Requirement for the Drywell Expansion Gap (III.G.2.a Criteria)

Required Post-Transition Yes

Licensing Basis

The 8/25/87 IELP submittal letter to the NRC provides justification for exemption from the requirements of 10 CFR Part 50 Appendix R Section III.G.2.a in an area where redundant trains of safe shutdown equipment are not separated by a fire barrier having a 3-hour rating. Specifically, IELP requested exemption from the for 3-hour fire barrier separating redundant trains in the Drywell Expansion Gap. The exemption was approved by the NRC in an SER dated 8/16/91. The basis for the exemption includes:

- Most of the foam material was removed from the expansion gap at DAEC following each concrete pour.
- The only combustible material remaining in the expansion gap at DAEC is elastic polyurethane circumferential strips 3 inches thick x 5 inches wide on 2-feet centers below elevation 748 feet 9 inches and 3-feet centers above that elevation.
- The strips are manufactured of plastic material that is classed as "self-extinguishing" in accordance with ASTM D 1692.
- Because of the geometry (long narrow circumferential strips separated by 3 feet on centers from below the equator of the bulb) and the self-extinguishing characteristics of the plastic material, any fire that might occur is expected to be limited to the area of ignition and would not spread to other strips.
- The steel drywell itself will serve as a large heat sink to further assist in cooling and aiding the self-extinguishing characteristics of this material should it become ignited.
- Maintenance work on containment penetrations is administratively controlled. In addition to fire watches, precautions include filling the annulus space with noncombustible material prior to any operations which might produce hot slag or sparks.

The bases for acceptability remain valid, as documented in FPLDA013-PR-005.

Fire Areas

ID	Description
DRY	Drywell

References

Document ID

1987-08-25 [Sections 2.0 and 3.5] - IELP letter, Rothert to Murley, 10 CFR 50 Appendix R Exemption Request for Drywell Expansion Gap (8709100184)

Evaluation

This letter was IELP's original exemption request submittal letter to the NRC. It contained the following evaluation:

"2.0 EXEMPTION REQUEST: 3-HOUR BARRIER

Appendix R, Section III.G.2 requires a 3-hour barrier or other equivalent means of separating redundant trains of safe shutdown equipment to ensure that one train is free of fire damage. An exemption from the 3-hour barrier requirement is requested for the DAEC drywell expansion gap.

Justification for this exemption request is provided by a three-step approach:

- Review of the DAEC drywell gap design
- Analysis of potential effects of a drywell gap fire
- Evaluation of compensating fire protection mechanisms"

"3.5 EVALUATION SUMMARY

In conclusion, the drywell allows communication between the exterior canisters, sleeves, and/or guard pipes of opposite trains of redundant safe shutdown equipment. The potential for providing both an ignition source and combustion air in the vicinity of the polyurethane foam in the gap is believed to exist only during cold shutdown while cutting or welding is being performed on the drywell liner or in special cases when permission is obtained to perform hot work on penetrations outside the

Licensing Action	Exemption #16 (19910816), Appendix R Exemption from the 3-Hour Fire Barrier Requirement for the Drywell Expansion Gap (III.G.2.a Criteria)

Evaluation

drywell during power operation. During either period, not only are the normal hot work precautions taken for work in proximity to rated fire barriers, but special precautions are also taken that are unique to drywell liner work.

In the unlikely event that a fire starts in the drywell gap, the fire hazards analysis demonstrates that no damage to safe shutdown equipment is expected, even though Appendix R, Section III.G allows repairs within 72 hours to restore cold shutdown equipment to service.

Based on the above, Iowa Electric is requesting an exemption from Appendix R, Section III.G.2 separation requirements on the basis of compensating fire protection provided while the risk of a fire in the drywell gap exists."

Document ID

1991-08-16 [SER, Sections II and III] - NRC letter from Shiraki to Liu, Exemption to 10 CFR 50, Appendix R, Section III.G.2 (ML021900627)

Evaluation

The SER granting the exemption contained the following evaluation:

"II.

On November 19, 1980, the Commission published a revised Section 50.48 and a new Appendix R to 10 CFR Part 50 regarding fire protection features of nuclear power plants. The revised Section 50.48 and Appendix R became effective on February 17, 1981. Section III of Appendix R contains 15 subsections lettered A through O, each of which specifies requirements for a particular aspect of the fire protection features at a nuclear power plant.

One of the subsections, III.G, is the subject of the licensee's exemption request. Specifically, Subsection III.G, Part 2 requires a 3-hour fire barrier or other equivalent means of separating redundant trains of safe shutdown equipment to ensure that one train is free of fire damage.

By letter dated August 25, 1987, the Iowa Electric Light and Power Company (the licensee) responded to an unresolved item (50-331/86005-01) from an NRC fire protection program inspection conducted at the Duane Arnold Energy Center (DAEC) on February 24-28, March 12, April 22-23, and May 15, 1986. The unresolved item was concerned with the potential for fire damage to redundant safe shutdown cables in penetrations passing through the expansion gap due to burning combustible foam material located in the expansion gap.

Boiling Water Reactor (BWR) Containments expand and contract with both the thermal and pressure changes which occur over the course of a normal operating cycle. In order to accommodate these dimensional changes, an "Expansion Gap" of about 2 1/2 to 3 inches is provided between the steel containment vessel (the drywell) and the reinforced concrete biological shield that surrounds the drywell. This Expansion Gap is built in by means of installing compressible plastic foam sheets around the outside of the steel drywell before pouring the concrete.

At Dresden Units 2 and 3, the plastic foam was covered with a glass-fiber mat which in turn was sealed with an epoxy resin and left permanently in place after the concrete pours.

During flame cutting operations on January 20, 1986, and again on June 4, 1988, on certain mechanical penetrations at Dresden Unit 3, maintenance personnel allowed hot slag to drop down the annulus around the penetration. The hot slag ignited the expansion gap material which smoldered for several hours and was difficult to extinguish. Licensees with designs similar to Dresden have evaluated their particular construction designs and requested exemptions, as appropriate, from the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 as they apply to the expansion gap.

In its letter dated August 25, 1987, the licensee requested an exemption from the Commission's regulations in 10 CFR Part 50, Appendix R, Section III.G.2 requiring a 3-hour barrier or other equivalent means of separating redundant trains of safe shutdown equipment to ensure that one train is free of fire damage.

Section III.G of Appendix R to 10 CFR Part 50 provides different acceptable methods of protecting safe shutdown capability from the effects of fire. These different methods utilize various combinations of 3-hour and 1-hour fire-related barriers, automatic fire detection and fixed fire suppression capability, and spatial separation

Licensing Action	Exemption #16 (19910816), Appendix R Exemption from the 3-Hour Fire Barrier Requirement for the Drywell Expansion Gap (III.G.2.a Criteria)

Evaluation

between redundant safe shutdown components. The licensee has requested an exemption from the specific requirements for 3-hour fire rated barrier separation for the redundant safe shutdown train instrumentation and power and control cables located in containment penetrations where they pass through the expansion gap between the steel drywell and the concrete biological shield.

The technical information furnished by the licensee to support this requested exemption included the following:

A. Unlike the Dresden construction, most of the foam material was removed from the expansion gap at DAEC following each concrete pour. The only combustible material remaining in the expansion gap at DAEC is elastic polyurethane circumferential strips 3 inches thick x 5 inches wide on 2-feet centers below elevation 748 feet 9 inches and 3-feet centers above that elevation. (The equator of the spherical portion of the drywell is at elevation 766 feet.)

B. The strips are manufactured of plastic material that is classed as "self-extinguishing in accordance with ASTM D 1692.

C. Because of the geometry (long narrow circumferential strips separated by 3 feet on centers from below the equator of the bulb) and the self-extinguishing characteristics of the plastic material, any fire that might occur is expected to be limited to the area of ignition and would not spread to other strips.

D. The steel drywell itself will serve as a large heat sink to further assist in cooling and aiding the self-extinguishing characteristics of this material should it become ignited.

E. Maintenance work on containment penetrations is administratively controlled. In addition to fire watches, precautions include filling the annulus space with noncombustible material prior to any operations which might produce hot slag or sparks.

The staff has evaluated the technical information furnished by the licensee to support its requested exemption. On the basis of that evaluation, the staff concludes that the likelihood of fire occurring in the expansion gap foam material is slight. Further, if the material should become ignited, the staff concludes that the fire would be localized and would not endanger components of redundant safe shutdown trains passing through the drywell.

On this basis, the staff finds that the licensee has demonstrated, as required by 10 CFR 50.12(a)(2)(ii), that the subject redundant safe shutdown train instrumentation and power and control cables located in containment penetrations where they pass through the expansion gap between the steel drywell and the concrete biological shield need not have a 3-hour fire barrier to achieve the underlying purpose of the rule (i.e., achieve and maintain safe shutdown) in that the geometry, construction techniques, and self-extinguishing characteristic of the foam material in the expansion gap will maintain the temperature increase in the cables below the damage threshold.

III.

In summary, the NRC staff finds that the licensee has demonstrated that there are special circumstances present as required by 10 CFR 50.12(a)(2). Further, the staff also finds that, for this exemption request, the fire protection provided by the licensee will not present an undue risk to the public health and safety.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the exemption as described in Section II is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest and hereby grants the exemption to the requirements of 10 CFR Part 50, Appendix R, Section III.G.2."

L. NFPA 805 Chapter 3 Requirements for Approval (10 CFR 50.48(c)(2)(vii)

9 Pages Attached

In accordance with 10 CFR 50.48(c)(2)(vii) Performance-based methods, the fire protection program elements and minimum design requirements of Chapter 3 may be subject to the performance-based methods permitted elsewhere in the standard.

In accordance with NFPA 805 Section 2.2.8, the performance-based approach to satisfy the nuclear safety, radiation release, life safety, and property damage/business interruption performance criteria requires engineering analyses to evaluate whether the performance criteria are satisfied.

In accordance with 10 CFR 50.48(c)(2)(vii), the engineering analysis performed shall determine that the performance-based methods for evaluating an equivalent level of fire protection for the requirements of NFPA 805 Chapter 3:

(A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;
(B) Maintains safety margins; and
(C) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

NextEra Energy Duane Arnold, LLC requests formal approval of performance-based methods used to demonstrate an equivalent level of fire protection for the requirements in Chapter 3 of NFPA 805 as follows:

Approval Request 1

NFPA 805 Section 3.3.3

NFPA 805 Section 3.3.3 states:

> *"**Interior Finishes.** Interior wall or ceiling finish classification shall be in accordance with NFPA 101®, Life Safety Code®, requirements for Class A materials. Interior floor finishes shall be in accordance with NFPA 101 requirements for Class I interior floor finishes."*

DAEC utilizes an epoxy floor coating system that does not meet the exact requirements of NFPA 805 Section 3.3.3.

NFPA 101 requirements for interior floor finishes state that the floor finish shall be characterized by a critical radiant flux not less than 0.45 W / cm^2. In addition, the NRC issued Information Notice (IN) 2007-26 to address the combustibility of epoxy floor coatings at commercial nuclear power plants. Per IN 2007-26, the NRC defined a non-combustible material as:

- A material which in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat; and
- Material having a structural base of noncombustible material, as defined above, with a surfacing not over 1/8-inch thick that has a flame spread rating not higher than 50 when measured using the test protocol of American Society for Testing and Materials (ASTM) E 84, Standard Test Method for Surface Burning Characteristics of Building Materials.

NFPA 805 has re-defined the IN 2007-26 definition of non-combustible material to limited combustible material:

> *"Material that, in the form in which it is used, has a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg) and either has a structural base of noncombustible material with a surfacing not exceeding a thickness of 1/8 in. (3.2 mm) that has a flame spread rating not greater than 50, or has another material having neither a flame spread rating greater than 25 nor evidence of continued progressive combustion, even on surfaces exposed by cutting through the material on any plane."*

NFPA 805 defines non-combustible material as:

> *"Material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat."*

A previous DAEC evaluation of the acceptability of the epoxy floor coatings was performed in response to an unresolved item from an NRC inspection report (Letter No. NG-03-0527 from NMC to NRC dated July 25, 2003). DAEC determined that coating samples taken from areas containing safety related equipment ranged in thickness from 0.003 inches to 0.071 inches (90% of samples) with a few outliers having a thickness up to 0.182 inches. DAEC also evaluated the contribution that epoxy floor coating may

have to combustible loads in safety related areas of the plant. The contribution was determined not to present a challenge to the plant's fire barriers and is considered to be negligible overall. The DAEC protective coatings procedure cites three epoxy concrete floor coating materials. These materials are classified as either meeting NFPA - Class A or have an ASTM E84 flame spread less than 50.

The basis for the request for approval of the performance-based method is:

- The floor coating thickness at DAEC.
- DAEC evaluation determined the contribution that epoxy floor coating has to combustible loads is negligible.
- The coatings permitted at DAEC are either NFPA - Class A qualified or ASTM E84 tested with a flame spread index less than 50.
- The epoxy coating is on the floor. The ASTM E-84 test is conducted with the material on the ceiling of a tunnel. This configuration would allow the flame to directly impinge on the ceiling surface, enhancing flame spread. With the material on the floor, the heat flux to the surface is much less than would be expected in the ceiling configuration since the convective flame is directing the heat away from the surface. This would mean that the overall flame spread would be expected to be much less, even with a slightly greater thickness.

Nuclear Safety and Radiological Release Performance Criteria:

The use of epoxy floor coating does not affect nuclear safety as it, in general, meets the definition of a limited combustible material with isolated thickness excesses. The floor coating materials were evaluated to have a negligible effect on combustibility. Application of epoxy floor coatings is controlled via a DAEC procedure to ensure that the amount of material does not add appreciable amounts of combustible material to the plant. Therefore, there is no impact on the nuclear safety performance criteria.

The use of epoxy floor coatings has no impact on the radiological release performance criteria. The radiological release review was performed based on the manual fire suppression activities in areas containing or potentially containing radioactive materials and is not dependent on the floor coating materials. The floor coatings do not change the radiological release evaluation, which concluded that potentially contaminated water is contained and smoke monitored. Floor coatings do not add additional radiological materials to the area or challenge system boundaries.

Safety Margin and Defense-in-Depth:

The use of epoxy floor coating does not affect safety margin as it, in general, meets the definition of a limited combustible material with isolated thickness excesses. The floor coating materials were evaluated to have a negligible effect on combustibility. Application of epoxy floor coatings is controlled via a DAEC procedure. These precautions and limitations on the use of these materials have been defined by the limitations of the analytical methods used in the development of the Fire PRA. Therefore, the inherent safety margin and conservatisms in these methods remain unchanged.

The three echelons of defense-in-depth are 1) to prevent fires from starting (combustible/hot work controls), 2) rapidly detect, control and extinguish fires that do occur thereby limiting damage (fire detection systems, automatic fire suppression, manual fire suppression, pre-fire plans), and 3) provide adequate level of fire protection for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire rated cable, success path remains free of fire damage, recovery actions). The use of epoxy floor coatings does not affect echelons 1, 2 and 3. The use of epoxy floor coatings does not directly result in compromising automatic fire suppression functions, manual fire suppression functions, or post-fire safe shutdown capability.

Conclusion:

NRC approval is requested for the use of epoxy floor coatings as a performance-based method that provides an equivalent level of fire protection to NFPA 805 Section 3.3.3 and:

(A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;
(B) Maintains safety margins; and
(C) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

Approval Request 2

NFPA 805 Section 3.3.5.2

NFPA 805 Section 3.3.5.2 states:

> *"Only metal tray and metal conduits shall be used for electrical raceways. Thin wall metallic tubing shall not be used for power, instrumentation, or control cables. Flexible metallic conduits shall only be used in short lengths to connect components."*

The use of plastic conduits for embedded installations is required by the DAEC specification for conduit and tray installation. Plastic conduits for embedded installations are required to be of a type suitable for its intended use. Access points to embedded conduit are required to be rigid steel. The plastic conduits are protected when embedded from mechanical damage and from damage resulting from either an exposure fire or from a fire within the conduit impacting other targets.

The basis for the approval request of this deviation is:

- The plastic conduit, while a combustible material, is not subject to flame/heat impingement from an external source which would result in structural failure, contribution to fire load, and/or damage to the circuits contained within where the conduit is embedded in concrete.
- Failure of circuits within the conduit resulting in a fire would not result in damage to external targets.

Nuclear Safety and Radiological Release Performance Criteria:

The use of plastic conduit in embedded locations does not affect nuclear safety as the material in which conduits are run within an embedded location are not subject to the failure mechanisms potentially resultant in circuit damage or resultant damage to external targets. Therefore there is no impact on the nuclear safety performance criteria.

The use of plastic conduit in embedded installations has no impact on the radiological release performance criteria. The radiological release review was performed based on the manual fire suppression activities in areas containing or potentially containing radioactive materials and is not dependent on the type of conduit material. The conduit material does not change the radiological release evaluation, which concluded that potentially contaminated water is contained and smoke monitored. The conduits do not add additional radiological materials to the area or challenge system boundaries.

Safety Margin and Defense-in-Depth:

The plastic conduit material is embedded in a non-combustible configuration. The use of these materials has been defined by the limitations of the analytical methods used in the development of the Fire PRA. Therefore, the inherent safety margin and conservatisms in these methods remain unchanged.

The three echelons of defense-in-depth are 1) to prevent fires from starting (combustible/hot work controls), 2) rapidly detect, control and extinguish fires that do occur thereby limiting damage (fire detection systems, automatic fire suppression,

manual fire suppression, pre-fire plans), and 3) provide adequate level of fire protection for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire rated cable, success path remains free of fire damage, recovery actions). The use of plastic conduit in embedded installations does not impact fire protection defense-in-depth. The plastic conduit in embedded installations does not affect echelons 1, 2 and 3. The plastic conduits do not directly result in compromising automatic or manual fire suppression functions for systems and structures, or post-fire safe shutdown capability.

Conclusion:

NRC approval is requested for the use of plastic conduit in embedded installations.

The engineering analysis performed determined that the performance-based methods for evaluating an equivalent level of fire protection for the requirements of NFPA 805 Chapter 3:

(A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;
(B) Maintains safety margins; and
(C) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

Approval Request 3

NFPA 805 Section 3.5.11

NFPA 805 Section 3.5.11 states:

> *"Means shall be provided to isolate portions of the yard fire main loop for maintenance or repair without simultaneously shutting off the supply to both fixed fire suppression systems and fire hose stations provided for manual backup. Sprinkler systems and manual hose station standpipes shall be connected to the plant fire protection water main so that a single active failure or a crack to the water supply piping to these systems can be isolated so as not to impair both the primary and backup fire suppression systems".*

The two manually actuated charcoal bed deluge suppression systems for the Control Building Standby Filter Units (Deluge Systems 21 and 22) are fed from the Turbine Building standpipe system. In addition, the Pumphouse standpipe and the sprinkler system protecting the diesel fire pump and fire pump day tank room (System 7) are fed directly from the fire water system piping in the Pumphouse. Therefore the primary fire suppression systems (sprinkler/deluge system) and the backup fire suppression system (standpipe hose stations) could be affected by isolating the water supply or by a single active failure.

Backup fire suppression for these areas is manual suppression by the fire brigade using an alternative water supply. The alternative water supply would be a hose connection to the main fire water system via yard fire hydrants.

The Standby Filter Unit systems are located in the Control Room HVAC Room (Fire Zone 12B) on the 800-foot elevation of the Control Building. This room is provided with an automatic sprinkler system (System 12), full smoke detection in the room, and thermal detection for the charcoal beds. The detection would result in early warning for fire brigade response. The fire brigade is trained and equipped with fire hose to connect to a nearby yard fire hydrant and provide fire fighting water through the nearest available access stairwell. Therefore backup fire suppression is readily available.

There are yard fire hydrants in close proximity to the Pumphouse which would be used in the event of a fire concurrent with an impairment/break of the water supply piping to the sprinkler/standpipe system. Therefore backup fire suppression is readily available.

The basis for the approval request of performance-based method is:

- Backup suppression is readily available via alternative sources.
- The fire brigade is trained and has access to hose lines connected to the unaffected yard fire water system to provide backup fire suppression in the event of loss of suppression system and manual hose station water.
- The Control Room HVAC Room is protected by room smoke detection, charcoal filter bed thermal detection, and an area sprinkler system supplied via an independent water system.

Nuclear Safety and Radiological Release Performance Criteria:

The configuration of the Control Building Standby Filter Unit deluge systems to the Turbine Building standpipe water supply system and the diesel fire pump and day tank room suppression system to the Pumphouse standpipe water supply system does not affect nuclear safety. There are alternative measures available to ensure suppression of a fire if one were to occur. Therefore there is no impact on the nuclear safety performance criteria.

