FPL

L-2018-191
10 CFR 54.17

November 28, 2018

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Re: Florida Power & Light Company
Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Turkey Point Units 3 and 4 Subsequent License Renewal Application
Safety Review Requests for Additional Information (RAI) Set 7 Responses and
Sets 1 and 5 Supplemental Responses

References:

1. FPL Letter L-2018-004 to NRC dated January 30, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application (ADAMS Accession No. ML18037A812)
2. FPL Letter L-2018-082 to NRC dated April 10, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application – Revision 1 (ADAMS Accession No. ML18113A134)
3. NRC RAI E-Mail to FPL dated October 31, 2018, Requests for Additional Information for the Safety Review of the Turkey Point Subsequent License Renewal Application – Set 7 (EPID No. L-2018-RNW-0002) (ADAMS Accession Nos. ML18292A665 and ML18292A746)
4. FPL Letter L-2018-152 to NRC dated August 31, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application Safety Review Requests for Additional Information (RAI) Set 1 Responses (ML18248A257)
5. FPL Letter L-2018-175 to NRC dated October 17, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application Safety Review Requests for Additional Information (RAI) Set 5 Responses (ML18292A642)

Florida Power & Light Company (FPL) submitted a subsequent license renewal application (SLRA) for Turkey Point Units 3 and 4 to the NRC on January 30, 2018 (Reference 1) and SLRA Revision 1 on April 10, 2018 (Reference 2).

The purpose of this letter is to provide, as attachments to this letter, responses to the safety review RAIs issued by the NRC on October 31, 2018 (Reference 3), as well as one supplemental response to RAI Set 1 and to Set 5 (References 4 and 5). Each RAI

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NRR

Florida Power & Light Company

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response and its corresponding attachment are indexed below. The attachments identify revisions amending the SLRA (if applicable).

If you have any questions, or need additional information, please contact me at 561-691-2294.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on November 28, 2018.

Sincerely,

William Maher
Senior Licensing Director
Florida Power & Light Company

WDM/RFO

Attachments: 14 RAI Responses (refer to Letter Attachment Index)

LETTER ATTACHMENT INDEX			
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Senior Resident Inspector, USNRC, Turkey Point Nuclear
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Project Manager, USNRC, Turkey Point Nuclear
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Plant Project Manager, USNRC, SLRA Environmental
Ms. Cindy Becker, Florida Department of Health

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

1. Fire Water System, GALL AMP XI.M27

Regulatory Basis:

Section 54.21(a)(3) of Title 10 of the Code of Federal Regulations (10 CFR) requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. As described in the NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants," (SRP-SLR), an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," (GALL-SLR Report). In order to complete its review and enable making a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

RAI 3.3.2.1.2-1a

Background:

The response to RAI 3.3.2.1.2-1 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18248A257) did not address loss of material for the gray cast iron heat exchanger shell exposed to treated water and copper alloy greater than 15 percent zinc heat exchanger channel head exposed to raw water beyond stating that aging effects will be managed by surveillance testing of the fire water pumps.

Issue:

Although the response to RAI 3.3.2.1.2-1 addressed many of the aging effects associated with the cited component, material, and environment combinations, the staff still lacks sufficient information to conclude which Fire Water System program inspections or tests will be conducted sufficient to detect loss of material for the gray cast iron heat exchanger shell exposed to treated water and copper alloy greater than 15 percent zinc heat exchanger channel head exposed to raw water.

Request:

State which Fire Water System program inspections or tests will be conducted sufficient to detect loss of material for the gray cast iron heat exchanger shell exposed to treated water and copper alloy greater than 15 percent zinc heat exchanger channel head exposed to raw water.

FPL Response:

The referenced RAI 3.3.2.1.2-1 response did not change the AMP that would detect loss of material for the subject heat exchanger channel head and shell because, unlike the tubes and tubesheet, it was felt that the channel head and shell should be correlated to piping, which is managed by the Fire Water System AMP.

