



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

January 25, 2019

Mr. Mano Nazaar  
President, Nuclear Division  
and Chief Nuclear Officer  
700 Universe Blvd  
EX/JB  
Juno Beach, FL 33408

SUBJECT: TURKEY POINT NUCLEAR GENERATING UNITS 3 AND 4 - REPORT FOR  
THE ON-SITE REGULATORY AUDIT REGARDING THE SUBSEQUENT  
LICENSE RENEWAL APPLICATION REVIEW (EPID NO. L-2018-RNW-0002)

Dear Mr. Nazar:

By letters dated January 30, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18037A812), as supplemented, Florida Power & Light Company (FPL) submitted an application for subsequent license renewal of Renewed Facility Operating License Nos. DPR-31 and DPR-41 for the Turkey Point Nuclear Generating Unit Nos. 3 and 4 (Turkey Point) to the U.S. Nuclear Regulatory Commission (NRC) pursuant to Section 103 of the Atomic Energy Act of 1954, as amended, and part 54 of title 10 of the *Code of Federal Regulations*, "Requirements for renewal of operating licenses for nuclear power plants."

The staff of the U.S. Nuclear Regulatory Commission (NRC) completed an on-site regulatory audit from August 27-31, 2018, in accordance with the on-site regulatory audit plan (ADAMS Accession No. ML18232A576). The audit report is enclosed.

If you have any questions, please contact by Mr. Bill Rogers, the audit manager by telephone at 301-415-2945 or by e-mail at [Bill.Rogers@nrc.gov](mailto:Bill.Rogers@nrc.gov).

Sincerely,

**/RA Bill Roger for/**

Eric R. Oesterle, Branch Chief  
License Renewal Project Branch  
Division of Materials and License Renewal  
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosure:  
Audit Report

cc w/encl: Listserv

SUBJECT: TURKEY POINT NUCLEAR GENERATING UNITS 3 AND 4 - REPORT FOR  
THE ON-SITE REGULATORY AUDIT REGARDING THE SUBSEQUENT  
LICENSE RENEWAL APPLICATION REVIEW (EPID NO. L-2018-RNW-0002)  
DATED: JANUARY 25, 2019

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**ADAMS Accession No. ML18341A024**

OFFICE	PM:MRPB:DMLR	LA:MRPB:DMLR	BC:MRPB:DMLR
NAME	BRogers	SLent	EOesterle (BRoger for)
DATE	1/23/2019	12/27/2018	1/25/2019

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**Audit Report**

**On-Site Regulatory Audit**  
**Regarding the Turkey Point Nuclear**  
**Generating Units 3 and 4,**  
**Subsequent License Renewal Application**

**August 27 – 31, 2018**

**Division of Materials and License Renewal**  
**Office of Nuclear Reactor Regulation**  
**U.S. Nuclear Regulatory Commission**

Enclosure

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION, DIVISION OF MATERIALS AND LICENSE  
RENEWAL

Docket Nos: 50-250 and 50-251

License No: DPR-31 and DPR-41

Licensee: Florida Power & Light Company

Facility: Turkey Point Nuclear Generating Units 3 and 4

Location: Homestead, Florida

Dates: August 27-31, 2018

Reviewers: B. Rogers, Project Manager, DMLR  
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## **Report for the On-Site Regulatory Audit Regarding the Turkey Point Nuclear Generating Units 3 and 4, Subsequent License Renewal Application**

### **1. Introduction**

The U.S. Nuclear Regulatory Commission (NRC or the staff) conducted an in-office audit of Florida Power & Light Company's (FPL's or the applicant's) (1) methodology to identify the systems, structures and components (SSCs) to be included within the scope of license renewal and subject to an aging management review (AMR) (Scoping and Screening Portion), and (2) aging management programs (AMPs), AMR items, Time-Limited Aging Analyses (TLAA) and associated bases and documentation as applicable (AMP and TLAA Portion).