The configuration of the Control Building Standby Filter Unit deluge systems to the Turbine Building standpipe water supply system and the diesel fire pump and day tank room suppression system to the Pumphouse standpipe water supply system has no impact on the radiological release performance criteria. The radiological release review was performed based on the manual fire suppression activities in areas containing or potentially containing radioactive materials and is not dependent on the suppression system water supplies. The suppression system water supplies do not change the radiological release evaluation, which concluded that potentially contaminated water is contained and smoke monitored. The configuration of water supply systems does not add additional radiological materials to the area or challenge system boundaries that contain these systems.

Safety Margin and Defense-in-Depth:

The configuration of the Control Building Standby Filter Unit deluge systems to the Turbine Building standpipe water supply system and the diesel fire pump and day tank room suppression system to the Pumphouse standpipe water supply system does not affect safety margin. The use of these systems has been defined by the limitations of the analytical methods used in the development of the Fire PRA. Therefore, the inherent safety margin and conservatisms in these methods remain unchanged.

The three echelons of defense-in-depth are 1) to prevent fires from starting (combustible/hot work controls), 2) rapidly detect, control and extinguish fires that do occur thereby limiting damage (fire detection systems, automatic fire suppression, manual fire suppression, pre-fire plans), and 3) provide adequate level of fire protection for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire rated cable, success path remains free of fire damage, recovery actions). Echelon 2 is maintained by the availability of automatic detection and suppression (sprinkler system) in the Control Room HVAC Room and the availability of alternative fire brigade water sources for manual fire fighting activities for the Control Room HVAC Room and the diesel fire pump and day tank rooms in the Pumphouse. The water supply configuration does not affect echelons 1 or 3. The water supply configuration does not compromise automatic fire detection functions or post-fire safe shutdown capability. Alternative hose station connections are available as the primary means of suppression in the event of the loss if the primary water supply.

Conclusion:

NRC approval is requested for the configuration of the Control Building Standby Filter Unit deluge systems to the Turbine Building standpipe water supply system and the

diesel fire pump and day tank room suppression system to the Pumphouse standpipe water supply system.

The engineering analysis performed determined that the performance-based methods for evaluating an equivalent level of fire protection for the requirements of NFPA 805 Chapter 3:

(A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;
(B) Maintains safety margins; and
(C) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

M. License Condition Changes

3 Pages Attached

Replace the current DAEC fire protection license condition 2.C(3) with the Standard License Condition based upon Regulatory Position 3.1 of RG 1.205.

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NextEra Energy Duane Arnold, LLC shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment request dated __________ (and supplements dated __________) and as approved in the safety evaluation dated __________ (and supplements dated __________). Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

Risk-Informed Changes that May Be Made Without Prior NRC Approval

A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods, and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the change being evaluated; be based on the as-built, as-operated, and maintained plant; and reflect the operating experience at the plant. Acceptable methods to assess the risk of the change may include methods that have been used in the peer-reviewed Fire PRA model, methods that have been approved by NRC through a plant-specific license amendment or NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.

(a) Prior NRC review and approval is not required for changes that clearly result in a decrease in risk. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.

(b) Prior NRC review and approval is not required for individual changes that result in a risk increase less than 1×10^{-7}/year (yr) for CDF and less than 1×10^{-8}/yr for LERF. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.

Other Changes that May Be Made Without Prior NRC Approval

1) Changes to NFPA 805, Chapter 3, Fundamental Fire Protection Program.

Prior NRC review and approval are not required for changes to the NFPA 805, Chapter 3, fundamental fire protection program elements and design requirements for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is functionally equivalent or adequate for the hazard. The licensee may use an engineering evaluation to demonstrate that a change to NFPA 805, Chapter 3 element is functionally equivalent to the corresponding technical requirement. A qualified fire protection engineer shall perform the engineering evaluation and

conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard.

The licensee may use an engineering evaluation to demonstrate that changes to certain NFPA 805, Chapter 3 elements are acceptable because the alternative is 'adequate for the hazard.' Prior NRC review and approval would not be required for alternatives to four specific sections of NFPA 805, Chapter 3, for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is adequate for the hazard. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard. The four specific sections of NFPA 805, Chapter 3, are as follows:

- Fire Alarm and Detection Systems (Section 3.8);
- Automatic and Manual Water-Based Fire Suppression Systems (Section 3.9);
- Gaseous Fire Suppression Systems (Section 3.10); and,
- Passive Fire Protection Features (Section 3.11).

2) Fire Protection Program Changes that Have No More than Minimal Risk Impact

Prior NRC review and approval are not required for changes to the licensee's fire protection program that have been demonstrated to have no more than a minimal risk impact. The licensee may use its screening process as approved in the NRC safety evaluation dated __________ to determine that certain fire protection program changes meet the minimal criterion. The licensee shall ensure that fire protection defense-in-depth and safety margins are maintained when changes are made to the fire protection program.

Transition License Conditions

(1) Before achieving full compliance with 10 CFR 50.48(c), as specified by (2) below, risk-informed changes to the licensee's fire protection program may not be made without prior NRC review and approval unless the change has been demonstrated to have no more than a minimal risk impact, as described in (2) above.

(2) The licensee shall implement the following modifications to its facility to complete the transition to full compliance with 10 CFR 50.48(c) by __________ [INSERT date]:

[See plant specific list of modifications identified in Attachment S]

(3) The licensee shall maintain appropriate compensatory measures in place until completion of the modifications delineated above.

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License condition 2.C(3) shall be superseded in its entirety:

NextEra Energy Duane Arnold, LLC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the Duane Arnold Energy Center and as approved in the SER

> *dated June 1, 1978, and Supplement dated February 10, 1981, subject to the following provision:*
>
> *Next Era Energy Duane Arnold, LLC may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire*

It is NextEra Energy Duane Arnold, LLC's understanding that implicit in the revocation of this license condition, all prior fire protection program SERs and commitments have been superseded in their entirety by the revised license condition.

No other license conditions need to be revised or superseded.

NextEra Energy Duane Arnold, LLC implemented the following process for determining that these are the only license conditions required to be either revised or superseded to implement the new fire protection program, which meets the requirements in 10 CFR 50.48(a) and 50.48(c):

- A review was conducted of the NextEra Energy Duane Arnold, LLC Renewed Facility Operating License No. DPR-49. The review was performed by reading the Operating License and performing electronic searches. Outstanding LARs that have been submitted to the NRC were also reviewed for potential impact on the license conditions.

N. Technical Specification Changes

11 Pages Attached

Delete the following Technical Specification:

- Section 5.4.1 *"Written procedures shall be established, implemented, and maintained covering the following activities:*
  d. Fire Protection Program implementation"

No other Technical Specifications need to be revised or deleted.

NextEra Energy Duane Arnold, LLC implemented the following process for determining that these are the only Technical Specifications required to be revised or deleted to implement the new fire protection program which meets the requirements in 10 CFR 50.48(a) and 50.48(c).

- A review was conducted by reading the Technical Specifications and performing electronic searches. Outstanding Technical Specification changes that have been submitted to the NRC were also reviewed for potential impact on the license conditions.

NextEra Energy Duane Arnold, LLC determined that these changes to the Technical Specifications are adequate for adoption of the new fire protection licensing basis, for the following reasons.

- The requirement for establishing, implementing, and maintaining fire protection procedures is contained in the regulation (10 CFR 50.48(a) and 50.48(c) NFPA 805 Chapter 3).

The mark ups and retypes follow.

FACILITY OPERATING LICENSE, TECHNICAL SPECIFICATIONS MARKUP

4 Pages Attached

(a) For Surveillance Requirements (SRs) whose acceptance criteria are modified, either directly or indirectly, by the increase in authorized maximum power level in 2.C.(1) above, in accordance with Amendment No. 243 to Facility Operating License DPR-49, those SRs are not required to be performed until their next scheduled performance, which is due at the end of the first surveillance interval that begins on the date the Surveillance was last performed prior to implementation of Amendment No. 243.

(b) Deleted.

(3) Fire Protection

NextEra Energy Duane Arnold, LLC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the Duane Arnold Energy Center and as approved in the SER dated June 1, 1978, and Supplement dated February 10, 1981, subject to the following provision:

NextEra Energy Duane Arnold, LLC may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

(4) The licensee is authorized to operate the Duane Arnold Energy Center following installation of modified safe-ends on the eight primary recirculation system inlet lines which are described in the licensee letter dated July 31, 1978, and supplemented by letter dated December 8, 1978.

(5) Physical Protection

NextEra Energy Duane Arnold, LLC shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans, which contains Safeguards Information protected under 10 CFR 73.21, is entitled: "Duane Arnold Energy Center Physical Security Plan," submitted by letter dated May 16, 2006.

5.0 ADMINISTRATIVE CONTROLS

5.4 Procedures

5.4.1 Written procedures shall be established, implemented, and maintained covering the following activities:

a. The applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978;

b. The emergency operating procedures required to implement the requirements of NUREG-0737 and to NUREG-0737, Supplement 1, as stated in Generic Letter 82-33;

c. Quality assurance for effluent and environmental monitoring;

d. Fire Protection Program implementation; and

e. All programs specified in Specifications 5.5.

NextEra Energy Duane Arnold, LLC shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment request dated ___________ (and supplements dated ___________) and as approved in the safety evaluation report dated ___________ (and supplements dated ___________). Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

Risk-Informed Changes that May Be Made Without Prior NRC Approval

A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods, and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the change being evaluated; be based on the as-built, as-operated, and maintained plant; and reflect the operating experience at the plant. Acceptable methods to assess the risk of the change may include methods that have been used in the peer-reviewed fire PRA model, methods that have been approved by NRC through a plant-specific license amendment or NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.

(a) Prior NRC review and approval is not required for changes that clearly result in a decrease in risk. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.

(b) Prior NRC review and approval is not required for individual changes that result in a risk increase less than 1×10^{-7}/year (yr) for CDF and less than 1×10^{-8}/yr for LERF. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.

Other Changes that May Be Made Without Prior NRC Approval

1. Changes to NFPA 805, Chapter 3, Fundamental Fire Protection Program. Prior NRC review and approval are not required for changes to the NFPA 805, Chapter 3, fundamental fire protection program elements and design requirements for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is functionally equivalent or adequate for the hazard. The licensee may use an engineering evaluation to demonstrate that a change to NFPA 805, Chapter 3 element is functionally equivalent to the corresponding technical requirement. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard.

The licensee may use an engineering evaluation to demonstrate that changes to certain NFPA 805, Chapter 3 elements are acceptable because the alternative is "adequate for the hazard." Prior NRC review and approval would not be required for alternatives to four specific sections of NFPA 805, Chapter 3, for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is adequate for the hazard. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard. The four specific sections of NFPA 805, Chapter 3, are as follows:

- Fire Alarm and Detection Systems (Section 3.8);
- Automatic and Manual Water-Based Fire Suppression Systems (Section 3.9);
- Gaseous Fire Suppression Systems (Section 3.10); and,
- Passive Fire Protection Features (Section 3.11).

2. Fire Protection Program Changes that Have No More than Minimal Risk Impact

Prior NRC review and approval are not required for changes to the licensee's fire protection program that have been demonstrated to have no more than a minimal risk impact. The licensee may use its screening process as approved in the NRC safety evaluation report dated ___________ to determine that certain fire protection program changes meet the minimal criterion. The licensee shall ensure that fire protection defense-in-depth and safety margins are maintained when changes are made to the fire protection program.

Transition License Conditions

(1) Before achieving full compliance with 10 CFR 50.48(c), as specified by (2) below, risk-informed changes to the licensee's fire protection program may not be made without prior NRC review and approval unless the change has been demonstrated to have no more than a minimal risk impact, as described in (2) above.

(2) The licensee shall implement the following modifications to its facility to complete the transition to full compliance with 10 CFR 50.48(c) by ___________ [INSERT date]:

[See plant specific list of modifications identified in Attachment S]

(3) The licensee shall maintain appropriate compensatory measures in place until completion of the modifications delineated above.

FACILITY OPERATING LICENSE, TECHNICAL SPECIFICATIONS RETYPE

4 Pages Attached

5.0 ADMINISTRATIVE CONTROLS

5.4 Procedures

5.4.1 Written procedures shall be established, implemented, and maintained covering the following activities:

a. The applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978;

b. The emergency operating procedures required to implement the requirements of NUREG-0737 and to NUREG-0737, Supplement 1, as stated in Generic Letter 82-33;

c. Quality assurance for effluent and environmental monitoring;

d. [Deleted]; and

e. All programs specified in Specifications 5.5.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I; Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

NextEra Energy Duane Arnold, LLC is authorized to operate the Duane Arnold Energy Center at steady state reactor core power levels not in excess of 1912 megawatts (thermal).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 277, are hereby incorporated in the license. NextEra Energy Duane Arnold, LLC shall operate the facility in accordance with the Technical Specifications.

(a) For Surveillance Requirements (SRs) whose acceptance criteria are modified, either directly or indirectly, by the increase in authorized maximum power level in 2.C.(1) above, in accordance with Amendment No. 243 to Facility Operating License DPR-49, those SRs are not required to be performed until their next scheduled performance, which is due at the end of the first surveillance interval that begins on the date the Surveillance was last performed prior to implementation of Amendment No. 243.

(b) Deleted.

(3) Fire Protection

NextEra Energy Duane Arnold, LLC shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment request dated ___________ (and supplements dated ___________) and as approved in the safety evaluation report dated ___________ (and supplements dated ___________). Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

Risk-Informed Changes that May Be Made Without Prior NRC Approval

A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods, and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the change being evaluated; be based on the as-built, as-operated, and maintained plant; and reflect the operating experience at the plant. Acceptable methods to assess the risk of the change may include methods that have been used in the peer-reviewed fire PRA model, methods that have been approved by NRC through a plant-specific license amendment or NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.

(a) Prior NRC review and approval is not required for changes that clearly result in a decrease in risk. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.

(b) Prior NRC review and approval is not required for individual changes that result in a risk increase less than 1×10^{-7}/year (yr) for CDF and less than 1×10^{-8}/yr for LERF. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.

Other Changes that May Be Made Without Prior NRC Approval

1. Changes to NFPA 805, Chapter 3, Fundamental Fire Protection Program. Prior NRC review and approval are not required for changes to the NFPA 805, Chapter 3, fundamental fire protection program elements and design requirements for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is functionally equivalent or adequate for the hazard. The licensee may use an engineering evaluation to demonstrate that a change to NFPA 805, Chapter 3 element is functionally equivalent to the corresponding technical requirement. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard.

   The licensee may use an engineering evaluation to demonstrate that changes to certain NFPA 805, Chapter 3 elements are acceptable because the alternative is "adequate for the hazard." Prior NRC review and approval would not be required for alternatives to four specific sections of NFPA 805, Chapter 3, for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is adequate for the hazard. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard. The four specific sections of NFPA 805, Chapter 3, are as follows:

- Fire Alarm and Detection Systems (Section 3.8);
- Automatic and Manual Water-Based Fire Suppression Systems (Section 3.9);
- Gaseous Fire Suppression Systems (Section 3.10); and,
- Passive Fire Protection Features (Section 3.11).

2. Fire Protection Program Changes that Have No More than Minimal Risk Impact

   Prior NRC review and approval are not required for changes to the licensee's fire protection program that have been demonstrated to have no more than a minimal risk impact. The licensee may use its screening process as approved in the NRC safety evaluation report dated ___________ to determine that certain fire protection program changes meet the minimal criterion. The licensee shall ensure that fire protection defense-in-depth and safety margins are maintained when changes are made to the fire protection program.

Transition License Conditions

(1) Before achieving full compliance with 10 CFR 50.48(c), as specified by (2) below, risk-informed changes to the licensee's fire protection program may not be made without prior NRC review and approval unless the change has been demonstrated to have no more than a minimal risk impact, as described in (2) above.

(2) The licensee shall implement the following modifications to its facility to complete the transition to full compliance with 10 CFR 50.48(c) by ___________ [INSERT date]:

[See plant specific list of modifications identified in Attachment S]

(3) The licensee shall maintain appropriate compensatory measures in place until completion of the modifications delineated above.

(4) The licensee is authorized to operate the Duane Arnold Energy Center following installation of modified safe-ends on the eight primary recirculation system inlet lines which are described in the licensee letter dated July 31, 1978, and supplemented by letter dated December 8, 1978.

(5) Physical Protection

NextEra Energy Duane Arnold, LLC shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification,

O. Orders and Exemptions

2 Pages Attached

Exemptions

Rescind the following exemptions granted against 10 CFR 50, Appendix R:

- Exemption #01 (19830426), Appendix R Exemption from Fire Protection Requirements of III.G.2 for Division 1 and Division 2 Cables Supplying the Scram Valves for Reactor Building North and South CRD Module Areas (III.G.2 Criteria)
- Exemption #02 (19830426), Appendix R Exemption from the Requirement to Provide Fixed Fire Suppression in the Control Room (III.G.3 Criteria)
- Exemption #03 (19831219), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less Than 3 Hour Fire Ratings Between Miscellaneous Doors and Dampers (III.G.2.a Criteria)
- Exemption #04 (19831219), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less than 3 Hour Fire Ratings Between Zones (Equipment Hatch) (III.G.2.a Criteria)
- Exemption #05 (19831219), Appendix R Exemption from the Automatic Suppression Requirement for the Turbine Building Water Treatment and Condensate Pump Area (III.G.2.c Criteria)
- Exemption #06 (19831219), Appendix R Exemption from the Requirement for Full Coverage by Automatic Suppression Systems in the HVAC Heat Exchanger and Chiller Area (III.G.3 Criteria)
- Exemption #07 (19850701), Appendix R Exemption from the 8-Hour Battery Requirement for the Control Room (III.J Criteria)
- Exemption #08 (19871014), Appendix R Exemption for Fire Zone Boundaries Having Communication Paths with Less Than 3 Hour Fire Ratings Between Zones (Doors No. 202 and 203) (III.G.2.a Criteria)
- Exemption #09 (19871014), Appendix R Exemption from 3 Hour Rated Barrier in the Reactor Building Torus Area (III.G.2.a Criteria)
- Exemption #10 (19871014), Appendix R Exemption from Automatic Suppression and Detection in the Reactor Building Torus Area (III.G.2.b Criteria)
- Exemption #11 (19871014), Appendix R Exemption from the Requirement for 3 Hour Fire Barriers in the Laydown Area and RWCU Area (Fire Zone 3-A/3-B) (III.G.2.a Criteria)
- Exemption #12 (19871014), Appendix R Exemption from the Requirement for 3 Hour Fire Barriers in the Reactor Building RHR Valve Room (Fire Zone 2-D) (III.G.2.a Criteria)
- Exemption #13 (19871014), Appendix R Exemption from the Requirement for 3 Hour Rated Fire Barriers in the Equipment Hatch Between Fire Zones 3-B and 4-B (III.G.2.a Criteria)
- Exemption #14 (19871014), Appendix R Exemption from the Requirement of Separation of Redundant Trains of Safe Shutdown Cables and Equipment by 3 Hour Rated Fire Barriers for the Ventilation Duct Fire Dampers (III.G.2.a Criteria)

- Exemption #15 (19871014), Appendix R Exemption from the Requirement that Structural Steel Forming Part of or Supporting Fire Barriers be Protected to a Fire Resistance Equivalent to that of the Barrier (III.G.2.a Criteria)
- Exemption #16 (19910816), Appendix R Exemption from the 3-Hour Fire Barrier Requirement for the Drywell Expansion Gap (III.G.2.a Criteria)

Orders

No Orders need to be superseded or revised.

NextEra Energy Duane Arnold, LLC implemented the following process for making this determination:

- A review was conducted of the DAEC docketed correspondence. The review was performed by reviewing the correspondence files and performing electronic searches of internal DAEC records and the NRC's ADAMS document system.

A specific review was performed of the license amendment that incorporated the mitigation strategies required by Section B.5.b of Commission Order EA-02-026 (TAC No MD4529) to ensure that any changes being made to ensure compliance with 10 CFR 50.48(c) do not invalidate existing commitments applicable to the plant. The review of this order demonstrated that changes to the fire protection program will not affect measures required by B.5.b.

P. RI-PB Alternatives to NFPA 805 10 CFR 50.48(c)(4)

No risk-informed or performance-based alternatives to compliance with NFPA 805 (per 10 CFR 50.48(c)(4)) were utilized by NextEra Energy Duane Arnold, LLC.