However, upon further review of the information from the SLRA and Attachment 15 of the reference below, with respect to NUREG-2191, internal loss of material and flow blockage for the following component and environment combinations will be managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Aging Management Program (AMP) rather than by the Fire Water System AMP:

- Gray cast iron heat exchanger shell exposed to treated water
- Copper alloy greater than 15 percent zinc heat exchanger channel head exposed to raw water

References:

FPL Letter L-2018-152 to NRC dated August 31, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application, Safety Review Requests for Additional Information (RAI) Set 1 Responses (ADAMS Accession No. ML18248A257)

Associated SLRA Revisions:

SLRA Table 3.3.2-15 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions.

Revise SLRA Table 3.3.2-15 as follows:

Table 3.3.2-15: Fire Protection — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Heat exchanger (channel head)	Pressure boundary	Copper alloy >15% Zn	Raw water (int)	Loss of material Flow blockage	~~Fire Water System~~ **Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components**	VII.G.AP-197	3.3-1, 064	~~C~~**E**
Heat exchanger (shell)	Pressure boundary	Gray cast iron	Treated water (int)	Loss of material Flow blockage	~~Fire Water System~~ **Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components**	VII.G.A-33	3.3-1, 064	~~C~~**E**

Associated Enclosures:

None

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

2. 10 CFR Part 50, Appendix J, GALL AMP XI.S4

Regulatory Basis:

Section 54.21(a)(3) to 10 CFR Part 54 requires the applicant to demonstrate, for systems, structures and components (SSCs) within the scope of license renewal and subject to an aging management review (AMR) pursuant to 10 CFR 54.21(a)(1), that the effects of aging are adequately managed so that the intended function(s) are maintained consistent with the current licensing basis (CLB) for the subsequent period of extended operation. This AMR consists of identifying the material, environment, aging effects, and the aging management programs (AMPs) credited for managing the aging effects.

RAI B.2.3.33-1

Background:

The regulations in 10 CFR Part 50, Appendix J require leak rate testing (LRT) to assure containment leakage does not exceed allowable leakage rates. Furthermore, 10 CFR 54.21(a)(3) requires that the effects of aging associated with containment boundary pressure-retaining components "will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation." The GALL-SLR Report AMP XI.S4, "10 CFR Part 50, Appendix J," "scope of program" program element sets these requirements as a bounding condition to manage GALL-SLR identified aging effects associated with containment pressure-retaining boundary components that have been excluded from Type B or C Appendix J testing.

Section 2.3.2.3 "Containment Isolation" of the Turkey Point Nuclear Plant Units 3 and 4 SLRA states that "all containment penetrations and associated containment isolation valves and passive components that ensure containment integrity, regardless of where they are described, require an AMR." SLRA Section B.2.3.33, "10 CFR Part 50 Appendix J," program states that the program is an existing AMP and that the applicant has implemented Option B of 10 CFR Part 50, Appendix J for LRT and is consistent, with an enhancement, with the GALL-SLR Report AMP XI.S4.

Issue:

Table 6.6-1, "Containment Piping Penetrations and Isolation Barriers," of the UFSAR contains several containment pressure retaining boundary components (e.g., penetrations, valves) that are excluded from local leak rate tests (LLRTs). The enhancement to the "scope of program" program element supports augmentation of the program to include management of aging effects for the entire containment pressure boundary. However, it is not clear how the applicant meets the regulatory requirement of 10 CFR 54.21(a)(3) and will continue to do so for the subsequent period of extended operation (SPEO) for components that have been excluded from Appendix J leak testing. It is also not clear why the applicant's definition of Type A, B, or C tests differ from those mandated by 10 CFR Part 50, Appendix J and their alignment to regulations is proposed as an enhancement.

Request:

1. State how the relevant aging effects associated with components excluded from 10 CFR Part 50 Appendix J testing will be managed consistent with 10 CFR 54.21(a)(3) during the SPEO.
2. Clarify differences in Turkey Point procedures regarding the definition of Type A, B, or C tests with those of 10 CFR Part 50, Appendix J and justify why their alignment to the regulations is proposed as an enhancement to be implemented prior to the SPEO.