This regulatory audit is a follow-up from the in-office regulatory conducted between June 18 – July 13, 2018. The scope of this audit focuses on areas where the NRC staff needed to observe, walkdown, or verify site information in order to conclude the scoping and screening methodology audit, or AMP, AMR, and TLAA audit. The specific areas of focus during the audit are provided below:

- SLRA AMP B.2.2.3, Concrete Containment Tendon Prestress
- SLRA AMP B.2.3.9, Bolting Integrity
- SLRA AMP B.2.3.17, Outdoor and Large Atmospheric Metallic Storage Tanks
- SLRA AMP B.2.3.31, ASME Section XI, Subsection IWL
- SLRA AMP B.2.3.33, 10 CFR Part 50, Appendix J
- SLRA AMP B.2.3.35, Structures Monitoring
- SLRA AMP B.2.3.36, Water Control Structures
- SLRA TLAA Section 4.5, Concrete Containment Tendon Prestress
- SLRA TLAA Section 4.6, Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis
- Scoping and Screening of Non-Safety Systems with Potential for Spatial Interactions

### **2. Audit Activities**

The following sections discuss the areas reviewed by the staff.

**SLRA AMP B.2.2.3, Concrete Containment Unbonded Tendon Prestress; SLRA AMP B.2.3.31, American Society of Mechanical Engineers (ASME) Section XI, Subsection IWL; and SLRA TLAA 4.5, Concrete Containment Tendon Prestress**

Audit Activities. During its audit, the staff conducted walkdowns of areas external to the concrete containment structure. In addition, the staff interviewed the applicant's staff and reviewed the 20<sup>th</sup> through the 45<sup>th</sup> year of tendon and concrete containment surveillances, onsite documentation provided by the applicant, action reports (ARs), and other relevant documents identified in the table below.

The table below lists the documents that were reviewed by the staff and were found relevant to the audit.

### Relevant Documents Reviewed

Document	Title	Revision / Date
PTN [Turkey Point]/BFSC-00-2001	30 <sup>TH</sup> YEAR TENDON INSPECTION (TENDON Selection and Lift-Off Criteria)	Revision (R)0, 06/19/2000
PTN/PSC-01-TP-004-000	Precision Surveillance Corporation (PSC): TURKEY POINT NUCLEAR PLANT UNITS 3 & 4 30 <sup>TH</sup> YEAR CONTAINMENT TENDON SURVEILLANCE	Revision 0, 11/07/2001
PTN/PSC-TP-N981-500	PSC - 35 <sup>TH</sup> YEAR CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Scope of Work)	Revision 1, 04/16/2007
PTN/PSC-TP-N981-501	PSC - 35 <sup>TH</sup> YEAR CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Tendon Selection, Normalization, and Lift-Off Criteria)	Revision 1, 04/16/2007
PTN/PSC-TP-N981-502	PSC - 35 <sup>TH</sup> YEAR CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Technical Requirements)	Revision 1, 04/16/2007
PTN/PSC-TP-N981-504	PSC - 35 <sup>TH</sup> YEAR CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Engineering Evaluation)	Revision 0, 12/08/2006
PTN/PSC-TP-N981-508	PSC - 35 <sup>TH</sup> YEAR CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Final Report)	Revision 0, 05/25/2007
PTN/PSC-TP-N1075-501	PSC - 40 <sup>TH</sup> YEAR IWL CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Tendon Selection and Predicted Forces)	Revision 0, 11/14/2011
PTN/PSC-TP-N1075-502	PSC - 40 <sup>TH</sup> YEAR IWL CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Technical Requirements)	Revision 1, 02/16/2012
PTN/PSC-TP-N1130-502	PSC - 45 <sup>TH</sup> YEAR IWL CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Technical Requirements)	Revision 0, 08/10/2016
PTN/PSC-TP-N1130-505	PSC - 45 <sup>TH</sup> YEAR IWL CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Tendon Walkdown Results)	Revision 0, 08/10/2016