Q. No Significant Hazards Evaluations

3 Pages Attached

NextEra Energy Duane Arnold, LLC has evaluated whether a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequence of an accident previously evaluated?

   Response: No.

   Operation of DAEC in accordance with the proposed amendment does not increase the probability or consequences of accidents previously evaluated. The Updated Final Safety Analysis Report (UFSAR) documents the analyses of design basis accidents (DBAs) at DAEC. The proposed amendment does not adversely affect accident initiators nor alter design assumptions, conditions, or configurations of the facility and does not adversely affect the ability of structures, systems, and components (SSCs) to perform their design function. SSCs required to safely shut down the reactor and to maintain it in a safe shutdown (SSD) condition will remain capable of performing their design functions.

   The purpose of this amendment is to permit DAEC to adopt a new fire protection licensing basis which complies with the requirements in 10 CFR 50.48(a) and (c) and the guidance in Revision 1 of Regulatory Guide (RG) 1.205. The NRC considers that National Fire Protection Association (NFPA) 805 provides an acceptable methodology and performance criteria for licensees to identify fire protection systems and features that are an acceptable alternative to the 10 CFR 50, Appendix R fire protection features (69 FR 33536, June 16, 2004). Engineering analyses, in accordance with NFPA 805, have been performed to demonstrate that the risk-informed, performance-based (RI-PB) requirements per NFPA 805 have been met.

   NFPA 805, taken as a whole, provides an acceptable alternative to 10 CFR 50.48(b), satisfies 10 CFR 50.48(a) and General Design Criterion (GDC) 3 of Appendix A to 10 CFR 50, and meets the underlying intent of the NRC's existing fire protection regulations and guidance, and achieves defense-in-depth (DID) and the goals, performance objectives, and performance criteria specified in Chapter 1 of the standard. The small increase in the net core damage frequency associated with this LAR submittal is consistent with the Commission's Safety Goal Policy. Additionally, 10 CFR 50.48(c) allows self approval of fire protection program changes post-transition. If there are any increases post-transition in core damage frequency (CDF) or risk, the increase will be small and consistent with the intent of the Commission's Safety Goal Policy.

   Based on this, the implementation of this amendment does not significantly increase the probability of any accident previously evaluated. Equipment required to mitigate an accident remains capable of performing the assumed function. Therefore, the consequences of any accident previously evaluated are not significantly increased with the implementation of this amendment.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any kind of accident previously evaluated?

Response: No.

Operation of DAEC in accordance with the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated. Any scenario or previously analyzed accident with offsite dose was included in the evaluation of DBAs documented in the UFSAR. The proposed change does not alter the requirements or function for systems required during accident conditions. Implementation of the new fire protection licensing basis which complies with the requirements in 10 CFR 50.48(a) and (c) and the guidance in Revision 1 of RG 1.205 will not result in new or different accidents.

The proposed amendment does not adversely affect accident initiators nor alter design assumptions, conditions, or configurations of the facility. The proposed amendment does not adversely affect the ability of SSCs to perform their design function. SSCs required to safely shut down the reactor and maintain it in a safe shutdown condition remain capable of performing their design functions.

The purpose of this amendment is to permit DAEC to adopt a new fire protection licensing basis which complies with the requirements in 10 CFR 50.48(a) and (c) and the guidance in Revision 1 of RG 1.205. The NRC considers that NFPA 805 provides an acceptable methodology and performance criteria for licensees to identify fire protection systems and features that are an acceptable alternative to the 10 CFR 50, Appendix R fire protection features (69 FR 33536, June 16, 2004).

The requirements in NFPA 805 address only fire protection and the impacts of fire on the plant that have already been evaluated. Based on this, the implementation of this amendment does not create the possibility of a new or different kind of accident from any kind of accident previously evaluated. The proposed changes do not involve new failure mechanisms or malfunctions that can initiate a new accident. Therefore, the possibility of a new or different kind of accident from any kind of accident previously evaluated is not created with the implementation of this amendment.

3. Does the proposed amendment involve a significant reduction in the margin of safety?
   Response: No

Operation of DAEC in accordance with the proposed amendment does not involve a significant reduction in the margin of safety. The proposed amendment does not alter the manner in which safety limits, limiting safety system settings or limiting conditions for operation are determined. The safety analysis acceptance criteria are not affected by this change. The proposed amendment does not adversely affect existing plant safety margins or the reliability of equipment assumed to mitigate accidents in the UFSAR. The proposed amendment does not adversely affect the ability of SSCs to perform their design function. SSCs required to safely shut down the reactor and to maintain it in a safe shutdown condition remain capable of performing their design function.

The purpose of this amendment is to permit DAEC to adopt a new fire protection licensing basis which complies with the requirements in 10 CFR 50.48(a) and (c)

and the guidance in Revision 1 of RG 1.205. The NRC considers that NFPA 805 provides an acceptable methodology and performance criteria for licensees to identify fire protection systems and features that are an acceptable alternative to the 10 CFR 50, Appendix R fire protection features (69 FR 33536, June 16, 2004). Engineering analyses, which may include engineering evaluations, probabilistic safety assessments, and fire modeling calculations, have been performed to demonstrate that the performance-based methods do not result in a significant reduction in the margin of safety.

Based on this, the implementation of this amendment does not significantly reduce the margin of safety. The proposed changes are evaluated to ensure that the risk and safety margins are kept within acceptable limits. Therefore, the transition does not involve a significant reduction in the margin of safety.

NFPA 805 continues to protect public health and safety and the common defense and security because the overall approach of NFPA 805 is consistent with the key principles for evaluating license basis changes, as described in RG 1.174, is consistent with the defense-in-depth philosophy, and maintains sufficient safety margins.

Margins previously established for the DAEC program in accordance with 10 CFR 50.48(b) and Appendix R to 10 CFR 50 are not significantly reduced. Therefore, this LAR does not result in a reduction in a margin of safety.

R. Environmental Considerations Evaluation

1 Page Attached

NextEra Energy Duane Arnold, LLC has evaluated this LAR against the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21. NextEra Energy Duane Arnold, LLC has determined that this LAR meets the criteria for a categorical exclusion set forth in 10 CFR 51.22(c)(9). This determination is based on the fact that this change is being proposed as an amendment to a license issued pursuant to 10 CFR 50.

The purpose of this amendment is to permit DAEC to adopt a new fire protection licensing basis which complies with the requirements in 10 CFR 50.48(a) and (c) and the guidance in Revision 1 of RG 1.205. The NRC considers that NFPA 805 provides an acceptable methodology and performance criteria for licensees to identify fire protection systems and features that are an acceptable alternative to the 10 CFR 50, Appendix R fire protection features (69 FR 33536, June 16, 2004)

The requirements in NFPA 805 address only fire protection and the impacts of fire on the plant have already been evaluated, as part of compliance to 10 CFR 50.48(a) and (b).

This amendment meets the following specific criteria:

i. The amendment involves no significant hazards consideration. As stated in Section 5.3.1, this proposed amendment does not involve significant hazards consideration.

ii. There is no significant change in the types or significant increase in the amounts of any effluent that may be released offsite.

   Compliance with NFPA 805 explicitly requires the attainment of performance criteria, objectives, and goals for radioactive releases to the environment. Transition to the NFPA 805 requirements does not impact effluents. Therefore, there will be no significant change in the types or significant increase in the amounts or any effluents released offsite.

iii. There is no significant increase in individual or cumulative occupational radiation exposure.

   Compliance with NFPA 805 explicitly requires the attainment of performance criteria, objectives, and goals for occupational exposure. There will be no significant increase in individual or cumulative occupational radiation exposure resulting from this change.

Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in conjunction with the proposed amendment.

T. Clarification of Prior NRC Approvals

NextEra Energy Duane Arnold, LLC does not have any elements of the current fire protection program for which NRC clarification is needed.

U. Internal Events PRA Quality

6 Pages Attached

The DAEC Internal Events Peer Review was originally performed in December 2007 using the NEI 05-04[5] process, the combined PRA standard, ASME/ANS RA-Sa–2005, and RG 1.200, Revision 1. This peer review identified 57 'Not Met' supporting requirements and 17 that did not meet capability category II, with a total of 66 findings. The internal events model used to develop the Fire PRA reflects the latest disposition of these findings as of January 2011.

To verify the quality of the updated internal events model used in the Fire PRA, a Focused PRA Peer Review was conducted in March 2011 using the most current combined PRA standard, ASME/ANS RA-Sa–2009, and RG 1.200, Revision 2. This DAEC Focused PRA Peer Review assessed all previous 2007 full-scope peer review findings and suggestions, including the adequacy of their dispositions. The focused peer review identified 4 supporting requirements as 'Not Met' and 3 as meeting Capability Category I (CC I) with a total of 12 findings. This latest peer review is an assessment of the internal events model used to develop the Fire PRA. Both of these Peer Review Reports are available upon request.

Table U-1 provides the Focused Peer Review supporting requirements that are assessed as 'Not Met' or 'CC I' and their associated findings, and discusses the potential impact of each on the Fire PRA. Note that the naming convention for the supporting requirements is in accordance with ASME/ANS RA-Sa–2005 to facilitate cross referencing to the initial peer review.

[5] NEI 05-04, Process for Performing Follow-on PRA Peer Reviews Using the ASME PRA Standard, Nuclear Energy Institute, Revision 1, Draft G, November 2007

Table U-1 Internal Events PRA Peer Review – Findings and Observations[6]

SR[7]	Category & Finding	Observation	Resolution of Category Capability Category in the Fire PRA Update
IE-B3 IE-C4	NOT MET Finding IE-B3-01A NOT MET Finding IE-B3-01A	Several findings and suggestions (from the original peer review) under HLR-A and HLR-B have been dispositioned/resolved, but the subsuming (IE-B3) and screening (IE-C4) of initiating events does not meet the standard. The following provides example summarizes (IE Notebook, including Appendix H): ▪ RBCCW (fails CRD, which is credited for early injection) is subsumed by TT, but RBCCW is not failed given TT. ▪ GSW (fails RBCCW, CRD, Feedwater, etc.) is subsumed by TC, but these systems are not failed given TC. ▪ The impacts of Reference and Variable Leg Breaks are not adequately described and are subsumed by Loss of FW. Most likely would be a manual shutdown with complications verses a Loss of FW. Given that immediate shutdown would occur given a break, these should be modeled. Section 2.4.8 described the low risk from these, but this does not meet standard for screening. ▪ 1A1/1A2 bus failures and partial loss of feedwater (one pump) are binned to TT, but this impact is not modeled given TT. ▪ 1A3/1A4 bus failures are subsumed with TT. Impact on loss of chargers [TS 3.8.4.] etc. and possibility that failure is a problem could lead to an immediate shutdown. Notes 11 and 12 suggest that only normal power source is lost, but emergency power is also unavailable if bus fails. RECOMMENDATION: Follow IE-B3 and C4 with regard to subsuming and screening or more importantly model the above initiating events.	NOT ADDRESSED: These support system initiating events are additional initiating events that are not fire initiating events, and therefore the impact of adding these initiating events will have minimal or no impact on the Fire PRA results.

6 The Focused Peer Review results are presented as the peer review of record – the initial 2007 Peer Review report will be available upon request.
7 Supporting Requirements use naming convention used in ASME PRA Standard RA-Sb-2005.

Table U-1 Internal Events PRA Peer Review – Findings and Observations [6]

SR[7]	Category & Finding	Observation	Resolution of Category Capability Category in the Fire PRA Update
SY-A3	MET Finding SY-A3-03A	The remarks made by the previous peer review under finding SY-A3-03 are still open and still valid. Failure of either vital 4kV bus Start Up Transformer (SUT) breaker, 1A302 [1A402], to trip on LOSP is not modeled – this failure would prevent associated EDG breaker from closing onto the bus. Omission of this is non-conservative. The model should include the necessary dependencies for this event. Specifically, the fault tree model omits a dependency; the failure of the normal supply breaker to each vital 4kV bus to trip upon a loss of offsite power to allow the associated EDG to close onto the bus. More importantly, a common cause failure between the two breakers for the two busses is omitted. This CCF may contribute significantly to SBO sequences. Also, not modeling these breakers will have an impact on the fire model. RECOMMENDATION: These components should be modeled to remove non-conservatism and to address future PRA applications.	NOT ADDRESSED: The Fire PRA evaluated the fire impact on the dependency of the offsite power breakers and the diesel generator breakers as part of the cable selection and circuit analysis efforts. Random failure of the offsite power feeder breaker to open is assigned a 1E-3 probability in the FPIE model. The CCF probability for both feeder breakers to fail to open is 1E-5 in the FPIE model. A sensitivity was performed by adding the random failure dependency of the feeder breakers into the Fire PRA. The result was a small increase in overall CDF and LERF by ~1%. This would not change the conclusions of the LAR submittal.
SY-A5	MET CC I/II Finding SY-A5-01A	The SBO event tree does not take credit for containment venting using an alternate alignment when the pneumatic supply is lost. DAEC procedure SAMP 706 provides detailed direction for venting PC [Primary Containment] given an unavailable pneumatic supply. The Containment Vent notebook does not credit/discuss this procedure. RECOMMENDATION: Add containment venting to the event tree along with operator actions and component alignments needed to vent containment without the pneumatic supply system.	NOT ADDRESSED: Addressing this finding will reduce risk. The results from the current internal events model are bounding for this application relative to this SR. Therefore the results of the Fire PRA model should be bounding relative to this LAR submittal.
SY-C2	MET CC I/II/III Finding SY-C2-01A Finding SY-C2-02A	**Finding SY-C2-01** There is no Fire Water System (Alternate Injection) notebook or equivalent information in another notebook. The operator action to align fire water for injection is modeled but the components are based on the argument that the probability of the action subsumes the component failure rates. RECOMMENDATION: Develop new system notebook for use of fire water as an alternate injection source.	NOT ADDRESSED: Addressing this finding will reduce risk. The results from the current internal events model are bounding for this application relative to this SR. Therefore the results of the Fire PRA model should be bounding relative to this LAR submittal.

Table U-1 Internal Events PRA Peer Review – Findings and Observations[6]

SR[7]	Category & Finding	Observation	Resolution of Category Capability Category in the Fire PRA Update
		Finding SY-C2-02 There are no system level cutsets included in the notebooks and as such no evidence that the system models were evaluated to validate they are complete and accurate [i.e. a description of model results]. Based on discussions with DAEC, system level cutsets were reviewed to validate the models, however the results of the review were not documented and the system level cutsets were not included in the notebooks. RECOMMENDATON: Include system level cutsets in the system notebooks along with an assessment.	NOT ADDRESSED: Given the conservatism of the Fire PRA model and the reviews performed in the process of developing the Fire PRA model, the system cutset review is not expected to identify modeling issues that would impact this LAR submittal.
HR-A1	NOT MET Finding HR-A1-01A	HRA Notebook (Appendix J, Table J-1) includes a systematic approach to identifying test and maintenance activities through a system by system review of potential misalignments. This meets the high level requirement to use a "systematic approach" and is judged to be adequate by the Peer Review team. However, the SR wording requires "a review of procedures and practices" which was not followed. As a result, the PR team must assess this SR as "not met." RECOMMENDATION: Reassess this SR when the Addendum B of the PRA Standard is released. The current proposed revision deletes the requirement for "a review of procedures and practices".	NOT ADDRESSED: The approach used was different than currently prescribed in the standard, but is considered capable of accurately identifying pre-initiators. As such this variance from the standard is judged to have no impact on this application.
HR-A2	NOT MET Finding HR-A1-02A	HRA Notebook (Appendix J, Table J-1) includes a systematic approach to identifying calibration activities through a system by system review of potential miscalibrations. This meets the high level requirement to use a "systematic approach" and is judged to be adequate by the Peer Review team. However, the SR wording requires "through a review of procedures and practices" which was not followed. As a result, the PR team must assess this SR as "not met." RECOMMENDATION: Reassess this SR when the Addendum B of the PRA Standard is released. The current proposed revision deletes the requirement for "a review of procedures and practices".	NOT ADDRESSED: The approach used was different then currently prescribed in the standard, but is considered capable of accurately identifying the effects of calibration activities that if performed incorrectly can have an adverse impact. As such this variance from the standard is judged to have no impact on this application.

Table U-1 Internal Events PRA Peer Review – Findings and Observations[6]

SR[7]	Category & Finding	Observation	Resolution of Category Capability Category in the Fire PRA Update
HR-C1	MET CC I/II/III Finding HR-C1-01A	A number of pre-IE [initiating event} HFEs are identified for modeling in the PRA. Generally these HFEs are at the train or system level, as appropriate. However, a small set were identified at the system level without related train-level HFEs. It is possible that the train level HFE may be important to system unavailability. For example, miscalibration of DG fuel oil level transmitters is done at the system level, but not at the train level. At the train level, the HFE would be 8e-3, compared with independent failure of the level transmitter of 5e-4. In other cases, the HFE is at the train level, but no corresponding system level dependent HFE is included. For example, failure to restore RHR SW post TM [testing and maintenance] is developed at the train level, but no common misalignment of both trains is considered. RECOMMENDATION: Review the differences between the modeling of system impact vs train.	NOT ADDRESSED: The CDF impact of the pre-initiators is less than 1E-6 and therefore the impact of evaluating pre initiators at the train level instead of the system level, or at the system level instead of the train level, was judged to have little or no impact on the results of this application.
DA-C10	MET CC I NOT MET CC II Finding DA-C10-01A	No evidence of failure mode level information is provided. This requires documentation of a review of test procedures to determine that test covers all failure modes of a component. For example a check associated with a pump may or may not be cycled based on the recirculation configuration. RECOMMENDATION: Address this issue by component type (e. g. pump test likely covers all pump failure modes but not failure modes of all downstream valves).	NOT ADDRESSED: This finding requires the review of test procedures to verify and document the test covers the failure mode(s) of the component crediting the test. Since every basic event is coded to identify that it is tested, this review has been implicitly completed but not fully documented in accordance with this SR. As such this review is expected to have little or no impact on this application.
DA-D4	MET CC I NOT MET CC II Finding DA-D4-01A	Appendix C.1 provides graphs of prior and posterior distributions; however there is no discussion of the reasonableness of the posterior. For example for type code AS1KFR (standby air compressor failure to run) has a prior mean of 9 E-5 with evidence of 3 failures in 544. It appears that the data is inconsistent with the prior.	NOT ADDRESSED: This will be an enhancement of the documentation to include a discussion of the specific checks performed on the Bayesian-updated data, as required by the SR, to ensure the reasonableness of the posterior and is expected to have little or no impact on this application.

Table U-1 Internal Events PRA Peer Review – Findings and Observations[6]

SR[7]	Category & Finding	Observation	Resolution of Category Capability Category in the Fire PRA Update
QU-D5a	MET CC I NOT MET CC II/III Finding QU-D6-01A	Table P-1 and P-2: plant position is that initiating event fault trees are not required by the standard (IE) and therefore equipment level of detail is not available or required to meet this SR. A future enhancement has been identified to document in the notebooks the importance of operator actions in support system initiating events, but is awaiting industry clarification. Fault trees are required for support system initiating events in order to satisfy this SR. RECOMMENDATION: Fault trees are required for support system initiating events in order to satisfy this SR.	NOT ADDRESSED: Developing fault trees for these initiating events should have minimal impact on the fire initiating events, and is judged to have little or no impact on this application.
MU-F1	MET Category I/II/III Finding MU-E1-01A	Weakness in most areas have been noted (SRs referenced are ASME/ANS RA-Sa–2009): (a): PRA inputs, such as revisions to key operating procedures, are not reviewed between updates. Ref. F&O MU-A1-01. OPEX reviews are not documented. Ref. F&O MU-A2-01. (b) Through (e): The change database provides evidence that a process is active and contains descriptions of changes to the PRA. (f): Record of the process and results used to address the cumulative impact of pending changes. Not met, Reference F&O MU-C1-01). (g): Record of the process and results used to evaluate changes on previously implemented risk-informed decisions (pursuant to MU-D1) Not met, Reference F&O MU-D1-01. (h): Description of the process used to maintain software con figuration control. Not met, (Reference MU-F1-01). Agree with 2007 assessment however improvements have been made – compliance with MU-F1 is generally met but direction and criteria is not sufficiently specific and may lead to misinterpretation and omissions. Key issues are time frames not defined and process is ambiguous, i.e. wide range of interpretations of critical requirements – refer to previous MU suggestions and findings for details. RECOMMENDATION: Address suggestions noted MU SRs: MU-A1, MU-A2, MU-B1, MU-B2, MU-C1, MU-E1	ADDRESSED: A fleet PRA procedure has been developed to meet all MU supporting requirements for Capability Category I/II/III.