FPL Response:

Responses to the above numbered requests are as follows:

1. The relevant internal and external aging effects of components excluded from 10 CFR Part 50 Appendix J, local leak rate, testing will be managed by the same aging management programs credited in SLRA Tables for their associated systems. The following table lists the structural components from SLRA Tables 3.5.2-1 and 3.5.2-15 for which 10 CFR Appendix J is a credited aging management program. Further, additional items added to SLRA Tables 3.5.2-1 and 3.5.2-15 by FPL Response to NRC RAI No. 3.5.1.9-1 are also included in the table below (B.2.3.33-1 Reference 2). For all structural components, other than "Seals and gaskets", the relevant aging effects are also managed by the ASME Section XI Subsection IWE AMP. Therefore, the relevant aging effects on any components that are excluded from 10 CFR Part 50 appendix J testing will be managed by the ASME Section XI Subsection IWE AMP and the visual inspection aspects of the 10 CFR Part 50 Appendix J AMP.

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program
Containment structure hatches and accessories	Pressure boundary Fire barrier	Carbon steel	Air – indoor uncontrolled Air – outdoor	Loss of leak tightness	ASME Section XI, Subsection IWE 10 CFR Part 50, Appendix J
Containment structure hatches and accessories	Pressure boundary Fire barrier	Carbon steel	Air – indoor uncontrolled Air – outdoor	Loss of material	ASME Section XI, Subsection IWE 10 CFR Part 50, Appendix J
Liner plate, anchors and attachments (accessible areas)	Pressure boundary Structural support	Carbon steel	Air – indoor uncontrolled	Loss of material	ASME Section XI, Subsection IWE 10 CFR Part 50, Appendix J
Liner plate, anchors and attachments (inaccessible areas)	Pressure boundary Structural support	Carbon steel	Air – indoor uncontrolled	Loss of material	ASME Section XI, Subsection IWE 10 CFR Part 50, Appendix J

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program
Liner plate, non-piping penetrations (hatches, electrical penetrations, etc.), dissimilar metal welds	Pressure boundary Fire barrier	Carbon steel	Air – indoor uncontrolled	Cracking due to cyclic loading	ASME Section XI, Subsection IWE 10 CFR Part 50, Appendix J
Penetration sleeves	Pressure boundary	Carbon steel	Air – indoor uncontrolled Air – outdoor	Loss of material	ASME Section XI, Subsection IWE 10 CFR Part 50, Appendix J
Penetration sleeves	Pressure boundary	Dissimilar metal welds	Air – indoor uncontrolled Air – outdoor	Cracking	ASME Section XI, Subsection IWE 10 CFR Part 50, Appendix J
Pressure-retaining bolting	Pressure boundary Fire barrier	Carbon steel	Air – indoor uncontrolled Air – outdoor	Loss of preload	ASME Section XI, Subsection IWE 10 CFR Part 50, Appendix J
Seals and gaskets	Pressure boundary	Elastomer, rubber and other similar materials	Air – indoor uncontrolled Air – outdoor	Loss of sealing	10 CFR Part 50, Appendix J
Fuel transfer tube (including penetration sleeves and expansion joints)	Pressure boundary	Stainless steel	Air – indoor uncontrolled Air – outdoor	Cracking	ASME Section XI, Subsection IWE 10 CFR Part 50, Appendix J
Fuel transfer tube (including penetration sleeves and expansion joints)	Pressure boundary	Stainless steel	Air – indoor uncontrolled	Cracking due to cyclic loading	ASME Section XI, Subsection IWE 10 CFR Part 50, Appendix J

As defined in 0-ADM-531, supported by 3/4-OSP-51.5, airlocks, hatches and penetrations with seals, such as transfer tube, hatch, and electrical penetrations receive type B testing. Therefore, for "Seals and gaskets" and the associated aging effect of "Loss of sealing", the associated containment penetrations are not excluded from Appendix J testing per 0-ADM-531 and 3/4-OSP-51.5.