PTN/PSC-TP-N1130-506	PSC - 45 <sup>TH</sup> YEAR IWL CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Unit 4 FCR Predicted Forces Summary)	R0, 02/17/2017
REP-1130-300*	PSC – 45 <sup>TH</sup> YEAR IWL CONTAINMENT TENDON SURVEILLANCE AT TURKEY POINT (Comparative Analysis of Methods Used to calculate Predicted Forces)	R1, 03/02/2017
REP-1130-510*	PSC - 45 <sup>TH</sup> YR U3 & U4 TENDON SURVEILLANCE AT TURKEY POINT (Final Report)	R0, 06/27/2017
REP-1130-511*	PSC - 45 <sup>TH</sup> YR SURVEILLANCE AT TURKEY POINT (Regression Analysis)	R0, 06/27/2017
N1130_000	PSC – FPL TURKEY POINT NUCLEAR PLANT UNITS 3 & 4 45 <sup>TH</sup> YEAR CONTAINMENT BUILDING TENDON	R1, 08/10/2016
I2-ISI-IWL-PTN-3-4	SURVEILLANCE (Post Tensioning System ISI Manual) TURKEY POINT UNITS 3 AND 4 - ASME SECTION XI, SUBSECTION IWL, INTERVAL 2, CONCRETE CONTAINMENT ISI PROGRAM	R1, 05/18/2016
N/A	DOCUMENTED in R4 IN REQUEST 4 - LIST OF 45 <sup>TH</sup> YEAR TENDON ARs	N/A
C-SJ599-11	BECHTEL - TURKEY POINT UNITS 3 & 4 (Containment Structure Final Analysis Results for All Load Combinations)	R0, 12/14/1994
C-SJ539-05	BECHTEL - TURKEY POINT UNITS 3 & 4 (Evaluation of the 15 <sup>TH</sup> Year Tendon Surveillance Lift-Off Forces)	R0, 06/08/1992
C-SJ539-02	BECHTEL - TURKEY POINT UNIT 3 (Determination of Lift-Off Forces for 20 <sup>TH</sup> Year Tendon Surveillance)	R5, 02/01/1993
C-SJ539-09	BECHTEL - TURKEY POINT NUCLEAR PLANT UNITS 3 & 4 (Probable Cause for Low Lift Off Forces on Hoop Tendons)	R1, 01/16/1993
C-SJ561-01	BECHTEL - TURKEY POINT UNITS 3 & 4 (Determination of Lift-Off Forces for Unit 4 20 <sup>TH</sup> Year Tendon Surveillance)	R4, 12/08/1992

C-SJ561-03	BECHTEL - TURKEY POINT UNITS 3 & 4 (Evaluation of the Unit 4 20 <sup>TH</sup> Year Tendon Surveillance Low Lift-Off Forces)	R1, 01/16/1993
PTN-BFJC-95-029	25 <sup>TH</sup> YEAR TENDON SURVEILLANCE (Random Tendon Selection)	R1, 09/19/1996
PTN-BFJC-95-031	25 <sup>TH</sup> YEAR TENDON SURVEILLANCE (Predicted Lower and Upper Limits and Normalizing Factors)	R0, 08/30/1996
AR 1920613	Issues Replacing Anodes, Containment Cathodic Protection	11/14/2013
AR 2216534	Containment Cathodic Protection System Non-Functional	07/24/2017
ML172277A837	Turkey Point Nuclear Generating Station – NRC Design Basis Assurance Inspection (Team) Report	10/02/2017
Turkey Point Units 3 and 4 Updated FSAR	Chapter 5, “Structures” and 8 Chapter 8, “Electrical Systems”	R 29
AR 2184466	U3 Loss of Tendon Grease Exceeds 10% of Volume	02/08/2017
AR 1679310	Leakage from Tendon Ends in U3/U4 Tendon Gallery	08/19/2011
AR 1959317	Unusual Stains – U3 NE Containment Building Tendon Caps	04/18/2014
AR 2184350	U3, Grease Leakage from tendon End Caps	02/08/2017
AR 1786466	U3 Containment Tendon (Leaking Oil)	07/21/2012
AR 2196366	U4, Containment Inspection Excessive Grease Leakage	04/04/2017

During the audit and review of the above documentation, the staff made the following observations and expressed concerns regarding corrosion of concrete containment tendons, tendon anchorages, and concrete containment reinforcing bars:

- Turkey Point currently uses grease as a corrosion protection medium for Turkey Point tendons. Staff review of Turkey Point operating experience (OE) and of PSC documents indicate that tendon end caps leaking grease is a reoccurring issue at Turkey Point. Documentation shows that at times replenished grease has been in excess of 10 percent of the total grease volume, which indicates that significant leakage is occurring (per the ASME Section XI, Subsection IWL Code).