V. Fire PRA Quality

53 Pages Attached

V.1 Fire PRA Quality Overview

The DAEC Fire PRA Peer Review was performed in June 2010 at DAEC using the NEI 07-12 Fire PRA peer review process, the combined PRA standard, ASME/ANS RA-Sa–2009, and RG 1.200, Revision 2. The purpose of this review was to provide a method for establishing the technical quality and adequacy of the Fire PRA for the spectrum of potential risk-informed plant licensing applications for which the Fire PRA may be used. The 2010 DAEC Fire PRA Peer Review was a full-scope review of all the Technical Elements of Section 4 of the ASME/ANS standard. The report was finalized and issued to DAEC in November 2010.

The results (i.e., Supporting Requirement capability assessments and F&Os) documented in the DAEC PRA 2010 peer review report were used to support the DAEC Fire PRA update for the NFPA 805 application.

The Fire PRA update addressed the Supporting Requirement assessed deficiencies (i.e., Not Met or CCI). Completion of recommendations related to Supporting Requirement assessments and 'Finding' F&Os results in a Capability Category II assessment for the associated Supporting Requirements. Some items are not completed at this time and are deferred. These items have been dispositioned for the potential impact on the Fire PRA and the application.

Based on the completion of peer review recommendations and the assessment of deferred items, the DAEC Fire PRA is adequate to support the NFPA 805 Fire Risk Evaluation process.

Table V-1 provides an assessment of the DAEC Fire PRA quality by supporting requirement.

Table V-2 provides the supporting requirements that are assessed as 'Not Met' or 'CC I' and discusses the potential impact of each on the application.

Table V-3 provides the peer review findings and the disposition for each in the Fire PRA.

V.2 Unreviewed Analysis Methods

There are two of the four Unreviewed Analysis Methods (UAMs) documented in the report entitled, Supplemental Fire PRA Methods, used in the DAEC Fire PRA. The potential impact of any change in the methods is discussed below.

V.2.1 Hot work pre initiator (0.01 Factor)

Purpose

The application of the NUREG/CR-6850 guidance for the treatment of hot work related fires provides only a fire frequency and a manual suppression factor. There is no guidance or treatment to address the hot work control procedures or other considerations that may result in potential cable targets being effectively protected from the effects of such fires during the performance of hot work.

DAEC Application

The hot work pre initiator factor was only applied for the Cable Spreading Room (CSR) bounding fire scenario. The use of such a factor is appropriate in this area regardless of the outcome of the review given the sensitive nature of the area. Any maintenance activities performed in the CSR during power operations would receive extensive attention from the plant. The plant hot work fire frequency apportioning method and generic manual suppression factor are not considered representative for such a sensitive area.

Conclusion

The CSR Fire PRA scenario is not associated with any VFDR conditions. VFDR conditions associated with the CSR are related to Alternate Shutdown Capability (ASC). ASC is the relied upon method in the CSR only because it shares the Control Room fire area boundary. Given a severe fire in the CSR, Division 1 components would be available for mitigation due to the limited damage associated with realistic fire scenarios. Therefore, the use of the UAM does not impact the risk calculations for the NFPA 805 application.

V.2.2 Transient HRR

Purpose

The application of the NUREG/CR-6850 guidance for the treatment of transient fires is based in part on testing of transient combustible fires and the measurement of the resulting fire characteristics. While these tests accurately predict the behavior of fires involving those transient combustible fuel packages, it conservatively reflects the behavior of the events for which the transient fire frequency is based. There is no guidance or treatment to address reasonable measures to mitigate that risk in the Fire PRA.

DAEC Application

The recommended transient HRR of 69 KW was applied for all identified general transient scenarios at DAEC. As such, targets were identified during fire scenario walkdowns based on the critical separation distance representative of a 69 KW transient fire. The report entitled, Fire PRA Quantification Report, contains further details regarding transient walkdowns.

Conclusion

Transient fire scenarios contribute 1% to the overall CDF and LERF. A best estimate sensitivity study was performed looking at drawings and performing calculations to estimate the additional impact a larger HRR would have on identified scenarios. Based on the best estimate, the use of the larger NUREG/CR-6850 transient HRR would increase CDF and LERF by no more than 1%. Transient scenarios are included in several of the VFDR conditions evaluated in the NFPA 805 application Fire Risk Evaluation (FRE) process. While there is considered not to be a noticeable increase in overall risk, the change in risk may increase. However, the change in risk is estimated to still meet the acceptance guidelines of RG 1.174.

Table V-1 DAEC Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment	DAEC Final Capability Assessment	Comment
PP-A1	Met	Met	
PP-B1	Met	Met	
PP-B2	Not Met	CC II/III	Addressed finding 6-4.
PP-B3	Not Met	CC II/III	Addressed finding 6-3.
PP-B4	Met	Met	
PP-B5	Not Met	CC II/III	Addressed finding 6-5.
PP-B6	Met	Met	
PP-B7	Not Met	Met	Addressed finding 6-6.
PP-C1	Met	Met	
PP-C2	Met	Met	
PP-C3	Met	Met	
PP-C4	Met	Met	
ES-A1	Met	Met	
ES-A2	Met	Met	
ES-A3	Not Met	Met	Addressed finding 4-1.
ES-A4	CC I/II	CC I/II	
ES-A5	CC II	CC II	
ES-A6	CC II	CC II	
ES-B1	CC II	CC II	
ES-B2	CC II	CC II	
ES-B3	Met	Met	
ES-B4	Met	Met	
ES-B5	Met	Met	
ES-C1	Not Met	Met	Addressed finding 1-3.
ES-C2	Not Met	CC II	Addressed finding 1-2.
ES-D1	Met	Met	
CS-A1	Met	Met	
CS-A2	CC III	CC III	
CS-A3	Met	Met	
CS-A4	Met	Met	
CS-A5	Met	Met	
CS-A6	Met	Met	
CS-A7	NA	NA	
CS-A8	NA	NA	
CS-A9	Met	Met	
CS-A10	CC II	CC II	
CS-A11	Met	Met	
CS-B1	Not Met	CC II/III	Addressed findings 5-20, 5-21, 5-22.
CS-C1	Met	Met	

Table V-1 DAEC Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment	DAEC Final Capability Assessment	Comment
CS-B1	Not Met	CC II/III	Addressed findings 5-20, 5-21, 5-22.
CS-C1	Met	Met	
CS-C2	Met	Met	
CS-C3	Met	Met	
CS-C4	Not Met	Met	Addressed finding 5-23.
QLS-A1	Met	Met	
QLS-A2	Met	Met	
QLS-A3	Met	Met	
QLS-A4	Met	Met	
QLS-B1	Met	Met	
QLS-B2	Met	Met	
QLS-B3	Met	Met	
PRM-A1	Met	Met	
PRM-A2	Met	Met	
PRM-A3	Met	Met	
PRM-A4	Met	Met	
PRM-B1	Met	Met	
PRM-B2	Not Met	Met	Addressed finding 6-8.
PRM-B3	Met	Met	
PRM-B4	Met	Met	
PRM-B5	Met	Met	
PRM-B6	Met	Met	
PRM-B7	Met	Met	
PRM-B8	Met	Met	
PRM-B9	Not Met	Met	Addressed findings 1-1, 2-7, 2-8, 2-9, 4-2, 4-7, 4-17. Finding 2-6 is related to use of the Revision 6 FPIE model and will be addressed as part of SR PRM-B2.
PRM-B10	Met	Met	
PRM-B11	Met	Met	
PRM-B12	Met	Met	
PRM-B13	Met	Met	
PRM-B14	Not Met	Met	Addressed finding 4-12.
PRM-B15	Not Met	Met	Addressed finding 4-15.
PRM-C1	Not Met	Met	Addressed findings 2-6, 2-7, 2-8, 2-9, 2-12, 4-12, 4-13, 4-14, 4-15.
FSS-A1	Met	Met	
FSS-A2	Met	Met	
FSS-A3	Met	Met	

Table V-1 DAEC Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment	DAEC Final Capability Assessment	Comment
FSS-A4	Met	Met	
FSS-A5	CC I/II	CC I/II	
FSS-A6	CC I/II	CC I/II	
FSS-B1	Met	Met	
FSS-B2	CC II	CC II	
FSS-C1	CC I	CC II	Addressed findings 3-9, 4-22.
FSS-C2	CC I	CC II/III	Addressed finding 4-25.
FSS-C3	NA	NA	
FSS-C4	CC II	CC II	
FSS-C5	CC I/II	CC I/II	
FSS-C6	CC I/II	CC I/II	
FSS-C7	NA	NA	
FSS-C8	NA	NA	
FSS-D1	Met	Met	
FSS-D2	Met	Met	
FSS-D3	CC II	CC II	
FSS-D4	Met	Met	
FSS-D5	Not Met	Deferred	See Table V-2.
FSS-D6	Met	Met	
FSS-D7	CC I	CC I	See Table V-2.
FSS-D8	Met	Met	
FSS-D9	CC II/III	CC II/III	
FSS-D10	CC II/III	CC II/III	
FSS-D11	Met	Met	
FSS-E1	Met	Met	
FSS-E2	Met	Met	
FSS-E3	CC II	CC II	
FSS-E4	Met	Met	
FSS-F1	CC I/II	CC I/II	
FSS-F2	CC II/III	CC II/III	
FSS-F3	NA	NA	
FSS-G1	Met	Met	
FSS-G2	Met	Met	
FSS-G3	Met	Met	
FSS-G4	CC I	CC II	Addressed finding 3-8.
FSS-G5	CC II/III	CC II/III	
FSS-G6	CC II/III	CC II/III	
FSS-H1	Met	Met	
FSS-H2	CC II/III	CC II/III	

Table V-1 DAEC Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment	DAEC Final Capability Assessment	Comment
FSS-H3	Met	Met	
FSS-H4	Met	Met	
FSS-H5	CC II	CC II	
FSS-H6	Met	Met	
FSS-H7	Met	Met	
FSS-H8	Met	Met	
FSS-H9	Not Met	Met	Addressed finding 4-28.
FSS-H10	Met	Met	
IGN-A1	Met	Met	
IGN-A2	NA	NA	
IGN-A3	NA	NA	
IGN-A4	CC I	CC III	Addressed findings 3-4, 4-43.
IGN-A5	Met	Met	
IGN-A6	Met	Met	
IGN-A7	Met	Met	
IGN-A8	Not Met	CC I/II	Addressed finding 5-9.
IGN-A9	Not Met	Met	Addressed finding 1-4.
IGN-A10	CC III	CC III	
IGN-B1	Met	Met	
IGN-B2	Met	Met	
IGN-B3	Met	Met	
IGN-B4	Met	Met	
IGN-B5	Not Met	Met	Addressed finding 1-5.
QNS-A1	NA	NA	
QNS-B1	NA	NA	
QNS-B2	NA	NA	
QNS-C1	NA	NA	
QNS-D1	NA	NA	
QNS-D2	NA	NA	
CF-A1	CC I	CC II/III	Addressed findings 4-38, 4-39, 4-40.
CF-A2	Met	Met	
CF-B1	Not Met	Met	Addressed finding 5-43.
HRA-A1	Met	Met	
HRA-A2	Not Met	Met	Addressed finding 1-6.
HRA-A3	CC I	CC II	Addressed finding 5-31.
HRA-A4	Not Met	Met	Addressed finding 5-27.
HRA-B1	CC I/II	CC I/II	
HRA-B2	Met	Met	

Table V-1 DAEC Fire PRA Quality Summary

Supporting Requirement	Peer Review Capability Assessment	DAEC Final Capability Assessment	Comment
HRA-B3	Not Met	CC II	Addressed findings 2-15, 5-37, 5-38, 5-39.
HRA-B4	CC I	CC II	Addressed finding 5-31.
HRA-C1	Not Met	CC II	Addressed findings 5-32, 5-33, 5-34, 5-35, 5-40, 5-41, 5-42.
HRA-D1	CC I	CC II	Addressed finding 2-13.
HRA-D2	NA	NA	
HRA-E1	Met	Met	
SF-A1	Met	Met	
SF-A2	Met	Met	
SF-A3	Not Met	Met	Addressed finding 3-6.
SF-A4	Not Met	Met	Addressed finding 5-11.
SF-A5	Not Met	Met	Addressed finding 5-10.
SF-B1	Met	Met	
FQ-A1	Met	Met	
FQ-A2	Met	Met	
FQ-A3	Met	Met	
FQ-A4	Met	Met	
FQ-B1	Met	Met	
FQ-C1	Met	Met	
FQ-D1	Met	Met	
FQ-E1	Not Met	Met	Addressed findings 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-15, 5-16.
FQ-F1	Not Met	Met	
FQ-F2	NA	NA	
UNC-A1	Not Met	Met	
UNC-A2	Not Met	Met	
FMU-A1	Met	Met	
FMU-A2	Met	Met	
FMU-B1	Met	Met	
FMU-B2	Met	Met	
FMU-B3	Met	Met	
FMU-B4	Met	Met	
FMU-C1	Met	Met	
FMU-D1	Met	Met	
FMU-E1	Met	Met	

Table V-2 DAEC Supporting Requirements Not Met or Capability Category I

Supporting Requirement	DAEC Final Capability Assessment	Comment
FSS-D5	Deferred	Findings 4-23, 4-32, and 5-29 are related to use of methods recommended in the ERIN report, Supplemental Fire PRA Methods. The methods are in the process of being reviewed by an industry expert panel. Finding 4-23 is related to the application of a 0.05 factor to some panel fire scenarios. The factor was removed and two point fire modeling treatment was applied Finding 4-32 is related to the application of a 0.08 transient factor. The factor was removed. Finding 5-29 is related to the use of a 0.01 factor a for hot work pre initiator. The factor was removed from all scenarios except the Cable Spreading Room bounding fire scenario.
FSS-D7	CC I	While plant specific data was not reviewed, it is not believed that DAEC systems have experienced outlier behavior and generic values provided by NUREG/CR-6850 are appropriate. Credited suppression systems will be evaluated as part of the NFPA 805 Monitoring Program as described in Section 4.6. Within this program, reliability and availability performance criteria will be established for equipment and programmatic elements important to the fire protection program. Attributes of existing suppression systems with regard to installation, maintenance, and operational history will be determined during development and implementation of the monitoring program.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
1-1	The internal events model was supplemented by the MSO / expert panel process. No clear documentation as to incorporation of those components into the model. This includes a list of action items, with no documented follow-up in the FPRA. In addition, the MSO lists some MSOs as not modeled in the PRA based on the 2008 report, but this status was not accurate - based on questions to the PRA staff. For example, MSO scenarios 4B, 4C, 4D, containment overpressure NPSH impacts, indicated review for possible PRA inclusion. However, it is not evident in the current FPRA model. (This F&O originated from SR ES-A4)	ES-A4	Clear documentation as to incorporation of expert panel findings was not provided. Create documentation to update final disposition of expert panel findings with actual disposition.	ADDRESSED: Table G-1 was added in the Fire Model Development Report, 493080001.02, to disposition each MSO and incorporated in the Fire PRA as applicable.
1-2	Systematic method used to determine if instrumentation impacted by fire could result in an undesired action was not documented. Item (b) was improperly addressed by only referencing the conduct of operations procedure (ACP 110.1) that operators would not take action on a single instrument without checking whether the multiple instruments could be impacted by a fire. (This F&O originated from SR ES-C2)	ES-C2	Need a systematic method to assess the potential of instrumentation resulting in undesired actions. One method to meet this SR would be to review alarm response procedures to ensure that instrumentation impacted by fire would not result in an adverse action. Alarms that require a specific operator action, where the action impacts SSD equipment should be included in the model.	ADDRESSED: A systematic review of ARP was performed to identify any instrumentation impacts associated with operator actions. Appendix H was added to the Fire Model Development Report, 493080001.02.
1-3	No listing of instrumentation used for operator actions found. Section E.2.3 indicates that instrumentation list information for fire scenarios is provided in AOP-913 except only RPV, DW and Torus is in the AOP. Other information for instruments used to determine hotwell level, filter dp, room temperatures are not	ES-C1	PSA actions rely on instrumentation beyond safe shutdown instruments. Need to evaluate instrumentation based on HRA requirements. Systematic Issue. Determine instrumentation used for HRA actions and confirm redundancy with routing.	ADDRESSED: Table 3.3-1 is added to the Fire Model Development Report, 493080001.02, to identify credited instrumentation. In addition, assumptions regarding cues inferred from credited NSCA instruments or environmental cues were added.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	adequately discussed and were not even listed as Appendix R instrumentation. (This F&O originated from SR ES-C1)			
1-4	Five areas were excluded: 02H, 02L, 02M, 07D and 09B page 19 of P0493080001-3475. Need to annotate the reason for the exclusion - can't be programmatic (administrative), it must be physical. Area 09B has access doors and is administratively controlled based on high radiation area so should not be excluded. (This F&O originated from SR IGN-A9)	IGN-A9	Per SR IGN-A9, cannot exclude transient combustible fires based on administrative restrictions - contrary to this area A09 was excluded based on administrative restrictions. Document bases for areas excluded and ensure that none of them are excluded based on administrative restrictions.	ADDRESSED: The fire ignition frequency for PAUs 02H, 02L, 02M, 07D, and 09B were updated to include potential for transient combustible fires. The Plant Partitioning and FIF Report, 493080001.01, was updated as applicable. (see also F&O 5-9)
1-5	NO assumptions or uncertainties identified in 493080001.001. One uncertainty from NUREG 6850 on fire ignition frequency values was evaluated in 493080001.004. (This F&O originated from SR IGN-B5)	IGN-B5	There are a large number of limitations and detailed instructions in the fire PSA project instruction on cabinet sizes, apportioning the number of small cabinets based on size, no guidance on determining vented cabinets etc., that could be assumptions /uncertainties. Add section to calculation to capture assumptions and uncertainties associated with ignition frequency.	ADDRESSED: Section 1.3 was added to the Plant Partitioning and FIF Report, 493080001.01, to identify assumptions and uncertainties.
1-6	No systematic review was performed of the plant fire response procedure(s) to identify the set of fire specific operator responses applicable to the modeled fire scenarios. For one example, consideration / documentation is needed as to why opening of 1D40 ckt 8 page 78 of AOP 913 is not adverse or not required to be modeled. As a result, no fire-specific HFEs, aside from MCR abandonment, are modeled in the FPRA. The FPRA team indicated that the reasoning for this approach was to credit as few fire-specific actions as possible in the FPRA, and that fire procedures would later be revised to reconcile the	HRA-A2	Current procedure AOP-913 was not completely assessed. The current fire PSA assumes that the fire procedure would be written such that no operator actions would be required. Current Fire PRA does not match the as-built, as-operated plant. Either review plant fire response procedure(s) for incorporation of fire specific operation responses, OR revise procedure such that there are no operator actions required for Fire PSA. Work with operations / training on which actions are appropriate to be modeled, and which will acceptably be removed from the fire response procedures.	ADDRESSED: A review of AOP 913, Fire, was added as Table E-3 in the Fire Scenario Report, 493080001.03. AOP 913 was reviewed for adverse fire response actions. One action was identified which would prevent use of the RHR cross tie. In the Fire PRA, the RHR cross tie was not credited in these fire areas. The specific example in the finding is related to establishing Shutdown Cooling which is outside the scope of the at

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	differences between procedures and the FPRA. However, this approach doesn't reflect the as-built, as-operated plant. Even if the approach is successful, (i.e., the approach to tailor the fire procedures to the conclusions and scenarios modeled in the FPRA), without significant input from the operations and training during FPRA development, the likely differences to reconcile at the end will probably be significant. A number of new human actions and associated HFEs will likely be identified because of the fire specific procedures (or at least based on input from operations / training). These new actions are identified from a review of these fire-related procedures, such as AOP-913. Many of these new actions may involve fire-related in-control room actions as well as local manual actions to be taken as a result of a fire. For example, operators may have to (1) clear a fire-induced ground fault by isolating a bus, (2) deenergize and energize certain buses and/or loads by operating breakers, or (3) shift control of the plant from the MCR to the safe shutdown panel or other areas used for ex-control room shutdown. Particular attention should be made to preemptive actions that are sometimes taken per the fire procedures to prevent spurious actuations of equipment and to protect safe shutdown equipment due to inadequacies in meeting Appendix R requirements. Also, including such actions and the corresponding HFEs in the model could lead to different accident sequence developments for possible			power Fire PRA. All other actions in AOP 913 not associated with Shutdown Cooling are actions that would recover equipment relied upon for NSCA. Not crediting the actions in the PRA represents conservatism in the fire risk. However, the impact is considered negligible as these actions are not for the top contributing fire areas (CB1, CB2, CB3, and CB4).