Table 6.6-1 of the UFSAR lists the penetrations and associated mechanical components that are excluded from 10 CFR Part 50 Appendix J testing. During the SPEO, the following AMPs are credited with managing the relevant aging effects for mechanical components, associated with containment penetrations that are excluded from 10 CFR Part 50 Appendix J testing: B.2.2.1 (Fatigue Monitoring), B.2.3.2 (Water Chemistry), B.2.3.4 (Boric Acid Corrosion), B.2.3.8 (Flow-Accelerated Corrosion), B.2.3.12 (Closed Treated Water Systems), B.2.3.20 (One-Time Inspection), B.2.3.23 (External Surfaces Monitoring), B.2.3.25 (Internal Surfaces in Miscellaneous Piping and Ducting Components), B.2.3.26 (Lubricating Oil Analysis). The AMPs are credited in the SLRA tables for managing the aging effects relevant to the material environment combination listed in those tables. The following systems and SLRA tables include component types associated with containment penetrations that are excluded from Appendix J testing:

- Components of the residual heat removal system included in SLRA Table 3.2.2-5
- Components of the component cooling water system included in SLRA Table 3.3.2-2
- Components of the chemical and volume control system included in SLRA Table 3.3.2-4
- Components of the safety injection system included in SLRA Table 3.2.2-4
- Components of the steam generator wet layup system included in SLRA Table 3.4.2-2
- Components of the main steam system included in SLRA Table 3.4.2-1
- Components of the auxiliary feedwater system included in SLRA Table 3.4.2-3
- Components of the feedwater system included in SLRA Table 3.4.2-2
- Components of the sample system – secondary included in SLRA Table 3.3.2-7

A description of the above systems can be found in SLRA Chapter 2, "Scoping and Screening Methodology for Identifying Structures and Components Subject to Aging Management Review and Implementation Results."

2. The definitions of Type A, B, and C tests in Turkey Point procedures currently capture the scope of the definitions of 10 CFR Part 50, Appendix J (SLRA Section 17.5 Reference 1). However, they are not identical. The table below highlights the additions (bold and underlined font) to the definitions in Turkey Point procedures that align them identically with those of 10 CFR Part 50, Appendix J. The alignment of these procedure definitions to the regulations is proposed as an enhancement to ensure the definitions are identical to those of 10 CFR Part 50, Appendix J for the SPEO, the expansion of Type C definition in particular.

Test	Definition with Addition
Type A	Pneumatic testing performed to measure the **primary reactor** containment system overall integrated leakage rate under conditions representing design basis loss of coolant accident containment peak pressure.
Type B	Pneumatic tests intended to detect local leaks and to measure containment isolation valve leakage across each pressure containing or leakage limiting boundary for the following containment penetrations: (1) Containment penetrations whose design incorporates resilient seals, gaskets, or sealant compounds, piping penetrations fitted with expansion bellows and electrical penetrations **fitted with flexible seal assemblies**.
Type C	A pneumatic test intended to measure containment isolation valve leakage. **The containment isolation valves included are those that:** **(1) Provide a direct connection between the inside and outside atmospheres of the primary reactor containment under normal operation, such as purge and ventilation, vacuum relief, and instrument valves;** **(2) Are required to close automatically upon receipt of a containment isolation signal in response to controls intended to effect containment isolation; and** **(3) Are required to operate intermittently under postaccident conditions.**

References:

SLRA Section 17.5 References:

1. 10 CFR 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors"

B.2.3.33-1 References:

2. FPL Letter L-2018-193 to NRC dated November 2, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application, Safety Review Requests for Additional Information (RAI) Set 6 Responses (ADAMS Accession No. ML18311A299)

Associated SLRA Revisions:

None

Associated Enclosures:

None

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

RAI 17.2.2.33-1

Background:

Section 54.21(d) of 10 CFR requires that the FSAR supplement for the SLRA contain a summary description of programs and activities for managing the effects of aging during the subsequent period of extended operation. Table XI-01 of the GALL-SLR Report, "FSAR [Final Safety Analysis Report] Supplement Summaries for GALL-SLR Report Chapter XI Aging Management Programs," outlines the FSAR supplement summary for an applicant to follow to assure consistency of its AMP with GALL-SLR AMP XI.S4.