It is not clear how tendons maintain a continuous corrosion protection medium and how the applicant's ASME Section XI, Subsection IWL AMP will manage grease volume and potential excessive leakage to ensure that grease maintains its function in preventing corrosion of containment tendons during the subsequent period of extended operation.

- Tendon anchorages have revealed signs of corrosion and inspected tendons have shown that water seepage has occurred inside tendons (as indicated, for example, in PTN-PSC-01-TP-004 and AR 1679310). Although tendons were covered with a grease residue some corrosion was found in areas originally filled with grease which is an indication that grease volume is insufficient to protect against corrosion. It is not clear whether the end caps provide adequate protection against water intrusion within the anchorage and tendon sheathing.
- Turkey Point has used in the past a cathodic protection system for corrosion protection of embedded containment steel components (e.g., rebars) and tendon anchorages. The cathodic protection system, however, has been inoperative since 2009 (as indicated in PTN AR 1920613) having achieved its end of life. During the audit, the applicant stated that the cathodic protection system and its effectiveness is being re-evaluated (as indicated in PTN AR 02216534) for potential reactivation. In SLRA Section 2.4, the applicant stated that the cathodic protection system is not in scope and thus not credited for corrosion protection. Since documentation that the staff reviewed indicates that the cathodic protection system was used to prevent corrosion of rebar and tendon components and the system has been "reviewed by Bechtel's Metallurgy and Quality Control Department" and "FPL's CSI (Component, Support & Inspections) corrosion specialists" for corrosion protection (as noted in the Updated Final Safety Analysis Report (UFSAR)) it is not clear how the applicant plans to manage corrosion for these components without its contribution, or, if measures were (are) taken to replace the function of the cathodic protection system.
- Below ground level, horizontal tendons and their anchorages are serviceable through access enclosures that are external to containment. These enclosures are accessible and are normally covered with metal plates. The staff noted during the audit that these enclosures have previously been filled with water; lack of drainage of the vaults has resulted in submergence of tendon anchorages that can lead to their corrosion. In discussions with the applicant during the onsite audit (and indicated in the SLRA), the staff noted that these areas are not within the scope of license renewal. Chronic or periodic submergence of tendon anchorages can cause accelerated aging effects to tendon components as well as to local concrete containment reinforcement. It is not clear how these areas will be effectively age managed to prevent loss of functionality of the local reinforcement and tendon anchorages.

During the audit and review of the above onsite documentation the staff made the following observations and expressed concerns regarding the identification and documentation of Unit 3 and Unit 4 prestressed concrete containments as twin containments and the methodology used to document tendon relaxation in the SLRA through the subsequent period of extended operation.

### SLRA AMP B.2.3.17 Outdoor and Large Atmospheric Metallic Storage Tanks

Audit Activities. During its audit, the staff conducted walkdowns of the condensate storage tanks (CST), primary water storage tanks (PWST), refueling water storage tanks (RWST), demineralized storage tank (DWST), Unit 3 and 4 diesel oil storage tanks (DOST) and the raw water tanks (RWT). In addition, the staff reviewed onsite documentation provided by the applicant.

The table below lists the documents that were reviewed by the staff and were found relevant to the audit.