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	success and failure paths, which would then be added to the FPRA. (This F&O originated from SR HRA-A2)			
1-7	The methodology for calculating the FIF values for fixed ignition sources required the counting of equipment in each of the PAUs. The fixed ignition source counts were used to allocate the updated fixed ignition source FIF on a proportional basis relative to total population of a component type in similar locations. Numerous potential discrepancies were noted on the PAU ISDS for 3 of the 4 areas walked down. (This F&O originated from SR IGN-A7)	IGN-A7	Area 02B found the following not on list: ▪ UR 2328 / IC471 ▪ 11L2861 6"x2.5'x5' cabinet ▪ 1C-89A hydrogen analyzer ▪ 1C-218A hydrogen analyzer ▪ 1H-212 3 ton monorail motor ▪ 1E-72/1C-189/5 hp motor ▪ 1XL70 transformer Area 03A found the following not on list: ▪ 1C48A 2'x2'x4' cabinet ▪ MOV CS B loop line ▪ 1C-381 1.5'x3'x5' cabinet ▪ couldn't locate any of the 8 fans listed in area Area 10F found the following not on list: ▪ 1X3235 plant computer xfmr ▪ RMT2UX 5'x6'x1.5' cabinet Review or re-perform component counts for significant fire compartments or do a reverse walkdown to ensure all ignition sources have been identified.	ADDRESSED: A plant walk down of the three PAUs was performed to determine the reason the identified items were not included in the count. Several of the identified components are panels. Small panels were screened consistent with the guidance in NUREG/CR-6850, FAQ 06-0016, and PI 07-06. Also, MOVs are screened consistent with PI 07-06. Area 02B: ▪ UR 2328 / IC471 - Screened ▪ 11LR861 - Screened ▪ 1C-89A - Screened ▪ 1C-218A - Screened ▪ 1H-212 3 – 5hp motor with no targets ▪ 1E-72/1C-189/5 hp motor with no targets ▪ 1XL70 – 75 kva with no targets Area 3A: ▪ 1C484A - Screened ▪ MOV CS B loop line - Screened ▪ 1C-381 – Screened ▪ 8 Fans – located in fan rooms in the area Area 10F: ▪ 1X3235 45 kva included in fire scenarios ▪ RMT2UX – marginal panel with no targets While some items identified should be

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
				included in the FIF count, the risk from these items was included during the fire scenario development process. The FIF is not updated as such but the potential for components not identified is identified as an uncertainty in the analysis.
1-8	Section 5.0 of P0493060006-3465 did not demonstrate convergence of LERF per the SR suggested method nor was there an alternate method credited. (This F&O originated from SR QU-B3)	FQ-B1	The SR requires that convergence of LERF be demonstrated to set the truncation limits. Demonstrate convergence with lower truncation limit or provide alternate method.	ADDRESSED: The final LERF calculation was performed to demonstrate convergence. Section 5.1 was added to the Fire PRA Quantification Report.
2-3	Section 4 of 0493080001.002, DAEC Fire PRA Fire Model Development report does not provide evidence that the evaluations have been performed and documented. The circuit failure probabilities are documented in 0493080001.003, DAEC Fire PRA Fire Scenario Report, which refers to CAL-E96-020 & CAL-E96-022. However, these two calculations are in draft and do not include the detailed failure modes and calculation of failure probabilities. A discussion with DAEC staff/contractor shows that only a small number of circuit analyses were performed for previously dominant fire scenarios. The majority of the fire-induced failures in the current model are generally assumed and no circuit failure likelihood probabilities are assigned. The failure mode for these fire-induced component failures are assumed to be grounding failures. However, no evidence in the documentation to show that the modeled failure modes in Fire PRA.	CS-A5	It is not evident that both cable conductor-to-ground and conductor-to-conductor shorts (both intracable and intercable) as potential cable and circuit failure modes. Considered to be mainly documentation issue. However, no evidence is available for the modeled failure modes. On the other hand, the additional detailed circuit analysis could remove some of the conservatism. Include cable conductor-to-ground and conductor-to-conductor shorts (both intracable and intercable) as potential cable and circuit failure modes . Evaluate & document the failure probabilities accordingly.	ADDRESSED: SR CS-A5 requires that cable conductor-to-ground and conductor-to-conductor shorts (both intractable and intercable) as potential cable and circuit failure modes be included. The DAEC FHA-500 methodology selects all cables for all schemes for a component. Therefore, no potential cable and circuit failure modes are excluded. The FHA compliance assessment summaries document the circuit analysis for each fire area identifying the circuit failure mode when required. The Fire PRA uses these as input. Section 4, Circuit Failure Mode Likelihood Analysis, of the Fire Scenario Report, 493080001.03, documents circuit failure conditional probabilities applied in the Fire PRA.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	(This F&O originated from SR CS-A5)			Section 8.3, Circuit Failure Mode Conditional Probabilities, of the Fire PRA Quantification Report, 493080001.04, concludes that circuit failure conditional probabilities were applied for risk significant components.
2-5	Fire Model Development report Section 4.3 documents some assumed cable routing. A check between these assumed cable routing with the database reports showed some discrepancies. Please explain. For example, the PAUs listed for General Service Water: Functional failure in PAUs 7B, 7C, 8A, 8B, 10E, 10F, 11A, 12A, and 16C. In the database reports, the general SW pumps are 1P089A/B. The corresponding cables & routed PAUs covers more than the documented PAUs, such as CB2, CB3, 07B, 07A, OUG, 10F, 10D, 10A, 16C, 16C, 12A, 10G, and etc. (This F&O originated from SR CS-C3)	CS-C3	Systematic issue Ensure documentation in Section 4.3 concurs with the PRA modeling. Reconcile any differences.	ADDRESSED: The assumed routing was reviewed and updated for consistency. 1P089A/B were removed from the assumed routing given that cable selection was performed for the PRA to support CRD. Section 4 of the Fire Model Development Report, 493080001.02, was updated as applicable.
2-6	DAEC system models followed the FPIE model with new changes added for FPRA model development as documented in report 0493080001.002, DAEC Fire PRA Fire Model Development, Section 6 and Attachment E. However, the Revision 6 FPIE model used for FPRA model has not been approved yet. The draft system notebooks have a section for fire impact, which should be updated accordingly with the FPRA models. (This F&O originated from SR SY-A1)	PRM-B1	FPIE model changes could affect FPRA system model. Evaluate FPIE system models and identify changes that may affect FPRA model changes after the FPIE Revision 6 is peer reviewed.	ADDRESSED: The Internal Events Peer Review was originally performed in December 2007. This peer review identified 57 "Not Met" supporting requirements and 17 that did not meet capability category II, with a total of 66 findings. The internal events model used to develop the Fire PRA reflects the latest disposition of these findings as of January 2011. To verify the quality of the updated internal events model used in the Fire PRA, a Focused PRA Peer Review was conducted in March 2011. This DAEC Focused PRA Peer Review assessed all

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
				previous 2007 full-scope peer review findings and suggestions, including the adequacy of their dispositions. This review identified 4 supporting requirements as "Not Met" and 3 as meeting Capability Category I (CC I). This latest peer review is effectively an assessment of the internal events model used to develop the Fire PRA and supersedes the previous peer review findings. These findings and associated dispositions are summarized in Attachment U.
2-7	DAEC system models followed the FPIE model with new changes added for FPRA model development as documented in report 0493080001.002, DAEC Fire PRA Fire Model Development, Section 6 and Attachment E. Section 6.4 states the changes were previously not included as part of the FPIE PRA model given they were considered to be negligible or the functional failures are only susceptible to fire. However, this does not meet the a number of SRs in SY-A and SY-B, which require a reasonably complete treatment of the causes of system failure and unavailability modes represented in the initiating events analysis and sequence definition and a reasonably complete treatment of common cause failures and intersystem and intra-system dependencies. For example, SR SY-A2 require collection of such information as system P&IDs, one-line diagrams, instrumentation and control drawings, spatial layout drawings, system operating procedures, abnormal operating	PRM-B9	No evidence of system model update for Fire PRA model update to meet all SY-A and SY-B requirements. Update system models for the FPRA model changes.	ADDRESSED: Fire Model Development Report, 493080001.02, was updated to discuss the process followed to identify components added to the FPIE model consistent with SR SY-A2. Additionally, the discussion in the report in Table E-1 was updated to provide clarity to the process in which failure modes were not included in the system model consistent with SR-SY-A15.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	procedures, emergency procedures, success criteria calculations, the final or updated SAR, technical specifications, training information, system descriptions and related design documents, actual system operating experience, and interviews with system engineers and operators. Other examples are provided as follows: SY-A11 requires to include in the system model those failures of the equipment and components that would affect system operability (as identified in the system success criteria), except when excluded using the criteria in SY-A15. SY-14 requires to include consideration of all failure modes, consistent with available data and model level of detail, except where excluded using the criteria in SY-A15. (This F&O originated from SR SY-A2)			
2-8	DAEC FPRA model followed the FPIE model. However, the modeling of CCF for expanded model is not fully developed and documented. Examples include the MSIV failure to close basic events added in the FPRA model. Other added components should also be considered for CCF. (This F&O originated from SR SY-B1).	PRM-B9	Incomplete CCF model. Update the system models for the added components for CCF.	ADDRESSED: Fire Model Development Report, 493080001.02, was updated consistent with SR-SY-B1 to show that CCF for fire induced failures do not impact the results and therefore are not modeled. The discussion in the report in Table E-1 was updated to provide clarity to the process in which failure modes were not included in the system model consistent with SR-SY-A15.
2-9	Some of the FPRA model changes are not documented properly. Some seem to be included in the FPIE system model updates but are still included in the Table E-1 of the fire model development report,	PRM-A4	Systematic issues. Could be documentation issue only. But could also be modeling issues too since the system model updates are not fully reviewed and documented yet.	ADDRESSED: Table E-1 of the Fire Model Development Report, 493080001.02, was updated consistent with the Fire PRA initiated

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	such as the keep-fill pump (gates Fire-24, Fire-19 and Fire-24a are not in the FPRA model). Some FPRA model changes are not in the actual model (e.g., Fire-01, Fire-05 through 09, Fire-19, Fire- 24, Fire-25). On the other hand, some model changes in FPRA fault tree are not documented (gates Fire-94 through 101). Table E-1 only listed the gate names and major changes, the detailed fault tree logic, the CCF and other dependencies are not fully documented. (This F&O originated from SR SY-A1)		Update Table E-1 of the fire model development report to be consistent with the FPRA model changes. If the FPIE model has been updated to be consistent with the FPRA model, may still document such changes if the changes are initiated from FPRA model development.	model changes.
2-11	The DAEC FPRA PRM used FRANC and XINIT for model development and quantification, which are capable of determining the significant contributors to the fire-induced risk. However, the tools have not been benchmarked and limitations of the tools have not been documented. Note the issue associated with min cut upper bound would be captured during the investigation of benchmarking between FRANC & XINIT results. Please discuss what have done so far on addressing these potential concerns. (This F&O originated from SR PRM-A1)	FQ-A3	Step not performed. Required per SR FQ-B1 - QU-B1. Perform benchmarking of the tools used for FPRA PRM model development and quantification. Document limitations and workarounds.	ADDRESSED: The XInits and FRANC benchmarking process and results are documented in Appendix K of the Fire PRA Quantification Report, 493080001.04.
2-12	DAEC system models followed the FPIE model with new changes added for FPRA model development as documented in report 0493080001.002, DAEC Fire PRA Fire Model Development, Section 6 and Attachment E. However, the sources of model uncertainty and related assumptions are not documented. (This F&O originated from SR SY-C3)	PRM-C1	Step not performed. DOCUMENT the sources of model uncertainty and related assumptions associated with the systems analysis for the FPRA model changes.	ADDRESSED: Section 1.3 was added to the Fire Model Development Report to identify assumptions and uncertainties.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
2-13	DAEC report 0493080001.003, DAEC Fire PRA Fire Scenario Report, Section 6 and Appendix E document the FPRA HRA development and results. No new operator recovery actions have been identified in the FPRA model. However, a review of top CDF/LERF cutsets show that some potential recovery actions should have been considered for significant accident sequences. Note the following examples are included for demonstration purpose only and other cases can be identified when a systematic review is performed for potential operator recovery actions. For example, operator actions to restore offsite power to the unaffected essential switchgear after the fire should be considered, especially in long-term LERF sequences. In another example, additional external injection sources should be considered, which are independent of the modeled LP injection sources that have been failed in SBO-type sequences in the LERF sequences. The additional external injection sources currently are modeled under gate RX-LP-EXTHW- F in the LERF XINIT fault tree with a failure rate of 1.0. Two events, DFPROTDN---INJECTF-- & DWELLWDN---INJECTF-- are modeled for fire water and well water injections. It is expected that the operator actions will be the dominant contributors to the failures of these two events. (This F&O originated from SR HRA-D1)	FQ-A3	Step not performed. Systematic issue. Review the CDF and LERF fire model results and INCLUDE operator recovery actions that can restore the functions, systems, or components on an as-needed basis to provide a more realistic evaluation of significant accident sequences.	ADDRESSED: Section 5 of the Fire PRA Quantification Report, 493080001.04, was updated to discuss the results of the review of recovery actions. Recovery of fire induced loss of offsite power due to damage to the protective relays is not considered feasible. The other specific examples provided in the finding are related to items that have been reviewed for the FPIE model and are not considered feasible.
2-14	FHA-400 provides details on structural steel at DAEC. Section 4 of FHA-400 discusses the methodology used at DAEC to evaluate structural steel and the	FSS-F1	The evaluation of the impact of postulated oil fires in Turbine Building at elevations of the operating deck and below and heat transmittal up to the	ADDRESSED: Section 5.1.8.4 of the Fire Scenario Report, 493080001.03, was updated to

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	need for structural steel fireproofing. A zone by zone on structural steel discussion has been provided in FHA-400. However, the evidence is not clearly documented for the impact of postulated oil fires in Turbine Building at elevations of the operating deck and below and heat transmittal up to the perimeter steel (or roof steel). (This F&O originated from SR FSS-F1)		perimeter steel (or roof steel) is not evident Evaluate and document the impact of postulated oil fires in Turbine Building at elevations of the operating deck and below and heat transmittal up to the perimeter steel (or roof steel).	include an evaluation of postulated oil fires in the turbine building that result in damage to structural integrity.
2-17	The "state-of- knowledge" correlation between fire-specific event probabilities (e.g., suppression system unavailability, fire ignition frequencies, hot short conditional probabilities, etc.) hasn't yet been applied. As a result, QU-A3 CC-II requirement is considered not met. (This F&O originated from SR QU-A3)	FQ-A4	Step not performed. ESTIMATE the mean CDF accounting for the state-of-knowledge correlation between event probabilities when significant in DAEC FPRA model.	ADDRESSED: The parametric uncertainty analysis was re-performed applying the state of knowledge correlation between basic event probabilities as applicable and documented in the Fire PRA Quantification Report, 493080001.04.
2-20	The Cable Spreading Room (CSR - PAU 11A) fire scenario is a bounding scenario (11A-A01), which accounts for all the fire ignition sources. The final quantification result for this scenario has a CDF of 7.52E-08 /yr. A discussion with DAEC staff/contractor showed that the fire ignition frequency for this scenario in the final XINIT model is 7.52E-8/yr, which includes factors to account for procedure non-compliance, which is covered in F&O 5-29. This frequency also includes a CCDP of 0.01 for the administrative controls imposed on the CSR, such as locked during operation, Cardox system, a posted guard, and the use of alternate shutdown panels outside of main control room for a loss of Div 2 components. The above stated basis is considered as	FQ-A4	If the additional factor of 0.01 for CCDP is not credited, CSR fire risk will have a significant increase. Develop basis for the CCDP used for CSR fire scenarios to remove double counting. Or develop detailed fire scenarios for CSR if this PAU results in significant contribution to total fire CDF and LERF.	ADDRESSED: The CSR qualitative discussion is revised to clearly identify basis for applied conditional probabilities and CCDP. While transient influence factors are applied in the frequency calculation, these factors do not consider administrative controls as specified by SR IGN-A9. A revised CCDP is applied based on Div. 1 components being available for shutdown from the main control room (i.e., CSR contains Div. 2 component cables). See Fire Scenario Report, 493080001.03, Attachment A.1, Fire Scenario Summary for 11A-A01.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	double counting since the CSR has been considered with low transient influencing factors as documented in Table B-1 of the Plant Partitioning and Fire Ignition Frequency Development report. (This F&O originated from SR FQ-A4)			
3-4	Review of the events contained in Appendix A of the DAEC Plant Partitioning and Fire Ignition Frequency Development Report indicates fire events that may have become challenging had immediate suppression not occurred. A review of the documentation in Appendix A did not provide sufficient justification to screen some of the events, given potential damage to additional equipment in the area given suppression failure. These events include numerous welding and cutting fires occurred, EDG manifold fires (addressed separately in F&O 4-43), and one notable transient fire (fire #5) that if not immediately extinguished could have developed into a challenging fire. Please note that the EPRI DB screening does not consider the location of the fire (in the yard away from equipment) as one of the criteria. (This F&O originated from SR IGN-A4)	IGN-A4	Systematic Issue. Plant-specific update of the generic fire frequencies resulted in lower values for Duane Arnold based on the screening of all Appendix A fires as non-challenging. Re-review the DAEC fire events database to ensure that the identified fire events are not potentially challenging using the EPRI Criteria. Consider categorizing as challenging or unknown for several welding fires and transient fire #5. Note the EDG manifold fires are addressed in F&O 4-43.	ADDRESSED: Each of the fire events were re reviewed and the condition reports included as part of Appendix A of the Plant Partitioning Report, 493080001.01.
3-6	Review of Appendix D of the DAEC Fire Scenario Report includes a review of the potential seismic degradation of fire suppression systems and features however this discussion does not assess the potential common cause failure of fire suppression systems due to the loss of support systems. (This F&O originated from SR SF-A3)	SF-A3	Analysis of the common cause failure of fire suppression systems is not provided. Analysis of the post seismic availability of fire suppression systems needs to be assessed.	ADDRESSED: Section D.2.5 was added to the Fire Scenario Report, 493080001.03, to document the analysis of common cause failure of suppression systems.
3-7	Section 5.3 and Appendix C of the Fire Scenario Report fully define the	FSS-G2	The probability of failure for each fire barrier element contained in a fire barrier	ADDRESSED:

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	screening criteria used to perform the multi-compartment analysis. Most of the screening criteria align with the guidance provided in NUREG/CR 6850, however differences were identified. Additional justification of the differences from the criteria identified in NUREG/CR 6850 should be provided. (This F&O originated from SR FSS-G2)		segment that separates fire compartments (PAUs) should be summed to establish the fire barrier failure probability. This analysis assumes a single bounding value for one such element. This approach may underestimate the barrier failure probability. Calculate barrier failure probability by summing the failure probability of each of the fire barrier elements.	The guidance in NUREG/CR-6850 and used in the Fire PRA postulates only one barrier failure. Appendix C of the Fire Scenario Report, 493080001.03, was updated to explicitly define the criteria used.
3-8	The DAEC FHA provides evidence that, credited fire rated barriers conform with applicable test standards however there is no clear link to that document. Additionally, item b) (assessing the effectiveness, reliability, and availability of any passive fire barrier) was not performed. (This F&O originated from SR FSS-G4)	FSS-G4	Step not performed. Provide a link to the FHA that includes documentation that establishes that passive fire barriers with a fire-resistance rating are not credited beyond their tested capabilities. Additionally, assess the effectiveness, reliability, and availability of any passive fire barriers credited in the MCA.	ADDRESSED: Appendix C of the Fire Scenario Report, 493080001.03, was updated to include the fire barrier requirement as provided in the FHA-400. The fire protection program provides the assessment of effectiveness and availability of the credited barriers. Random failure probabilities are assigned based on NUREG/CR-6850.
3-9	An empirical model was developed to describe a transient HRR that is significantly lower than that provided in NUREG/CR-6850. The generic model suggests using a HRR closer to an electric motor fire than the transient. Based on this position a 98% 317kW transient fire is replaced with a 98% 69kW fire for an electric motor. The basis for this transient HRR is comparison of the 6850 value to significantly lower fire events data. The basis of this empirical model is not considered to be well founded. (This F&O originated from SR FSS-D6)	FSS-D6	The fact that industry fire events do not support use of the 317kW fire is the only justification provided. It would not be expected that industry experience as a whole would bear out the 98% HRR instead such fires by definition would make up a very small percentage of the whole. Therefore the fact that such fires are not regularly reported does not justify this change. Provide a better justification for this empirical basis or use the industry accepted HRR values. An industry independent review of the HRR information in the ERIN supplemental report is needed.	DEFERRED: The ERIN supplemental report is in the NEI new methods expert panel review process. A sensitivity study was performed and the use of the higher NUREG/CR-6850 transient HRR was estimated to increase CDF/LERF by no more than 1%. Refer to Section 8.5 of the Quantification Report, 493080001.04 for details. Additionally, the transient scenarios included in FRE calculations were reviewed for potential impact on delta CDF/LERF calculations. A potential for increase in delta CDF/LERF was