The GALL-SLR Report FSAR summary includes in its description the implementing documents for 10 CFR Part 50, Appendix J, mandatory satisfaction of 10 CFR Part 54 Regulatory requirements, and Corrective Actions to be taken if leakage rates exceed acceptance criteria.

Issue:

The UFSAR supplement description in Turkey Point SLRA Section 17.2.2.33 for AMP B.2.3.33, "10 CFR Part 50, Appendix J," does not appear to be consistent with the summary provided in GALL-SLR Table XI-01 for AMP XI.S4. The UFSAR supplement does not state: (i) the implementing documents for 10 CFR Part 50, Appendix J program, (ii) the intent to continue with the implementation of the 10 CFR Part 54 Regulatory Requirements, and (iii) the necessity to perform "Corrective Actions" when leakage rates exceed acceptance criteria. The staff needs additional information necessary to verify the sufficiency of the UFSAR supplement description for the SLRA Section B.2.3.33 AMP.

Request:

1. Clarify how the FSAR supplement in SLRA Section 17.2.2.33 sufficiently defines the intent of the SLRA AMP B.2.3.33 in accomplishing the Regulatory Requirements for 10 CFR Part 50, Appendix J, 10 CFR Part 54, and the guidance in GALL-SLR AMP XI.S4; or
2. Provide a revised FSAR supplement description for SLRA Section 17.2.2.33 (for SLRA AMP B.2.3.33) to include information equivalent to that in GALL-SLR Table XI-01 for GALL-SLR Report AMP XI.S4.

FPL Response:

Based on review, a revised UFSAR supplement description is provided for SLRA Section 17.2.2.33. This revision includes information currently stated in the AMP basis document for closer consistency with GALL-SLR Table XI-01 for AMP XI.S4.

References:

None

Associated SLRA Revisions:

SLRA Section 17.2.2.33 is amended as indicated by the following text deletion (strikethrough) and text addition (red underlined font) revisions.

The PTN 10 CFR Part 50, Appendix J, AMP is an existing AMP that was formerly the PTN Containment Leak Rate Testing Program, although it was not previously credited for license renewal. This AMP is a performance monitoring program that monitors leakage rates through the containment pressure boundary, including the containment **shell or** liner, associated welds, penetrations, isolation valves, fittings, and other access openings, in order to detect degradation of the containment pressure boundary. **Corrective actions are taken if leakage rates exceed acceptance criteria. This program is implemented in accordance with 10 CFR Part 50 Appendix J, RG 1.163, NEI 94-01, and is subject to the requirements of 10 CFR Part 54.** Additionally, 10 CFR 50, Appendix J, requires a general visual inspection of the accessible interior and exterior surfaces of the containment structures and components to be performed prior to any Type A test and at periodic intervals between tests based on the performance of the containment system.

Associated Enclosures:

None

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

3. Structures Monitoring Program, GALL AMP XI.S6

Regulatory Basis:

Section 54.21(a)(3) of 10 CFR requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. As described in the SRP-SLR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL-SLR Report and explaining when evaluation of the matter in the GALL-SLR Report applies to the plant.

RAI B.2.3.35-5

Background:

SRP-SLR Section 1.2 states that if an applicant takes credit for a program in the GALL-SLR Report, it is incumbent on the applicant to ensure that the conditions and operating experience (OpE) at the plant are bounded by the conditions and OpE for which the GALL-SLR Report program was evaluated. If these bounding conditions are not met, the applicant must address the additional effects of aging and augment the AMP(s) in the GALL-SLR Report in the SLRA, as appropriate. SRP-SLR Section A.4 provides that OpE should provide objective evidence to support the conclusion that the effects of aging are managed adequately so that the structures and components' (SCs) intended function(s) will be maintained during the subsequent period of extended operation.