**Relevant Documents Reviewed**

Document	Title	Revision / Date
5614-M-724	Emergency Diesel Generator Building Plan and Sections	Revision 0
5614-M-731	Emergency Diesel Generators 4A & 4B Piping Sections	Revision 0
5614-P-869	Diesel Oil System	Revision 3
5614-P-867	Diesel Oil System	Revision 2
5614-M-3022	Emergency Diesel Engine and Oil System EDG 4A Fuel System	Revision 7
5614-M-725	Emergency Diesel Generator 4A & 4B Piping Plans	Revision 0

The staff made the following observations during walkdowns:

- During the walkdown of all of the cited tanks, the tank to concrete interface joint appeared to be sealed with either an elastomeric compound or an unknown hard material. Except in minor degraded areas, the interface joint is coated. In addition, in some locations there was evidence of a white residue, potentially comprised of salt deposits.
- During the walkdown of the CSTs the staff noted that: (a) although the tank base to concrete interface is above ground elevation, there is an approximately ½- inch deep depressed area that could accumulate moisture around the entire circumference of each tank; (b) on both tanks there is an approximately 3-inch long area where what appears to be sealant material is missing; (c) in some areas there is a greenish substance appearing to be a mold, indicating the pervasive presence of moisture; (d) on the southeast side of the Unit 3 tank, there are locations of heavy corrosion at the base although absent indications of severe loss of material; (e) the Unit 4 tank exhibited some moderate corrosion at the tank base to concrete interface; and (f) some areas of the sealant material have an uneven application and are depressed, which will accumulate moisture.

- During the walkdown of the PWSTs the staff noted that: (a) there are some locations where the ground slopes towards the tank to concrete interface; (b) the tank to concrete interface is essentially at ground elevation; (c) two anchor bolts on the northeast side of the Unit 3 tank and two on the west side of the Unit 4 tank exhibited minor corrosion; and (d) some areas of the sealant are damaged.
- During the walkdown of the RWSTs the staff noted that: (a) there are some locations where the ground slopes towards the tank to concrete interface; (b) the tank to concrete interface is essentially at ground elevation including some areas where the area is covered with stone and some sediment; (c) there is sporadic light corrosion at the tank base; and (d) on the west side of both tanks, the sealant is damaged.
- During the walkdown of the DWSTs the staff noted that: (a) the tank to concrete interface is approximately 12-inches above grade; and (b) in the north-north east quadrant there are indications of minor corrosion at the base in sparse locations.
- During the walkdown of the Unit 3 DOST the staff noted that: (a) the tank to concrete interface is approximately 3-inches above grade; and (b) there are locations of heavy surface corrosion at the base (approximately 15 percent of the circumference). There was no evidence of significant loss of material in the locations of heavy surface corrosion.
- During the walkdown of the Unit 4 DOST the staff noted that the manway enclosures, tank sample connections, and flame arrestors that penetrate the roof of the tank are sealed with an elastomeric compound.
- During the walkdown of the RWTs the staff noted that: (a) the tank to concrete interface is approximately 3-inches above grade, although there were some locations where the joint was covered by ground elevation stones and light sediment; and (b) there were some locations where the base exhibited moderate corrosion.

The staff made the following observation during the audit:

- The staff reviewed the above cited relevant documents and in conjunction with the walkdown of the 4A DOST, verified that with the exception of the manway enclosures, tank sample connections, and flame arrestors (all located on the top of the tank), all of the penetrations into the 4A DOST tank are located inside the attached emergency diesel generator building.

### **SLRA AMP B.2.3.33 10 CFR Part 50, Appendix J**

Audit Activities. During its audit, the staff conducted discussions with the applicant's plant and fleet personnel regarding the implementation of 10 CFR Part 50, Appendix J testing. In addition, the staff reviewed onsite documentation provided by the applicant.

The table below lists the documents that were reviewed by the staff and were found relevant to the audit.