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
				estimated for the RB3 FRE. The increase in delta was evaluated and the area and cumulative increase in risk is estimated to still meet the RG 1.174 acceptance criteria.
3-10	The Multi-Compartment Analysis methodology and identification of risk significant scenarios is well documented in Section 5 and Appendix C of the DAEC Fire Scenario Report. This analysis performed the required analysis and identified the quantitative results of potentially risk significant scenarios. As documented in the results, further evaluation of zone specific data as well as walkdowns of the fire zones to eliminate conservatisms assumed in the screening methodology will be necessary to complete this analysis. Based on the above this SR is considered met but an F&O is generated to document the need to complete the analysis. (This F&O originated from SR FSS-H8)	FSS-H8	MCA not complete. Complete the analysis and walkdowns as necessary to complete the analysis.	ADDRESSED: The MCA was completed and Appendix C of the Fire Scenario Report, 493080001.03, was updated.
4-1	The Fire PRA model is developed based on quantification of the PRA model assuming a turbine trip, followed by a subsequent loss of function. Additional logic is added for Loss of Offsite Power (Fire-101) Head Vents (under small LOCA) and ISLOCA pathways (e.g., Fire-50) Table 3.1-1 of the Fire Model Development Report documents the CCDP for base loss of the IE and a TT with a loss of the function. On loss of DC power, the loss of the initiating event is around 20% higher than the TT with loss of DC power. For other initiating events, the TT is conservative by up to a factor of 5 (loss of FW).	ES-A3	Fire PRA model has no equipment identified that can cause a loss of DC power, RW, Feedwater overfeed, etc. This results in a %TT being used in the quantification, rather than any of the special initiating events. Perform an identification of equipment that can cause each support system initiating modeled in the internal events PRA, SSA or identified as new in the MSO review or similar tasks.	ADDRESSED: All equipment that results in a loss of DC, RW, or Feedwater overfeed is explicitly modeled in the Fire PRA based on a review of the requirements of the safe shutdown analysis and is incorporated via the Equipment. Cable, and Location relationship, Section 3 of the Fire Model Development Report, 493080001.02, was updated to clarify the equipment selection process and the selection of initiator. The DAEC08A model had non-conservative treatment which led to the lesser fire risk of the %TT in some cases

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	This approach is used in the FQ modeling for the model solution, in order to simplify the model solution, as well as ensure all of the subsequent failures are treated completely. However, since the SR and HLR in ES-A3 and others require the FPRA model to include equipment that can cause an initiating event, plant shutdown, etc., and this equipment identification tying the equipment in the FPRA to each initiating event is not performed, the requirements to identify equipment that can cause an initiating event is considered not met. The operator actions are different for special initiators than for TT, based on the timing and initial conditions following the special initiators. (This F&O originated from SR ES-A3)			identified by the finding. The DAEC08B fixed that treatment.
4-2	The Fire Model development report includes Table E-1 on Fire PRA model changes. However, a number of the changes to the model are not discussed on the table. See Gates Fire-94 to Fire-101. (This F&O originated from SR PRM-B9)	PRM-B9	Systematic Issues. TBD May be just a documentation Issue. Document all model changes per the referenced SRs in SY-A/B.	ADDRESSED: Fire Model Development Report, 493080001.02, Table E-1 was reviewed and updated to include all fire initiated model changes.
4-4	The LOOP logic included in gate Fire-101 includes logic ties to X3 and X4, which includes protective relaying. However, the logic added does not match the SSA defined loss of offsite power. See NSCASLD- G010<02>. For example, failures of Breaker K, Breaker J, or DC power do not result in a loss of offsite power initiating event. (This F&O originated from SR ES-A2)	ES-A2	The protective relaying and X3/4 failures appear to give the proper failure of offsite power. The other failures are mapped to the components which come through the %TT failure logic in the power required for the systems used. As such, these failures will also come through the LOOP logic, but only once the X3 and X4 fails. It is unclear if the present Fire-101 logic is expanded if the impact will be significant. Add the logic for X3/4 supporting equipment, such as breaker k/J/H/I and	ADDRESSED: The Fire-101 logic is added to address a specific fire induced LOOP scenario from damage to protective relaying cables. Fire Model Development Report, 493080001.02, Table E-1 was updated to discuss model changes.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
			DC power, to the loss of offsite power logic under Fire-101.	
4-6	Feedwater Overfeed initiating (including condensate) event is not included in the FPRA model. This scenario is discussed in the MSO list, and in NUREG/CR-6850 as one of concern for BWRs. Also, found to be significant at other BWRs. (This F&O originated from SR ES-A5)	ES-A5	Could be significant. Include consideration for FW overfeed in the Fire PRA model.	ADDRESSED: FW overfeed MSO added to the logic model to fail HPCI and RCIC and the Fire Model Development Report, 493080001.02, Appendix G was updated as applicable.
4-7	Logic under gate HPCI-MSL-FLD appears to be incorrect. As developed, both a HPCI valve failure and Level 8 Failure are required. However, even if level 8 occurs, the valve failure can result in overfeed continuing. (This F&O originated from SR PRM-B9)	PRM-B9	Isolated issue Correct logic under HPCI-MSL-FLD.	ADDRESSED: Logic corrected and requirement for Level 8 failure removed.
4-8	A review of the DAEC Fire Model Development Report was performed. Section 3.2.4 discusses additional equipment added to the Fire PRA model during the model development. Additional logic is included in Table 6 of this report, and includes logic from the MSO expert panel report and some additional equipment selection reviews. However, it does not appear that all additional equipment was included. This would include the consideration of previously screened Containment Isolation Flow-paths. Section 3.2.4.3 mentions: "No new fire induced failures were identified as a significant contributor to LERF." However, the significance is not part of the consideration here, but rather are the pathway failures more likely as a result of a fire? (This F&O originated from SR ES-B3)	ES-B3	Additional Containment Isolation Pathway failures could be significant, depending on the LERF modeling assumptions (present modeling is conservative). Review previously screened containment isolation paths that may be subject to Fire-Induced Damage, and include in the FPRA model.	ADDRESSED: The Fire Model Development Report, 493080001.02, was updated to document the containment isolation pathway review and indicates that no pathways were excluded from the FPIE based on low likelihood of occurrence.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
4-12	Section 6.5 of the Fire Model Development Report discusses change to the LERF model. Based on this, no changes were performed other than those changes affecting the level 1 model. However, in discussions on the details of what was reviewed, it appears as if the Level II model was not reviewed for potential changes as a result of fire impacts. A review of the DAEC Level II PSA Analysis was performed for this review. Modeling features such as AC Power Recovery, Containment Isolation, Operator Depressurizes Reactor Vessel, Core Melt Progression, Combustible Gas Venting, and other features are potentially impacted by Fire. Fire Impacts of these should be reviewed to determine any potential changes, including those involving spurious operation. Reviews at similar plants indicated fire-induced impacts of DW and WW Integrity, including containment flooding, WW venting, and fire-induced failures of support systems and cooling. (This F&O originated from SR PRM-B14)	PRM-B14	Systematic Issue Systematically review the DAEC Level II PSA Analysis for potential impact due to fire, and modify the model based on these impacts.	ADDRESSED: Section 6.5 of the Fire Model Development Report, 493080001.02, was updated to include a detailed LERF model review. No changes were identified given the events in the Level 2 model are generally conditional events, phenomenon events, and long term human actions. None of these events would be considered impacted by a fire as discussed in the review.
4-14	New Fire Basic events are identified in Table D-1 of the Fire Model Development Analysis report. These Basic Events are related to fault tree changes listed in Table E-1. Identification is related to fire events, with some events being set to zero in order to support the Fire spurious operation modeling. However, no sources of model uncertainty and related assumptions are identified for the new data added to the model. (This F&O originated from SR DA-E3)	PRM-C1	Requirement of DA-E3 and PRM. Review the new basic events added to the Fire PRA model and identify sources of model uncertainty and related assumptions for treatment in the quantification.	ADDRESSED: Section 1.3 was added to the Fire Model Development Report to include model uncertainty and assumptions.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
4-15	Since no impacts were identified as requiring any changes to the Level II model, this SR can not be fully reviewed. The finding on PRM-B14 will likely result in impacts being identified and changes to the LERF model. These impacts as well as the existing changes made to the CDF model would need to be reviewed against LE-A/B/C/D. An initial review indicated a number of potential issues with the present Fire PRA model, due to failure to consider the impacts of fire on the level II model. However, since the likely model changes from the SR-B14 Finding will require re-review of the referenced SRs, this SR (PRM-B15) is not reviewed for this peer review. In reviewing the LE referenced SRs, a number of areas in the Level II model that will likely be impact by Fire were identified. These include things like -- Adverse Reactor Building Conditions Cause Failure , Instruments needed to "properly diagnose the need to implement emergency RPV depressurization," ADS-INITIATE (some impacts included in the level I), DADS---NPHSRVSTKCE--, CET NODE OP FAULT TREE QUANTIFICATION, and others. Based on similar reviews at other plants, a significant number of changes are expected when the independent level II modeling issues, listed in Appendix C of the Level II report, are reviewed for fire impacts. (This F&O originated from SR PRM-B15)	PRM-B15	Systematic Issue Model the Fire Impacts on Level II model characteristics discussed in Appendix C of the Level II PRA report.	ADDRESSED: Section 6.5 of the Fire Model Development Report, 493080001.02, was updated to include a detailed LERF model review. No changes were identified given the events in the Level 2 model are generally conditional events, phenomenon events, and long term human actions. None of these events would be considered impacted by a fire as discussed in the review. Given that no additional changes were identified in the process of upgrading the documentation this finding is considered closed by the resolution of 4-12.
4-16	The Fire PRA model does not appear to model Fire-Induced Opening of all SRVs, as required by the MSO list scenario 3A. The scenario can be more limiting than 2	PRM-B5	Required per MSO list scenario 3A. Model MSO scenario 3A to open all SRVs.	ADDRESSED: The Fire PRA models multiple SRVs opening consistent with the FPIE PRA

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	SRVs or ADS, due to the thermal transient that results. This could result in a change to the success criteria, accident sequences, etc. that are presently modeled in the FPRA. (This F&O originated from SR PRM-B5)			model and the defined success criteria based on the supporting thermal hydraulic analysis. Table G-1 of the Fire Model Development Report, 493080001.02, was updated as such.
4-17	The FPRA model changes do not include the model for those systems that are required for initiation and actuation. For example, the MSIV fail to close logic does not included the associated instrumentation, controls, or operator actions. (This F&O originated from SR SY-B10)	PRM-B9	Step not performed. MODEL those systems that are required for initiation and actuation of a system. In the model quantification, INCLUDE the presence of the conditions needed for automatic actuation (e.g., low vessel water level). INCLUDE permissive and lockout signals that are required to complete actuation logic.	ADDRESSED: The fire induced MSIV failure to close logic is updated to include operator action and fire induced failure of a single automatic actuation signal. This modeling is conservative given that there are several automatic actuation conditions. The operator action to close MSIVs is considered a minimum conservatism in the PRA. The F-V is ~1E-4 for the LERF model and even lower for the CDF model. The Table E-1 in the Fire PRA Model Development Report, 493080001.02, was updated to discuss the new logic.
4-18	Table 4.1-1 of P0493080001-3475 provides mean values and uncertainty intervals for the fire ignition frequency bins. The PRA model does not include uncertainty bounds for all fire initiating events. (This F&O originated from SR IGN-A10)	IGN-A10	Systematic issue. Add uncertainty bounds for all fire initiating events.	ADDRESSED: Table 5.1-1 of the Plant Partitioning and FIF Report, 493080001.01, provides uncertainty intervals for the FIF for each PAU. Uncertainty intervals for all fire scenario FIFs are assigned for the uncertainty analysis. Table 5.1-1 was updated to indicate that the same methodology used to assign PAU FIF uncertainty intervals is used to assign uncertainty intervals to all fire scenario FIFs.
4-21	The MCR Analysis includes numerous scenarios for fire burnout of an entire board, as well as pinch point analysis for a loss of function. This includes the top	FSS-A6	Appears to be significant for the top MCB scenarios. Include consideration for spurious operation in the CCDP calculations for all	ADDRESSED: The MCR analysis is updated. The CCDP for non-abandonment is based on

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	MCB scenario, %FR-12A_F07. For these scenarios, use of the ASC is credited at 0.1. However, the analysis does not include consideration of whether ASC will function. As a point of clarification, for loss of function scenarios, the fire damage could result in spurious operation (including MSOs) that could fail the ASC function. This might include starting an EDG without cooling water, running cooling water pumps with the discharge closed, overfilling the vessel (assuming the ASC using a TD pump for operation) and other similar scenarios. Without consideration for these types of events, the analysis can be non-conservative. Additionally, the analysis, as performed, does not look at the MSO issue for the control room. As such, the FPRA does not address the risk significance of possible MSOs in the control room Another point of clarification is that although it is recommended to take MSOs into account for any loss of function scenario analyzed in the MCR analysis, it is not recommended that in lieu of the analysis, the MCR abandonment CCDP be set to 1.0 in order to be conservative. Although the use of 0.1 could be non-conservative (MSO = 0.3 * 0.3, HEP = 0.1, CCDP = 0.2), the use of 0.1 is more accurate than using a CCDP of 1.0. Rather, some attempt to consider the MSO scenarios in the CCDP is recommended. (This F&O originated from SR FSS-A6)		"loss of function" scenarios in the MCR FPRA analysis.	functional failures as well as multiple spurious operations (MSO). Alternate Shutdown Capability (ASC) CCDP is assigned based on ASC functional failures, as well as MSO probability. Section 5.2 of the Fire Scenario Report, 493080001.03, was updated to document the CCDP for each scenario.
4-22	Fire Damage is based on the Generic Fire Modeling, based on the distance between the source and the target. The	FSS-C1	Requirement of FSS-C1 to apply a multi-point fire model to significant fire scenarios, when applicable (Non-HEAF).	ADDRESSED: Fire scenario 10E-F45 sensitivity case

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	significant scenarios are based on a single point fire model using the minimum HRR for a damage fire. A sensitivity case for scenario 10E-F45 shows about a factor of 2 risk reduction when applying a multi-point fire model. (This F&O originated from SR FSS-C1)		Current treatment is conservative. Apply a multi-point fire model, when applicable (Non-HEAF scenarios) to all significant fire scenarios.	refined the use of the electric panel factor approach (See Finding 4-23) to use of the Hughes Generic Fire Modeling results for critical separation distances based on HRR. The refined approach assesses individual target sets for an ignition source based on fire growth and critical separation distance consistent with SR FSS-C1 CC II. Section 5.1.6 and Appendix G of the Fire Scenario Report, 493080001.003, document the fire scenario factors derived for use in multi-point fire modeling.
4-23	Severity factors are discussed in Section 2.4 and Table 2-1of the Fire Scenario Report. Severity factors applied, other than from HRR analysis, are from NUREG/CR-6850. However, a severity factor of 0.05 is applied to significant switchgear fires, such as scenario 10E_F51 (7% of CDF). This severity factor comes from the ERIN engineering supplemental fire methods, Table 2-1. In reviewing the data associated with Table 2-1, the factors (such as the 0.05) appear to be incorrectly developed and not independent on the ignition frequency partitioning. The issue is mainly due to the use of the 109 fires in the denominator of the severity factor determination. The severity factors each use the same denominator, and apply the numerator based on the number of severe fires for that category. This ratio (severity factor) is then the number of severe fires of that type divided by the	FSS-C4	Severity Factors are applied to significant scenarios. An independent review of the Severity Factors in 2-1 of the ERIN supplemental report is needed. If used as is, the severity factors should be re-calculated to be based on the number of severe fires for a given component divided by the total number of fires for that component type.	ADDRESSED: The use of the subject severity factors were replaced with a refined multi-point treatment. Fire scenario 10E-F45 sensitivity case refined the use of the electric panel factor approach (See Finding 4-23) to use of the Hughes Generic Fire Modeling results for critical separation distances based on HRR. The refined approach assesses individual target sets for an ignition source based on fire growth and critical separation distance consistent with SR FSS-C1 CC II. Section 5.1.6 and Appendix G of the Fire Scenario Report, 493080001.003, document the fire scenario factors derived for use in multi-point fire modeling.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	total number of fires. Overall, the severity factors in Table 2-1 are basically unreviewed, but appear based on our initial review to be inaccurate. (This F&O originated from SR FSS-C4)			
4-25	Analysis is generally applied using the intensity at peak HRR, based on the Fire Scenario Report and the Hughes generic fire modeling report. Fire Growth for significant contributors does not appear to be applied, based on a review of the top fire scenarios in the results. (This F&O originated from SR FSS-C2)	FSS-C2	Systematic. Present model is conservative. Apply fire growth, when applicable (not to HEAFs) to each significant fire scenario. Fire Damage time can then be adjusted, and a non-suppression factor determined.	ADDRESSED: Fire scenario 10E-F45 sensitivity case refined the use of the electric panel factor approach (See Finding 4-23) to use of the Hughes Generic Fire Modeling results for critical separation distances based on HRR. The refined approach assesses individual target sets for an ignition source based on fire growth and critical separation distance consistent with SR FSS-C1 CC II. Section 5.1.6 and Appendix G of the Fire Scenario Report, 493080001.003, document the fire scenario factors derived for use in multi-point fire modeling.
4-28	The Hughes Generic Fire Modeling Report, Section 3.3.6 provides a discussion of the uncertainty for the fire modeling task. Table E-1 of the Quantification Results provides a limited discussion on the FSS task. However, a comprehensive review of uncertainty is not provided in the FSS report. (This F&O originated from SR FSS-H9)	FSS-H9	Requirement of FSS-H9 Document sources of uncertainty for the FSS technical element.	ADDRESSED: Section 1.3 was added to the Fire Scenario Report to include uncertainty and assumptions.
4-32	A severity factor of 0.08 was applied to numerous transient scenarios such as 10E-D02. This factor is based on the ERIN supplemental method report. The	FSS-C4	Systematic Issue. Remove the severity factor of 0.08 from transient scenarios or submit the technical method to the industry review	ADDRESSED: The use of the factor was removed given low contribution of transients to the