SLRA Section B.2.3.35 states that the Turkey Point Structures Monitoring AMP, with an exception and enhancements, will be consistent with the ten elements of the GALL-SLR Report, Section XI.S6, "Structures Monitoring." The SLRA concludes that the Structures Monitoring Program (SMP), with an exception and enhancements, will provide reasonable assurance that the effects of aging will be managed so that the intended function(s) of components within the scope of the AMP will be maintained consistent with the CLB during the SPEO.

During the audit of the "operating experience" program element, the staff's independent database search identified significant plant-specific operating experience related to corrosion degradation for several structures and components at the site. During the in-office and on-site audits the staff interviewed the applicant's staff, reviewed onsite documentation, performed walkdowns, and made the following observations:

- A review of the 2012 baseline inspection reports, SSMP-WKDN-001A and SSMP-WKDN-001B, identified significant degradation related to corrosion for several structures and components exposed to air-outdoor or water environments.
- During the walkdowns, the staff observed significant degradation in the exterior of the Unit 4 fuel handling building. Concrete was cracked, delaminated, and spalled, and uncovered rebar was corroded. The staff noted that an engineering assessment report, 400149-CA-001, attributed the on-ongoing corrosion

degradation to the harsh environment present at the site (i.e. the outdoor air contains a high concentration of airborne chlorides).

- During the walkdowns the staff observed similar corrosion-related degradation at specific locations in the exterior of the reactor building, intake structure, manholes, trenches, and other structures at the site. These degradations have been documented in numerous corrective action reports (e.g. CR 484335, CR 448795, CR 440745, CR 1832359, CR 2030479, CR 02041346, CR 02140186, CR 205396).
- A staff review of AR 1767712 and AR 440745 noted ongoing corrosion degradation in areas of the Unit 3 intake concrete structure and conduit supports.
- 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 inspections reports. The document also did not appear to consistently disposition previous degradations between subsequent reports (i.e., in some cases, the conditions were re-marked as acceptable when they had been previously notated as unacceptable without a clear disposition.

Issue:

Based on the staff's review of plant-specific OpE associated with structural degradation due to corrosion (reviewed during both the in-office and onsite audits) and staff-observed conditions during audit walkdowns of SCs, it is not clear that conditions and OpE at the plant are bounded by the conditions and OpE for which the GALL-SLR Report program was evaluated. The OpE has not provided objective evidence to support the conclusion that the effects of aging are managed adequately to provide reasonable assurance that the SCs' intended function(s) will be maintained during the subsequent period of extended operation. Specifically, it is not clear (1) how the SMP accounts for the observed plant-specific OpE associated with corrosion to provide objective evidence that supports the conclusion that the effects of aging will be adequately managed during the SPEO, (2) whether and how the SMP specified inspection frequency of 5 years remains adequate for SCs with ongoing corrosion degradation, considering their condition and site-specific OpE, and (3) how the program will trend ongoing degradation given the lack of quantitative criteria or consistency in performing inspections to ensure that SCs will maintain their intended functions between inspections.

Request:

1. Clarify the basis for the Structures Monitoring Program's specified inspection frequency of 5 years, considering the current conditions, operating experience of SCs, and the lack of quantitative criteria for trending of ongoing degradations that could lead to a loss of intended function.
2. Discuss any additional applicable plant-specific measures or actions that will be taken to ensure that unbounded plant-specific conditions and OpE from the GALL-

SLR Report are addressed to provide reasonable assurance that the Turkey Point Structures Monitoring AMP will adequately manage the aging effect associated with corrosion degradation to ensure that the SCs' intended function(s) will be maintained during the subsequent period of extended operation.