#### **RELEVANT DOCUMENTS REVIEWED**

<b>Document</b>	<b>Title</b>	<b>Revision / Date</b>
ER-AA-114	Appendix J Testing Program	Revision 2
Attachment 12	Integrated Leak Rate Test	03/31/2005
PT4-28, Periodic Testing	Turkey Point Nuclear Plant: Containment Leakage Rate Testing Types A, B and C (includes data from 4PT27 and 4PT28)	02/26/2015
PT3-28, Periodic Testing	Turkey Point Nuclear Plant: Containment Leakage Rate Testing Types A, B and C (includes data from 3PT27 and 3PT28)	02/23/2016

During the audit the staff made the following observations:

- The staff reviewed fleet procedure ER-AA-114 and noted that "Gray" areas discussed in Section 5.2, "Documentation Requirements" are to resolve ONLY technical questions of how the containment system leakage testing will be performed.
- When Type B and Type C as-found/as-left local leakage rate test (LLRT) results are missed then the missing as-found and as-left LLRT quantities are counted as test penalties and incorporated as such into the integrated leakage rate test (ILRT) results.

### **SLRA AMP B.2.3.35, Structures Monitoring and SLRA AMP B.2.3.36, Inspection of Water Control Structures Associated with Nuclear Power Plants**

Audit Activities. During its audit, the staff conducted walkdowns of the Unit 3 and Unit 4 fuel handling buildings, CCW heat exchanger rooms, high safety injection pump rooms, auxiliary building, turbine buildings and the condenser pits, electrical manholes, common units AFW pump room, intake and discharge structures, the boundary (embankments) of the cooling canal, and yard structures. In addition, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant. These activities were undertaken to assess the applicant's operating experience and verify its Structures Monitoring Program effectiveness

The table below lists the documents that were reviewed by the staff and were found relevant to the audit.

Document	Title	Revision / Date
0-ADM-561	Structures Monitoring Program	Revision 7
EN-AA-206	Renewed License Process	Revision 8
AR 1766347	Waste Gas Compressor Room (b) Concrete Ledge Delamination and Cracks (Auxiliary Building)	05/11/2012
AR 1766352	South Wall Under Stairwell Concrete Delamination and Cracks (Auxiliary Building)	05/11/2012
1110-0040-RPT-001	Review of Auxiliary Building and Fuel Handling Building Functionality Assessments and Apparent Cause Evaluation	Revision 0
1110-0040-RPT-002	Review of Fuel Handling Building with Crane Loading Conditions to Support Apparent Cause Evaluation	Revision 0
400149-CA-001	Unit 4 Fuel Handling Building West and North Wall Corrosion Condition Assessment Report	Revision 00A 08/09/2018
200024-01	Unit 4 Fuel Handling Building Wall Evaluation	Revision 00A 08/03/2018
AR 1800290	U-4 Spent Fuel Building Degraded Concrete	09/05/2012
AR 1800281	U-4 Spent Fuel Building Degraded Concrete	09/05/2012
CR 2263467-02	Unit 3 and 4 Fuel Handling Building Degraded Concrete	06/27/2017
AR 18822156	Concrete Spalling Noted in High-Safety injection Pump Room Trench	11/10/2012
AR 02237081	Unit 3 High-Safety Injection Pump Room Trench - Walkdown	11/20/2017
AR 1766607	NNS Pipe Supports, Conduit, and Conduit Supports,	05/12/2012
AR 1767712	U-3 Intake Structure (concrete spall and corroded rebar, corroded conduit supports)	05/16/2012
AR 1793860	U-4 Auxiliary Bldg Degraded Concrete	09/28/2012
AR 2213207	Structures Monitoring Program Long Term Action Monitoring Inspection Requirements not being tracked	12/08/2017
AR 2239727	Major Gaps to Effectiveness – PTN Structures Monitoring Program	12/08/2017
SSMP-WKDN-001A	Structures Monitoring Program Walkdown Report, Unit 3, Baseline	Revision 1A
SSMP-WKDN-001B	Structures Monitoring Program Walkdown Report, Unit 4, Baseline	Revision 1B