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	supporting analysis for this was reviewed, and did not appear to be well supported. In addition, the application of this severity factor in addition to the area weighting factor (100/area of the room) appears to double count the probability that the fire can occur near a target cable. (This F&O originated from SR FSS-C4)		team for peer review.	DAEC Fire PRA. Section 6 of the Overview Report, 493080001.00 documents the revised treatment.
4-34	The area factor of 100 divided by the total area is applied to numerous scenarios where the damage could occur on a number of cable trays. The area where the damage could occur would be within a few feet of the cable tray, but along the entire length. The treatment used is non-conservative, since the area covered by the cable trays could be much larger than 100 square feet. (This F&O originated from SR FSS-C4)	FSS-C4	Systematic Issue. Could be significant. Remove the area weighting factor when the target(s) being damaged is not limited to a single location. Apply a more appropriate severity factor, based on the zone of influence that may damage the target.	ADDRESSED: The use of a 100 square foot zone of influence is only applied to localized transients and is generally a conservative method of apportioning the transient FIF in a PAU. A more appropriate severity factor based on the zone of influence is applied for transients when necessary. Given general transients only contribute to 1% of the total fire risk from the method of apportioning transients within a PAU is considered negligible. As noted for DAEC, identified transients are generally localized. If a more severe transient was capable of impacting a larger target set then that was identified in the area.
4-35	Fire Suppression was applied for a limited number of scenarios in the Fire PRA. See results table A-1, where scenarios include a non-1.0 factor in the non-suppression column. In cases where suppression is credited, the factors listed in CC II do not appear to be evaluated. The following is not addressed for non-	FSS-D7	Requirement of FSS-D7. Determine the following for any suppression system credited: a) the credited system is installed and maintained in accordance with applicable codes and standards, and b) the credited system is in a fully operable state during plant operation, and c) the system has	DEFERRED: While plant specific data was not reviewed, it is not believed that DAEC systems have experienced outlier behavior and generic values provided by NUREG/CR-6850 are appropriate.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	suppression: a) the credited system is installed and maintained in accordance with applicable codes and standards, and b) the credited system is in a fully operable state during plant operation, and c) the system has not experienced outlier behavior relative to system unavailability. (This F&O originated from SR FSS-D7)		not experienced outlier behavior relative to system unavailability	Credited suppression systems will be evaluated as part of the NFPA 805 Monitoring Program as described in Section 4.6. Within this program, reliability and availability performance criteria will be established for equipment and programmatic elements important to the fire protection program. Attributes of existing suppression systems with regard to installation, maintenance, and operational history will be determined during development and implementation of the monitoring program.
4-40	A set of sensitivity runs were performed using FRANC and XINIT setting spurious operations (originally set to 1) to a typical value (0.6 or 0.3). As a result, a number of MSOs were identified that were significant, based on the standard definition of significant. As a result, the requirement to analyze significant circuit failures using plant specific circuit analysis based on the specific circuit configuration under consideration was considered not performed. (This F&O originated from SR CF-A1)	CF-A1	Requirement of CF-A1. Present model is slightly conservative. This Finding results in CF-A1 not meeting CC II, but the finding does not impact CF-A1 meeting CC I. Determine any significant spurious operations in the FPRA results, and analyze using based on the specific circuit configuration under consideration.	ADDRESSED: Section 4.0 of the Fire Scenario Report, 493080001.03, provides the list of basic events for which the appropriate circuit failure mode conditional probability was applied. Section 8.3 of the Quantification Report, 493080001.04, documents the sensitivity study performed to ensure the significant spurious operations circuit failure mode were considered. Based on the sensitivity, two additional spurious operations had a F-V slightly greater than 0.005. Therefore, the intent of the requirement for CC II has been achieved and significant spurious operations were analyzed based on the circuit configuration.
4-41	Event DFEED-CNOP-NOTTFRX-- (recovery of feedwater) should be set to 1.0 for scenarios where MFW is not credited. It appears this event is not	PRM-B10	Appears to be significant, especially for LERF. Fail the event DFEED-CNOP-NOTTFRX--- in the FPRA.	ADDRESSED: The Feedwater recovery event is only modeled in logic with the Loss of

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	changed for the Fire PRA, but it does show up in the Cutsets. (This F&O originated from SR PRM-B10)			Feedwater Initiator. As described in Section 3 of the equipment selection report the turbine trip is used as the default initiator for general transients. Therefore, the recovery of Feedwater is not credited.
5-1	Table C-1 of FPRA Fire Risk Quantification and Summary report 493080001.004 provides a summary of DAEC Fire PRA CDF top 100 cutsets. However, no review is documented to provide assurance that the logic of the cutsets is correct. Such a review would ideally provide a short narrative of each cutset to document validity and reasonableness, taking into consideration the applicable initiating event, equipment failed by fire, reasonableness of human interactions, hot shorts, and MSO scenarios. To reduce the effort and potentially provide additional clarity, cutsets may be grouped by compartment / scenario prior to documenting the review. (This F&O originated from SR QU-D1)	FQ-E1	Step not performed Perform and document a review to provide assurance that the logic of the cutsets is correct.	ADDRESSED: Section 5.2.3 and 5.3.3 of the Fire PRA Quantification Report was updated to document the review of cutsets for correctness.
5-2	Although the internal events PRA, which provides the basis for the FPRA model, has been reviewed for modeling consistency and operational consistency, no such review has been documented for FPRA scenarios. Such a review may include at least the following: a) review of modeled MSO scenarios to ensure impacts to plant response are properly represented; b) review of human failure events to ensure failure events are applicable to the cutsets/sequences to	FQ-E1	Step not performed Review the results of the PRA for modeling consistency	ADDRESSED: Section 5 of the Fire PRA Quantification Report was updated to document review of the CDF/LERF results. Section 7 documents insights from the reviews which show model and operational consistency.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	which they are applied; c) review of sequence cutsets fire-specific initiating events, if any, to ensure accident sequences and success criteria are reasonable. (This F&O originated from SR QU-D2)			
5-3	No documentation is provided of a review of flag event settings, mutually exclusive event rules, and recovery rules to ensure that logical results are produced. The ZoneTag table is provided in the DAEC Fire Model Development Report 493080001.002, but this table merely provides information about fire impacts. For example, develop a section in the Fire Risk Quantification and Summary Report 493080001.004 with information such as the following: a) mutually exclusive cutset deletion with basis for each deletion; b) recovery rules with basis for each rule; c) "ones" run cutsets for significant scenarios with explanations that demonstrate reasonableness. (This F&O originated from SR QU-D3)	FQ-E1	Step not performed. Document a review of flag event settings, mutually exclusive event rules, and recovery rules to demonstrate that logical results are produced.	ADDRESSED: Appendix G and H of the Fire PRA Quantification Report provide the mutually exclusive and recovery rules applied consistent with the FPIE PRA model quantification. Section 5.2.3 and 5.3.3 was updated to document the review of cutsets. Section 5.5 was updated to document a review of importance measures. Therefore, the quantification was reviewed to ensure logical results were produced consistent with SR QU-D3.
5-5	No review of non-significant cutsets appears to have been documented. Such a review would provide assurance that the FPRA plant response model is logical, accurate and producing the intended results. This documentation may include the following: a) a review of cutsets from a sample of scenarios with non-significant frequencies; b) a review of non-significant cutsets from a sample of significant scenarios; This review may include the following for	FQ-E1	Step not performed. Non-significant cutsets are reviewed to verify that the logic used in the PRA model was producing reasonable results and that the cutsets have physical meaning.	ADDRESSED: Section 5.2.3 and 5.3.3 of the Fire PRA Quantification Report was updated to document the review of non-significant cutsets.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	example: • The bottom 5 non-significant cutsets from 5% of the significant fire scenarios; • Five non-significant cutsets from 5% of the non-significant fire scenarios. (This F&O originated from SR QU-D5)			
5-6	No documentation is provided of a review of basic event importance. Such a review examines the following: a) examine symmetry and asymmetry between redundant components and system trains and document reasonableness; b) assess basic event importances relative to each other in light of the FPRA modeling to ensure that the relative importance is logical. For example, do very large RAW or RRW values make sense? Conversely, are small RAW/RRW values reasonable? c) are the relative importances of systems sensible? d) are the relative importances of operator actions sensible? e) do common cause failures and dependent operator errors appear among the important events? (This F&O originated from SR QU-D7)	FQ-E1	Step not performed Document a review of basic event importance measures.	ADDRESSED: Section 5.5 of the Fire PRA Quantification Report was updated to document the review of basic events.
5-9	The DAEC Fire PRA assigns an ignition frequency, greater than zero to every plant physical analysis unit, with the exception of PAUs 02L, 02M and 09B. The Standard requires a non-zero ignition frequency for all plant analysis units that have not been qualitatively screened. (This F&O originated from SR IGN-A8)	IGN-A8	Requirement not met Qualitatively screen PAUs 02L, 02M and 09B or develop fire ignition frequencies for them.	ADDRESSED: The Fire PRA is updated to include a fire ignition frequency for all PAUs. (see also F&O 1-4)
5-10	The FPRA Fire Scenario Development	SF-A5	Step not performed	ADDRESSED:

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	Report 493080001.003, Appendix D doesn't address the specific requirements of SR SF-A5, which are to: 1) review plant fire brigade training procedures to assess the extent to which training has prepared firefighting personnel to respond; 2) review the storage and placement of firefighting support equipment and fire brigade access routes; and 3) assess the potential that an earthquake might compromise one or more of these features. Questions to consider are a) does fire brigade training include seismic considerations and are procedures adequate; b) what are the expected access routes and how could ground movement impact these; c) is support equipment stored in manners that minimize the risk of disablement or loss due to a seismic event; d) assess the potential impact of a seismic event on manual firefighting. (This F&O originated from SR SF-A5)		Review plant fire brigade training procedures, storage and placement of firefighting support equipment, fire brigade access routes and assess the potential that an earthquake might compromise one or more of these features.	Section D.2.5 was added to the Fire Scenario Report, 493080001.03 Rev. 2, to document the review of plant fire brigade training procedures, storage and placement of firefighting equipment, and access routes for the potential that an earthquake might compromise these features. Area Fire Plans (AFPs) provide guidance to the fire brigade for the location of firefighting equipment, access and egress routes, staging areas, and any additional special precautions to be taken in an area. Therefore, while an earthquake may compromise an access route or set of equipment, the AFPs provide the brigade with the necessary information for alternate strategies.
5-11	The FPRA Fire Scenario Development Report 493080001.003, Appendix D does not review plant seismic response procedures to qualitatively the potential that a seismically induced fire, or the spurious operation of fire suppression systems, might compromise post-earthquake plant response. The following considerations are recommended: a) review plant earthquake response procedures and identify key components and systems credited for safe shutdown; b) identify any recovery actions required to support post earthquake safe	SF-A4	Step not performed Review plant seismic response procedures to qualitatively the potential that a seismically induced fire, or the spurious operation of fire suppression systems, might compromise post-earthquake plant response.	ADDRESSED: Section D.2.5 was added to the Fire Scenario Report, 493080001.03 Rev. 2, to document the review of plant seismic response procedures and the potential for a seismically induced fire to compromise post-earthquake plant response.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	shutdown; c) identify fire compartments where local manual control or repair actions may be needed in response to an earthquake; d) identify access paths within the plant required to support safe personnel passage and/or safe access following an earthquake. (This F&O originated from SR SF-A4)			
5-15	Section 5.2 of the quantification report discusses the LERF results. No review of the reasonableness of LERF contributors is documented. (This F&O originated from SR LE-F2)	FQ-E1	Step not performed Review and document the reasonableness of LERF contributors	ADDRESSED: Section 5.3 of the Fire PRA Quantification Report was updated to document the review of reasonableness of LERF contributors.
5-16	The sources of LERF model uncertainty and related assumptions have not been identified or documented. (This F&O originated from SR LE-F3)	FQ-E1	Step not performed. Identify and document the sources of LERF model uncertainty and related assumptions.	ADDRESSED: The quantification and summary report is updated to document the sources of LERF model uncertainty and assumptions. The Fire PRA used the FPIE PRA LERF model. The FPIE PRA Level 2 Report, DAEC-PSA-L2-15, and Summary Report, DAEC-PSA-QU-14, documents assumptions and model uncertainty of Level 2 model.
5-17	The FPRA Fire Risk Quantification and Summary report 493080001.004, section 5.1 documents CDF and LERF results, but does not provide detailed descriptions of all significant accident sequences or functional failure groups. See the standard definition for significant accident sequence: "For this version of the Standard,3 the summed percentage is 95% and the individual percentage is 1% of the applicable hazard group." (This F&O originated from SR QU-F3)	FQ-F1	Step not completely performed Provide detailed descriptions of all significant accident sequences or functional failure groups	ADDRESSED: Section 5.2 and 5.3 of the Quantification Report, 493080001.04, was updated to document significant accident sequences.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
5-18	Sources of model uncertainty and related assumptions are documented in Appendix E of the FPRA Fire Risk Quantification and Summary report 493080001.004. the identification is limited to one area of uncertainty per task, which is minimal. See NUREG/CR-6850 for one possible approach. (This F&O originated from SR QU-F4)	FQ-F1	Task incomplete Document sources of model uncertainty and related assumptions for the FPRA development tasks.	ADDRESSED: Section 1.3 was added to the Plant Partitioning Report, Fire Model Development Report, and Fire Scenario Report to document sources of model uncertainty and related assumptions.
5-19	The FPRA Fire Risk Quantification and Summary report 493080001.004 provides no documentation for significant basic event, significant cutset, and significant accident sequence. For LERF: The quantitative definition used for significant accident progression sequence is not documented. (This F&O originated from SR QU-F6)	FQ-F1	Step not performed For CDF, document definitions for significant basic event, significant cutset, and significant accident sequence; for LERF, document the quantitative definition used for significant accident progression sequence is not documented.	ADDRESSED: Section 5.2 and 5.3 of the Quantification Report, 493080001.04, was updated to document significant cutsets and accident sequences.
5-20	Lack of coordination issues are noted in the breaker coordination calculations but in some cases the resolutions for these issues are not documented. For example, CAL-E08-006 notes a coordination issue for 480V breaker 52-106, but no resolution is provided. CAL-E08-007 notes coordination issues for breakers 1D40, 1D41, 1D42 and notes that a corrective action will be written for these issues, as well as all other coordination issues. However, it is not clear when this corrective action will take place, in what manner, and also it is uncertain how the FPRA model addresses the issues (does the model reflect the current as-built as-operated plant? (This F&O originated from SR CS-B1)	CS-B1	Ambiguity about how coordination issues have been addressed. Document the resolutions for all coordination issues. Ensure the FPRA model reflects the as-built, as-operated plant.	ADDRESSED: Section 4.4 of the Fire PRA Model Development Report, 493080001.02, was updated to document the breaker coordination analysis. For the specific cases listed in F&O 5-20 regarding the lack of coordination for 480V breaker 52-106 and 250 VDC distribution panel 1D40 and Motor Control Centers 1D41 and 1D42, the branch circuit cables are associated with the upstream power supply as CPS cables up to the point coordination is achieved. Therefore, the NSCA and Fire PRA reflect the as-built as-operated plant.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
5-21	It is not clear from the calculations whether breaker coordination evaluations have been performed for all credited FPRA equipment / loads (e.g., well water components). Discussion with the FPRA team indicated at least one power bus - 1B33 - that has not received an overcurrent coordination and protection analysis. (This F&O originated from SR CS-B1)	CS-B1	Analysis incomplete Ensure that electrical coordination is performed for all loads modeled in the FPRA, and provide clearer documentation to demonstrate this.	ADDRESSED: Section 4.4 of the Fire PRA Model Development Report, 493080001.02, was updated to document the breaker coordination treatment for Fire PRA credited equipment. For those power supplies that are not fully coordinated and have uncoordinated branch circuits that route outside the same fire area as the power supply, the branch circuit cables are associated in the NFPA 805 database as Common Power Supply (CPS) cables with the NSCA or Fire PRA power supplies up to the point where coordination is demonstrated. For the specific case listed in F&O 5-21 regarding discussion with Fire PRA team that 1B33 has not received an overcurrent coordination and protection analysis. 1B33 has been included in the scope of Fire PRA equipment in the NFPA 805 database and coordination capability provided in CAL-E08-006 evaluated and shown to demonstrate that 1B33 is fully coordinated.
5-22	Documentation is not provided in all cases to confirm satisfactory electrical overcurrent protection for common enclosure issues. For example, the evaluation of 4KV and 480V electrical coordination in CAL-E08-006 Revision 0 doesn't document consideration of overcurrent protection for common enclosure issues. (This F&O originated from SR CS-B1)	CS-B1	Step not performed. Ensure satisfactory electrical overcurrent protection for common enclosure issues is evaluated for all FPRA-related equipment.	ADDRESSED: Section 4.4 of the Fire PRA Model Development Report, 493080001.02, was updated to document that DAEC meets the guidance of NEI 00-01, Revision 1 and NUREG/CR-6850 for common enclosure concerns.
5-23	The FPRA Model Development report	CS-C4	Insufficient documentation to support	ADDRESSED:

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	493080001.002 Section 4.4 provides only limited documentation (two sentences) on the topic of electrical distribution system overcurrent coordination and protection analysis. (This F&O originated from SR CS-C4)		FPRA review and applications. Provide full documentation of the evaluation of electrical distribution system overcurrent coordination and protection. Section 3.5.4 of NUREG/CR-6850 provides the recommended steps and considerations.	Section 4.4 of the Fire PRA Model Development Report, 493080001.02, was updated to document the overcurrent coordination and protection analysis.
5-26	The human activity transient influence factors selected for DAEC, as documented Table 4.3-3 FPRA Plant Partitioning and Fire Ignition Frequency Development report 493080001.001, in some instances did not appear to be reasonable based on review. For example, compartment 03D ignition source counts show 15 electrical cabinets, 6 pumps, 2 mg sets, 2 vent systems, which is a significant amount of equipment, and yet influence factors are relatively low: hot work 1, mech / elec is a 3, occupancy is a 1, storage is a 3. For compartment 07E, ignition source counting shows 12 electrical cabinets and 16 pumps, however, influence factors again are low: hotwork is a 1, mech / elec is a 3, storage is a 3. There are numerous examples in Table 4.3-3 where the application of a ranking of 0 or 1 is not consistent with NUREG/CR-6850. For example, a ranking of 1 for hot work would be in areas where administrative procedures prohibit hot work at power (page 6-22). Additional guidance provided in Table 6-3 of 6850 is not consistent with the application at DAEC. Additionally, the values appear to be skewed to have a majority of areas ranked as 1 or 0 and do not appear to be reasonable. (This F&O originated from SR IGN-A7)	IGN-A7	Potential unrealistic assignment of transient influence factors; example battery room hallway (area 10A) has the same storage influence factor as the battery rooms (10B, 10C and 10D). Re-examine the assigned human activity transient influence factors. Consider reviewing maintenance records, storage and work orders to check reasonableness of influence factors assigned by the expert panel.	ADDRESSED: Appendix B of the FIF report, 493080001.001, provides the results of the DAEC expert panel. Section 1.3.3 identifies the results of the expert panel as an uncertainty in the Fire PRA. The transient influence factors are used to apportion the generic fire ignition frequency. As such, the method to calculate the transient fire ignition frequency as documented in Section 4.3 of the report considers the influence factors in a particular PAU vs the plant location. Therefore, as long as the expert panel assigned influence factors consistently throughout the site then the calculated factors would not be substantially different no matter what is considered low, average, or high. A review of the DAEC review indicates the expert panel consistently applied influence factors. The Transient fire scenarios are approximately 1% of the total fire risk. Therefore, changes in the influence factors would have a negligible impact on the Fire PRA.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
5-27	Although the FPRA documentation indicates that operator interviews were conducted, no documentation of these interviews was found and relatively few fire-specific insights from operators were incorporated into the HRA. Talk throughs or reviews with plant operations are needed to confirm the interpretation of the procedures relevant the human failure events modeled in the FPRA. These interactions with operations helps to confirm that the HRA is consistent with plant operational and training practices. (This F&O originated from SR HRA-A4)	HRA-A4	Lack of sufficient input from operations regarding procedures and sequence of events to confirm that interpretation of the procedures is consistent with plant observations and training procedures. For each HFE modeled in the FPRA, review with operations the procedures selected to be relevant to the actions, the cues timing, performance shaping factors and the selected stress levels. Adjust the HRA, as applicable, based on operator comment / responses.	ADDRESSED: The Fire PRA documentation is updated to include documentation of the operator interviews in Appendix E of the Fire Scenario Report, 493080001.03.
5-29	A 0.01 factor was applied to the hot work fire ignition frequency (Table 5-1 and Section 5.1.5.1 of the FPRA Plant Partitioning and Fire Ignition Frequency Development report 493080001.001) for failure to protect the target given procedural non-compliance. This approach represents an extra layer of adjustment however, since the ignition frequency already reflects a population of plants, most of which likely have procedural controls for hot work. A review was performed of the ERIN Engineering report supporting this 0.01 adjustment as well as other transient fire severity factors described in Appendix C. This includes: a) 'Control/Aux/RB', b) 'Turbine Bldg' c) plant-wide' transient fires. The basis for these factors include a review of a small number of fires that do not substantiate a 1E-02 factor. For example, for cable fires caused by welding, 12 TB fire events were reviewed in the last 20 years. Some of these events do not appear to have sufficient	IGN-A7	Non-conservative treatment. Risk significance is unknown. Application of the 0.01 for procedural non-compliance applied to the hot work fire ignition frequency is judged to not be appropriate. This approach represents an extra layer of adjustment that is, in theory, already reflected in the hot work ignition frequency. An industry independent review of the Severity Factors in the ERIN supplemental report is needed.	ADDRESSED: The 0.01 factor was removed from all the hot work fire ignition frequency for all scenarios except the bounding Cable Spreading Room scenario, 11A-A01. The factor is considered appropriate for the Cable Spreading Room given the sensitive nature of the room. Section 6 of the Overview Report, 493080001.00 documents the revised treatment.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	description to determine the extent of the fire. Additionally, if none of the fires caused cable damage, a more appropriate value would have been to use a Jeffrey's non-informative prior, or a failure rate of 1 in 24, at best. However, events where it cannot be determined if cable fire occurred should be excluded from such a calculation. (This F&O originated from SR IGN-A7)			
5-30	No simulator observations or talk-throughs with operators have been performed to confirm the response models for fire scenarios modeled. This step involves reviewing scenarios / cutsets modeled in the FPRA to ensure they are reasonable from an operations perspective, including the modeling of human failure events modeled in those scenarios. (This F&O originated from SR HR-E4)	HRA-A4	Step not performed. Use simulator observations or talk-throughs with operators have been performed to confirm the response models for fire scenarios modeled.	ADDRESSED: The Fire PRA documentation is updated to include documentation of the operator interviews in Appendix E of the Fire Scenario Report, 493080001.03.
5-31	No documentation is provided of a review of alarm response procedures to identify undesired actions that could result from spurious indications. Operator interview responses are indicated as the basis for identifying no actions. However, no documentation of these interviews was provided. An additional basis was presented that the AOP-913 fire procedure directs operators to cues that can be trusted for a given fire. However, AOP-913 merely lists the available Appendix R-related instrumentation / indications, and does not address alarm response procedures The ARPs to review are any ARPs which involve equipment or systems modeled in the Fire PRA. Conclusions reached from	HRA-A3	Review not performed of alarm response procedures Perform a review of alarm response procedures to identify undesired actions that could result from spurious indications.	ADDRESSED: A systematic review of ARPs was performed to identify any instrumentation impacts associated with operator actions. Appendix H was added to the Fire Model Development Report, 493080001.02.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	this review should ideally be confirmed with operations to be reasonable. (This F&O originated from SR HRA-A3)			
5-32	The HRA utilizes a combination CBDTM+ASEP for cognitive errors and THERP for execution errors. These approaches address performance shaping factors for each HEP modeled. However, consideration of performance shaping factors (PSFs) at the scenario level have not been taken into account. (This F&O originated from SR HR-G3)	HRA-C1	Evaluation not complete. Address PSFs at the scenario level and model scenario-specific HFEs where applicable.	ADDRESSED: Section E.4 of the Fire Scenario Report, 493080001.03, is updated to discuss PSFs. The FPIE HRA is based on the sequence level and the timing related to those in which the methodology uses conservative PSF as sequences are grouped together. The Fire PRA utilizes the FPIE HRA as a basis. For the Fire PRA: The PSFs in the main control room are not expected to change for ex-CR fires, so scenario-specific PSF assessments would only be applied for actions that are executed from outside of the main control room. While scenario-specific HFEs were not developed for DAEC, bounding case PSF assessments were applied to all ex-CR executed actions using the following approaches: Access: If the fire prevented access to the execution location, the action was not credited. For all remaining fire locations, a ten minute access delay, considered to be representative the bounding case, was assigned for all ex-CR executed actions. The decrease in the time available for recovery resulted in an increase in the ASEP value for short term actions (defined as having less than one hour available for recovery) and a potential loss of certain CBDTM recovery factors. These modifications increase the cognitive execution error and in several cases, resulted in a loss of credit for the