FPL Response:

Responses to the above numbered requests are as follows:

1. The basis for the specified Turkey Point Structures Monitoring AMP 5 year inspection frequency during the SPEO is the same as for original license renewal, an industry standard, routine inspection interval that is not to be exceeded but can be shortened as deficiencies are identified and evaluated. The previously identified degraded concrete and structural (reinforcement) steel conditions were found to warrant future attention and repair rather than near-term corrective action and inspection frequency was increased as appropriate. The implementing procedure for the existing Turkey Point Structures Monitoring program, description of the purpose, includes the statement that "Development of the monitoring program consists of defining the inspection tasks and task frequency to assure timely identification, assessment, and repair or replacement of degraded structural elements."

   Structures in the scope of Subsequent License Renewal are inspected with a routine frequency of every 5 years. The frequency may be adjusted as necessary based on future inspection results and industry experience but the interval between inspections can NOT exceed 5 years. Inspected structures are classified as acceptable, acceptable with deficiencies, or unacceptable. Deficiency follow-up inspections (DFI), with types described below, are also directed in the implementing procedure for the Turkey Point Structures Monitoring program. Structures determined to be acceptable with deficiencies have the potential for propagation and shall be trended for evidence of further degradation. A DFI is performed a) when a previously documented deficiency is being trended for further evidence of degradation, b) when repairs recommended by an Engineering Review have been completed, or c) a previously performed DFI are inspected to ensure their adequacy. There are three types of DFIs:

   - Increased Frequency DFI - performed for structures which require inspection prior to the periodic inspection schedule due to deficiencies, etc.
   - Routine Frequency DFI - performed for structures which have noted deficiencies, but do NOT require re-inspection for further degradation prior to the routine periodic inspection. The Routine Frequency DFI may be performed during other periodically scheduled inspections.
   - Deficiency Repair DFI - performed following completion of repairs to a deficiency in order to ensure the repairs are adequate.

DFI should be scheduled during a periodic inspection. If the repairs are acceptable, the Deficiency may be closed, and no further inspection prior to the next periodic inspection is required. If additional corrective actions are required, the Deficiency shall remain open, and a new Deficiency Repair DFI scheduled. If a previously unidentified Deficiency is noted, it shall be treated as a new Deficiency. The Structures Monitoring Program Owner determines the frequency of the SSC requiring DFI and tracks DFIs with management actions or long term management actions.

An example of the pertinent operating experience is the Unit 4 Fuel Handling Building west wall, which was walked down and inspected in 2018. The concrete spalling present at the lower elevations was relatively unchanged compared to the engineering assessment described in the background above. The concrete cover delamination on the upper elevations in certain locations was observed to be further separated and more concrete was dislodged from the wall, confirming that the corrosion mechanism is active, and progressing. However, the degraded condition was determined to be bounded by a related functional (structural) assessment. The functional assessment quantitatively analyzed the degraded wall condition and concluded the walls are structurally adequate and the building is adequate to support design loads. The increased inspection frequency is in the program owner's notebook/database and is further discussed in the response to RAI B.2.3.35-6 (L-2018-191 Attachment 5). Similarly, degraded areas in the Auxiliary Building and Intake Structure are currently inspected quarterly and each refueling outage, respectively, until repaired.

The current implementing procedure does not provide specific guidance with respect to trending of deficiencies involving significant degradation/corrosion that require more frequent inspections or the quantitative criteria to be applied. The implementing procedure will be enhanced to strengthen the detail and criteria for engineering evaluation performed when a deficiency involves significant corrosion-related degradation. The evaluation will either quantify that the structure remains functional until the next scheduled routine (5 year) inspection or direct more frequent inspections.

2. The environmental conditions, materials of construction, and plant specific operating experience at Turkey Point are consistent with those documented in NUREG-2191 XI.S6. NUREG-2191 references for the Structures Monitoring Program include NUREG-1522 (Reference 2) and NUREG/CR-7111 (Reference 3). Both discuss the potential aging effects of salt water environments and review examples of degradation similar to those observed at Turkey Point.