PTN-ENG-SECS-17-019	2017 PTN Structures Monitoring Program Report	Revision 3 / 06/01/2018
FPLCORP020-REP-088	AMP Basis for Water Control Structures Program	Revision 1
FPLCORP020-REPT-025	PTN Screening Results – Non-Containment Structures	Revision 1
FPLCORP020-REPT-107	AMP Basis for Structures Monitoring Program	Revision 1
SPEC-C-004	Engineering Maintenance Specification - Coating	Revision 12
EC-282844	Turkey Point Cooling Canal System Sediment Removal	Revision 2
EC-291348	Engineering Evaluation for Cooling Canal System	Revision 0
AR 00597049	Concrete spalling east foundation wall of south condenser	01/14/2011
AR 01768157	Intake structure degraded steel and concrete	05/17/2012
AR 02010523	Concrete spalling on north side of Unit 4 Spent Fuel Pool	12/02/2014
AR 02036089	Unit 4 Spent Fuel Pool building concrete structures falling off on the top of Auxiliary building	03/29/2015
AR 01832119	Discharge structure corrosion on steel beam	12/12/2012

During walkdowns the staff made the following observations:

- During the walkdown of the Unit 4 fuel handling building the staff noted the following structural degradation in the exterior of the structure: (i) cracked concrete, (ii) delaminated and spalled concrete, and (iii) corroded uncovered rebar. The applicant identified the observed degradations in AR 1800281 and AR 1800290, and the conditions were evaluated as acceptable with deficiencies in the following reports: 400149-CA-001, 1110-0040-RPT-001 and 1110-0040-RPT-002. The staff notes that corrective action was transferred to AR 02010523 to be corrected under work order package (WOP) 40181604-01.
- During the walkdown of the auxiliary building the staff noted major cracks (no sign of water infiltration) and concrete delamination at the 2, 4 and 10 feet elevations of the structure. The applicant identified the observed degradations in AR 1766347 and AR 1766352, repairs were noted in most of the degraded areas, and the conditions were evaluated in AR 1766347 and report no. 1110-0040-RPT-001.
- During the walkdown of the cooling canal the staff noted the cooling canal boundary embankments are in good condition, with no signs of cracking, spalling or distortion. The water level to the top of the embankments varies from 3 to 7 feet on both sides of the embankments.

During the audit the staff made the following observations:

- The staff reviewed report number 400149-CA-001 and noted that the engineering assessment of the structure concluded that the west and north wall of Unit 4 fuel handling building currently have active corrosion with a medium to high corrosion rate, and attributed the on-going degradation to the harsh environment present at the site where airborne chlorides are significant.
- The staff reviewed report number 1110-0040-RPT-001 and noted that the engineering assessment of the auxiliary building concluded that the degradation was caused by initial differential settlement due to its unique foundation design.
- The staff reviewed AR 1767712 and AR 0440745 and noted that engineering inspections have identified ongoing degradation due to corrosion in the Unit 3 intake concrete structure and conduit supports.
- The staff reviewed AR 1793860, where the applicant documented indications of concrete leaching on Turkey Point Unit 4 auxiliary building concrete east wall. The degradation was evaluated by the applicant and deemed not to affect the intended function of the structural component.
- The staff reviewed walkdown reports SSMP-WKDN-001A and SSMP-WKDN-001B and noted that most corrosion-related degradation in steel structures and components, and steel reinforcement in concrete structures can be attributed to the harsh environment present at the site where airborne chlorides are significant.
- The staff reviewed the 2017 walkdown report, PTN-ENG-SECS-17-019, and noted that the report did not provide quantitative criteria for identified degradation, and does not trend the degradation from the baseline inspection reports. (Report No. SSMP-WKDN-001A and SSMP-WKDN-001B). The document also did not appear to consistently disposition previous degradations between subsequent reports.
- The staff reviewed EN-AA-206 and verified that enhancements were implemented in the procedure to ensure that work orders are periodically reviewed using management-controlled systems to identify backlog (long-standing issues), and to ensure that significant item repairs are scheduled and performed.
- The staff reviewed 0-ADM-561 and verified that enhancements were implemented in Section 4.4 of the Structures Monitoring Program procedure to ensure that identified follow-up inspections are properly tracked, scheduled and performed using quality-controlled systems.

## **SLRA TLAA Section 4.6, Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis**

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed onsite documentation provided by the applicant.

The table below lists the documents that were reviewed by the staff and were found relevant to the audit.