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
				action within the FPRA. Execution Stress: In the EPRI HRA Calculator, the quantitative impact for negative PSFs is applied through the use of execution stress factors. For credited ex-CR executed actions within the DAEC FPRA, all execution stress factors were increased from their base values as given in the FPIE HEP assessment unless the time available was extensive and the fire was considered to be out and thus not continuing to cause late-scenario complicating disturbances. For example, DHPCI-CNOPOPENDRHE-- had an original FPIE execution stress of high (x5) which was increased to "fire stress" (x10) because it has a relatively short time line and the FPIE HFE evaluation had already assigned negative PSFs because of a hot environment and emergency lighting. For further details, see the HEP consistency table submitted after the peer review.
5-34	No review for consistency of the FPRA HEP quantifications has been documented. (This F&O originated from SR HR-G6)	HRA-C1	Step not performed. Review the FPRA HEP quantifications for consistency and document the observations.	ADDRESSED: Table E-5 was added to the Fire Scenario report, 493080001.03, to document HEP consistency review.
5-36	Sources of model uncertainty and related assumptions have not been identified for the HRA. (This F&O originated from SR HR-I3)	HRA-E1	Specific sources of model uncertainty and related assumptions have not been identified for the HRA. Review the HRA and identify specific areas of uncertainty associated with the development of human failure events and human error probabilities.	ADDRESSED: Section 1.3.3 of the Fire Scenario Report, 493080001.03, was added to document the sources of uncertainty and assumptions for the HRA.
5-37	The availability / degree of clarity of cues for some modeled HFEs cannot be confirmed. For example, for DCNDSTCNOP02----HE-- the identified	HRA-B3	Cues identified for particular HFEs are not adequate and/or not demonstrated to be available for fire scenarios. Identify adequate cues for all HFEs and	ADDRESSED: Table 3.3-1 was added to the Fire Model Development Report, 493080001.02,

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	cue is the Hotwell Level Low alarm, which is not on the SSEL. The HEP development indicates that the isolation of the MSIVs would be the likely cue and poor cue clarity is noted, and yet the HEP development does not reflect this poor quality. Specifically, the human error probability contribution for "Availability of Information" is assigned to be negligible (0); the "Warning of Differences" error contribution is assigned to be very low (3E-3), whereas the CBDTM decision tree for this contribution would more reasonably be 1E-1. Other examples where availability / degree of clarity of cues for some modeled HFEs cannot be confirmed and no corresponding affect on the HEP is addressed are as follows: DCBHV-NNOPDORFANHE-- This action credits local operator rounds as a cue for high switchgear room temperature, rather than chiller trouble and switchgear room temp indication. Formal heat-up calculations are not cited, but are needed, however, to justify use of operator rounds as a cue for this action. Localized overheating in areas of the room may result and damage equipment and may not be detected by rounds; DSYSTMNNOPRESTRTHE-- This action is applied to the manual starting of RBCCW and GSW pumps if they don't start automatically as part of DG load sequencing. No clear cue is stated, other than RPV level. It is not clear how RPV level provides an adequate cue. Equipment cooling to prevent damage is a concern. Operator interview		ensure availability of the cues for the scenario in question, or set the HEP to be failed (1.0).	identifying the credited instrument for cue for each operator action. These were also included in the HRAC.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	recommended to discuss the specifics for restarting equipment following loop given fire, with potentially degraded indications / alarms. DHPCI-CNOPOPENDRHE-- Cue is not satisfactory. EDG trouble alarm may come only after damage due to room over-temperature is unavoidable. Also, Trouble Alarm instrumentation is not on the FPRA equipment list. D250DCENOPCB4023HE-- Credited cue is loss of DC on indicating lights would occur only when battery is depleted, which alters the HFE timing profile. Cue is not satisfactory. Need operator input to determine what the timeline actually would be. (This F&O originated from SR HRA-B3)			
5-38	Additional considerations required for operator timelines. Here are two examples: a) 10 minutes is assumed for time delay needed to address actions in the fire procedure AOP-913. The This estimate was based on queries with operators, but no documentation of this interview was provided. Also this 10 minutes was applied to time delay, where as it is generally more appropriate, probably, to apply whatever time is needed for AOP-913 to the median response time. b) for D250DCENOPCB4023HE--, the cue defined for FPRA is when the battery has depleted (charger trouble alarm is not on the SSEL and not credited). However, the system time window modeled for the action is the full four-hour battery life, which is not correct. The four hours is more appropriately apply to the time delay. The 10 minutes for AOP-	HRA-B3	In some cases, the operator timelines do not consider actual plant responses, or conditions applicable to fire scenarios. Potential non-conservatism. Review the operator timelines in the HRA calculator. Ensure the timelines realistically reflect the actual fire scenarios being modeled and any applicable thermal hydraulic analyses.	ADDRESSED: Section E.4 was added to the HRA documentation in the Fire Scenario Report, 493080001.03, to provide basis for scenario specific fire impacts. Section E.5 was added to discuss operator interviews. In addition, each action in the HRAC was reviewed for available cue and fire impacts on PSFs.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	913 are not applicable to the timeline. The system time window needs to be the 4 hour battery life plus whatever time is found to be available to perform this action, given that the battery is depleted, before the undesired consequence applicable for this action occurs. (This F&O originated from SR HRA-B3)			
5-39	The dependency levels for recovery of cognitive errors in the CBDTM methodology have not been assigned. This is non-conservative. For example, for DSYSTM-NOP-302-1HE-- , the minimum level of dependence recommended by the calculator is medium. However, a "N/A" is assigned, which is equivalent to zero dependence (non-conservative). (This F&O originated from SR HRA-B3)	HRA-B3	Non-conservative assessment of dependency levels for the cognitive recovered portion of the CBDTM methodology. Assess the appropriate level of dependence for the cognitive recovered portion of the CBDTM methodology, assigning dependence levels no lower than the minimum recommended by the Calculator.	ADDRESSED: The Fire PRA dependency analysis was reanalyzed for appropriateness. Section E.2.5 of the Fire Scenario Report, 493080001.03, was updated to document the review.
5-41	The nominal or lower bound cognitive error probabilities are selected in many instances when the ASEP methodology is applied. Given the occurrence of fire, the nominal or lower bound probabilities may not be appropriate. The upper bound may be more appropriate. (This F&O originated from SR HRA-C1)	HRA-C1	Needed to ensure realistic error probabilities are applied. Review the selected probabilities and ensure the applicable values are applied.	ADDRESSED: The Fire PRA HRA analysis was reanalyzed for appropriateness and Appendix E of the Fire Scenario Report, 493080001.03, was updated as applicable.
5-42	Recoveries for execution errors are assigned dependence levels that are lower than the dependence levels recommended by the HRA calculator, based on event timing. This can produce nonconservative results. For example, for DN2---ANOPGRP3BYHE--, the dependence level recommended by the Calculator for execution error recoveries is high dependence, but medium dependence was assigned by the analyst. For DSYSTMNNOPRESTRTHE-	HRA-C1	Nonconservative HEPs Review the dependence levels selected for recovery of execution errors. Assign dependence levels no lower than the values recommended by the Calculator.	ADDRESSED: The Fire PRA dependency analysis was reanalyzed for appropriateness. Section E.2.5 of the Fire Scenario Report, 493080001.03, was updated to document the review.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	- the dependence level recommended by the Calculator for execution error recoveries is high dependence but the dependency level assigned by the analyst is low. (This F&O originated from SR HRA-C1)			
5-43	The FPRA Fire Scenario Development Report 493080001.003, Section 4, documents the circuit failure analysis, but the following are not provided: a) methodology to identify which hot short failures receive a circuit failure analysis and results of the identification process; b) listing of hot short failures which didn't receive a circuit failure analysis and basis for not doing so; c) justification for use of option #1 of the NUREG/CR-6850 circuit failure methodology (which is appropriate for grounded circuits); d) basis for not using option #2 (which is appropriate for ungrounded circuits); e) a description of how each circuit failure probability is calculated. (This F&O originated from SR CF-B1)	CF-B1	Insufficient documentation detail. Provide documentation detail as noted.	ADDRESSED: Section 3 and 4 of the Fire Scenario Report, 493080001.03, were updated to reference the FHA-500 methodology, the Compliance Assessment summaries used as input, basis for using Option #1, and description of how each probability is calculated. NUREG/CR-6850, Section 10.5.3, recommends Option #1 given that it can be applied quickly, consistently, and tends to be conservative to Option #2.
5-44	The quantification documentation does not provide the following: (a) records of the process/results when adding non-recovery terms as part of the final quantification (b) records of the cutset review process (g) equipment or human actions that are the key factors in causing the accidents to be nondominant (l) asymmetries in quantitative modeling to provide application users the necessary understanding of the reasons such asymmetries are present in the model (This F&O originated from SR QU-F2)	FQ-F1	Documentation incomplete Expand the quantification documentation to include the elements indicated by this SR.	ADDRESSED: The identified items are addressed as follows: (a) Recovery of fire induced offsite power was not credited as discussed in Section 8 of the Fire Model Development Report, 493080001.02. Section 5.5 of the Fire PRA Quantification Report, 493080001.04, discusses basic event importance measures and the significance of this assumption. (b) Section 5.2.3 and 5.3.3 of the Fire PRA Quantification Report, 493080001.01, documents the cutset

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
				review process. (g) Section 7 of the Fire PRA Quantification Report, 493080001.01, discusses the sufficient divisional separation at DAEC and the large contribution from fire induced LOOP sequences. As such, the review in Section 5.2.3 and 5.3.3 that identifies that the bottom cutsets are characterized by maintenance unavailability and random failures is reasonable. (l) Sections 5.2.6 and 5.3.6 discuss the significant scenarios. Section 5.4 of the Fire PRA Quantification Report, 493080001.04, was added to discuss high consequence scenarios. These discussions provide the detail that identifies the reason for any asymmetries in the model.
5-45	The FPRA LERF model is based on the FPIE LERF model. The FPRA Fire Risk Quantification and Summary report 493080001.004 did not include fire-related considerations for the following: (c) the containment failure modes, phenomena, equipment failures, and human actions considered in the development of the accident progression sequences and the justification for their inclusion or exclusion from the accident progression analysis (d) the treatment of factors influencing containment challenges and containment capability, as appropriate for the level of detail of the analysis (g) the basis for parameter estimates (This F&O originated from SR LE-G2)	FQ-F1	Incomplete documentation. Provide fire-related considerations for the LERF model as indicated by this SR.	ADDRESSED: As stated in the finding and identified in Section 6.5 of the Fire Model Development Report, 493080001.02, the Fire PRA used the FPIE PRA LERF model. Section 6.5 of the report was updated to discuss a review of the LERF model and the conclusion that no additional changes were required for the Fire PRA beyond fire impacts on containment isolation valves. The FPIE PRA Level 2 Report, DAEC-PSA-L2-15, documents the treatment of factors influencing containment challenges and the parameter estimate basis.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
5-46	The PRA documentation does not identify limitations in the LERF analysis that would impact applications. (This F&O originated from SR LE-G5)	FQ-F1	Step not performed. Identify limitations in the LERF analysis that would impact applications.	ADDRESSED: The Fire PRA used the FPIE PRA LERF model. The FPIE PRA Summary Report, DAEC-PSA-QU-14, Section 3.4, documents limitations of the Level 2 model. Section 7 of the Fire PRA Quantification Report, 493080001.04, was updated to discuss limitations of the estimated LERF,
6-2	The Switchyard is excluded from the Global Analysis Boundary. Table 2.1-1 note states that it is bounded by the loss of off site power, however the document does not include an explanation on how this "bounding" conclusion was reached. At this point in the analysis, without knowing the ignition frequency, the bounding analysis does not appear to be substantiated. Also, the CCDP/CLERP for a fire event may be higher than a similar event caused by a random LOP, especially given no credit to recovery offsite power following a fire. (This F&O originated from SR PP-A1)	PP-A1	PP-A1 requires to "include within the global analysis boundary all fire areas...". The switchyard may be an initiator, but it maybe a mitigating function as well. If a fire is postulated in the switchyard a offsite power recovery probability is needed to understand the consequence. Given LOOP is the largest CDF/LERF contributor to the internal events, this may be significant. Include the switchyard into the Global Analysis Boundary. Develop ignition frequencies for this area, prior to treating with subsequent screening steps.	ADDRESSED: Section 1.3 was updated to remove screening criteria related to areas that may be bounded by an internal events initiator. The switchyard was added to Table 2.2-1 and a FIF was developed as documented in Table 5.1-1.
6-3	Section 2.2 of Report 0493080001.001 R0 states 'Spatial separation was not directly considered as a boundary during the fire scenario development'. This indicates that spatial separation was used and it is not clear how it was directly or indirectly used. The report does not explain the extent of use spatial separation and no justifications are provided. (This F&O originated from SR PP-B3)	PP-B3	PP-B3 requires not to credit spatial separation as a partitioning feature (CCI). CCII requires that if a spatial separation is credit, a justification needs to be provided. Identify all spatial separations used (directly or indirectly) and provided justification for their use.	ADDRESSED: Section 2.2 of the Plant Partitioning and FIF Report, 493080001.01 was updated to describe that spatial separation was credited as a partitioning element and justified consistent with the criteria in NUREG/CR-6850 consistent with SR PP-B3.

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
6-4	Section 2.2 of report 0493080001.001 states 'there were many PAUs that have partitioning elements that are not rated fire barriers....'. This does not meet CCI. However, it does not meet CCII/III either the report lacks the justification required by CCII/IIII. (This F&O originated from SR PP-B2)	PP-B2	There no evidence of justification for crediting un-rated fire barriers. Identify all not rated fire barriers that were credited and provide proper justification.	ADDRESSED: Section 2.2 of the Plant Partitioning and FIF Report, 493080001.01 was updated to describe the NUREG/CR-6850 criteria applied in justifying the use of the partitioning elements lacking fire resistance rating.
6-5	Section 2.2 of report 0493080001.001 states 'Active fire barrier elements (e.g., fire dampers) for several PAUs were credited in the individual fire scenario tasks.....'. This does not meet CCI. However, it does not meet CCII/III either the report lacks defining and justification required by CCII/IIII. (This F&O originated from SR PP-B5)	PP-B5	Active fire barriers credited in the FPRA need to be identified and justification for their credit provided to ensure proper configuration control of these credited barriers. identify all credited active fire barriers and provide technical justification for the crediting.	ADDRESSED: Section 2.2 of the Plant Partitioning and FIF Report, 493080001.01 was updated to reflect that active fire barriers were credited consistent with the SR based on NUREG/CR-6850 criteria.
6-6	No evidence exists that a confirmatory walkdown was performed. (This F&O originated from SR PP-B7)	PP-B7	Review of report 0493080001.001 R0 provided no evidence that a confirmatory walkdown was performed in support of the plant partitioning task, specifically. Perform a confirmatory walk down and provide documentation.	ADDRESSED: Section 2.2 of the Plant Partitioning and FIF Report, 493080001.01 was updated to document that a confirmatory walkdown was performed during fire scenario analysis.
6-7	Report 0493080001.002 contains comprehensive and detailed description of the process used in the development of the Fire PRA PRM However; Revision 6 of the model is used. This revision has not been peer reviewed as required by the note associated with this SR that states: 'If the available analysis has not been assessed against Section 2 (of ASME Code), then the Fire PRA faces an additional burden to demonstrate that the entire Fire PRA plant response model meets the applicable requirements of Section 2'.	PRM-B1	Peer review of the base model is required in order for it to be used. Perform Peer Review of revision 6 of the model.	ADDRESSED: The Internal Events Peer Review was originally performed in June 2007. This peer review identified 57 "Not Met" supporting requirements and 17 that did not meet capability category II, with a total of 66 findings. The internal events model used to develop the Fire PRA reflects the latest disposition of these findings as of January 2011. To verify the quality of the updated internal events model used in the Fire PRA, a Focused PRA Peer Review was

Table V-3
DISPOSITION OF 2010 DAEC FIRE PRA PEER REVIEW ASSESSMENTS: 'FINDING' F&Os

Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
	See note 1 on PRM-B1 on discussion of meeting Section 2 of the Standard. (This F&O originated from SR PRM-B1)			conducted in March 2011. This DAEC Focused PRA Peer Review assessed all previous 2007 full-scope peer review findings and suggestions, including the adequacy of their dispositions. This review identified 4 supporting requirements as "Not Met" and 3 as meeting Capability Category I (CC I). This latest peer review is effectively an assessment of the internal events model used to develop the Fire PRA and supersedes the previous peer review findings. These findings and associated dispositions as summarized in Attachment U.
6-8	No documented evidence exists to show that peer review finding disposition was performed for FPRA affect. (This F&O originated from SR PRM-B2)	PRM-B2	Discussions with PRA group personal did not produce documented evidence that the review was performed. Discussions with PRA group personal did not produce documented evidence that the review was performed.	ADDRESSED: The Internal Events Peer Review was originally performed in June 2007. This peer review identified 57 "Not Met" supporting requirements and 17 that did not meet capability category II, with a total of 66 findings. The internal events model used to develop the Fire PRA reflects the latest disposition of these findings as of January 2011. To verify the quality of the updated internal events model used in the Fire PRA, a Focused PRA Peer Review was conducted in March 2011. This DAEC Focused PRA Peer Review assessed all previous 2007 full-scope peer review findings and suggestions, including the adequacy of their dispositions. This review identified 4 supporting requirements as "Not Met" and 3 as meeting Capability Category I (CC I). This latest peer review is effectively an

Table V-3
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Finding F&O	Discussion	Fire PRA SR	Basis and Recommendation	Disposition in Fire PRA Update
				assessment of the internal events model used to develop the Fire PRA and supersedes the previous peer review findings. These findings and associated dispositions as summarized in Attachment U.