**RELEVANT DOCUMENTS REVIEWED**

<b>Document</b>	<b>Title</b>	<b>Revision / Date</b>
AR 02276547	Unable to Locate Original Referenced Document for SLRA	08/18/2018

During the audit the staff made the following observation:

The staff reviewed AR 02276547 and was unable to verify the fatigue design requirements for containment penetrations other than piping penetrations (e.g. personnel airlocks, equipment hatch and/or personnel hatch, electrical penetrations, etc.). As described in AR 02276547, the applicant was unable to find the fatigue analysis referenced in UFSAR Section 16.3.5, "Containment Liner Plate Fatigue," and described in UFSAR Appendix 5B, Section B.2.1. The staff notes that SLRA Section 4.6 references the analysis described in UFSAR Appendix 5B, Section B.2.1, to disposition the fatigue analysis of the containment liner and penetrations for Turkey Point. However, sufficient information was not available for the staff to evaluate the disposition associated with containment penetrations other than piping penetrations.



## Scoping and Screening of Non-Safety Systems with Potential for Spatial Interactions

Audit Activities. During its audit, the staff conducted walkdowns of the following areas to evaluate the potential for systems and components omitted from the scope of license renewal to have spatial interactions with safety-related systems, structures, and components:

- the emergency diesel generator and safety-related electrical distribution areas to evaluate the scoping of non-safety-related water systems with the potential to cause failure of the electrical equipment
- the areas of the turbine building containing safety-related electrical equipment to evaluate the scoping of non-safety-related power conversion systems with the potential to cause failure of the electrical equipment

The table below lists the documents that were reviewed by the staff and were found relevant to the audit.

**Relevant Documents Reviewed**

Document	Title	Revision / Date
ER-AA-111	Flow-Accelerated Corrosion Program	Revision 1
5613-M-3073, Sheet 3	Condensate System SLRA Piping and Instrumentation Diagram	Revision 23

During walkdowns the staff made the following observations:

- Floor drains from the upper 480 Volt (V) enclosed switchgear rooms for both trains entered a common floor drain piping run that passed directly over one train of the vital 4 kilovolt (kV) switchgear in the enclosed room below the 480V switchgear rooms. Condensate from the 480V room air handling units was routed to the floor drains, and in-scope chilled water piping was also a potential source of water to the floor drains. The floor drain piping run had not been identified among the structures, systems, and components with the scope of license renewal. Although the water sources contained a limited inventory of water, the sensitivity of the indoor-rated switchgear to water and the potential for cross-train interaction increased the safety-significance.
- Sumps collecting air handling unit condensate within each of the 4 kV switchgear rooms (two trains in each Unit 3 and Unit 4) were drained by non-safety sump pumps with vertical discharge piping. Intermittent operation of the sump pump creates the potential to spray nearby safety-related 4kV switchgear if the discharge piping failed.
- In addition to the safety-related turbine-driven auxiliary feedwater pumps, the staff noted that safety-related breakers/controllers for motor-operated valves and associated wiring were located within outdoor-rated electrical cabinets in the general turbine building area below the operating deck. The SLRA stated that spatial protection was provided by including steam and power conversion system piping within the scope of license renewal. However, the staff identified that large diameter piping identified as feedwater heater bypass piping was not included within the scope of license renewal and was

located in the general turbine building area below the operating deck where failure of high energy piping could affect safety-related equipment. The applicant's staff indicated that exclusion of the piping from the scope of license renewal for high-energy interaction potential was acceptable due to infrequent use consistent with the Turkey Point licensing basis for high-energy line break protection.

### **3. Applicant Personnel Contacted During Audit**

<b>Name</b>	<b>Affiliation</b>
Olga Hanek	PTN
Bill Maher	FPL
Paul Jacobs	FPL
Steve Franzone	FPL
Hoankee Kim	FPL
Scott Walker	Enercon
Steve Hale	Enercon

### **4. Exit Meeting**

An exit meeting was held with the applicant on August 31, 2018, to discuss the results of the operating experience audit. The staff is considering the issuance of an RAI to support completion of the staff's SLRA review.