   As described in SLRA Section B.2.3.35 (pg B-260), the plant conditions were noted, evaluated and determined to have no loss of intended function. Work orders were issued for repair. These issues are presently associated with a long-term asset management item, qualitatively trended through program health reports and planned to be resolved at least 10 years prior to the end of the current period of extended operation (PEO). As such, necessary repairs will be completed prior to the SPEO.

Applicable plant-specific measures or actions are underway to restore the Systems and Structures Monitoring program effectiveness for the current PEO, through the corrective action and long-term asset management processes. When completed, including the repairs described in response to the 1st request above, the conditions at Turkey Point will be more clearly bounded by the operating experience in NUREG-2191 XI.S6.

The implementing procedure for the Structures Monitoring Program does not currently provide detailed guidance with respect to trending of observed corrosion degradation resulting in increased inspection frequencies. As discussed above, the procedure will be strengthened to require an engineering evaluation of inspection frequency when degradation/corrosion that may affect component function prior to the next routine inspection is observed to ensure there is no subsequent lapse in Structures Monitoring AMP effectiveness and that the aging effect of corrosion degradation is adequately managed through the SPEO. Additional direction will be provided for detailed evaluation and trending of on-going degradation/corrosion. This will include:

- best estimate projection of functionality based on quantitative criteria (developed from industry standards, operating experience and site operating experience) or link to the criteria for comparative evaluations,
- consistent classification with previous inspections, and
- adjustment of inspection frequency or requirements as warranted to ensure function is maintained between inspections.

Updates to the PTN Structures Monitoring AMP, SLRA Section 17.2.2.35; Table 17-3, item 39; and Section B.2.3.35, were provided in the responses to Set 6 RAIs B.2.3.35-1 to B.2.3.35-4 and RAI 3.5.1.100-1 (Reference 1, L-2018-193 Attachments 14 to 18, respectively). Those previous updates are consolidated in this response (normal text) for clarity and completeness in describing the current, as-amended Structures Monitoring AMP.

The current, as-amended Structures Monitoring AMP is revised as described below to address frequency considerations and to clarify the implementing procedure relative to quantitative criteria and consistent trending of identified degradation.

References:

1. FPL Letter L-2018-193 to NRC dated November 2, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application, Safety Review Requests for Additional Information (RAI) Set 6 Responses (ADAMS Accession No. ML18311A299)
2. NUREG-1522, Assessment of Inservice Conditions of Safety-Related Nuclear Plant Structures, Published June 1995 (ADAMS Accession No. ML062501407)

3. NUREG/CR-7111 (ORNL/TM-2011/410), A Summary of Aging Effects and Their Management in Reactor Spent Fuel Pools, Refueling Cavities, Tori, and Safety-Related Concrete Structures, Published January 2012 (ADAMS Accession No. ML12047A184)

Associated SLRA Revisions:

Current SLRA Section 17.2.2.35; Table 17-3, item 39; and Section B.2.3.35 (Reference 1, L-2018-193 Attachments 14 to 18), are amended as indicated by the following text deletion (strikethrough) and text addition (red underlined font) revisions.

Revise current SLRA Section 17.2.2.35, updated via L-2018-193 Attachment 16 (pgs 3, 4 of 10) as follows:

The PTN Structures Monitoring AMP is an existing condition monitoring program that consists primarily of periodic visual inspections of plant SCs for evidence of deterioration or degradation, such as described in the American Concrete Institute (ACI) Standards 349.3R, ACI 201.1R, and Structural Engineering Institute/American Society of Civil Engineers Standard (SEI/ASCE) 11. Quantitative acceptance criteria for concrete inspections are based on ACI 349.3R. Inspections and evaluations are performed using criteria derived from industry codes and standards contained in the plant CLB including but not limited to ACI 349.3R, ACI 318, SEI/ASCE 11, and the American Institute of Steel Construction (AISC) specifications. **Inspections and evaluations are performed at an interval no greater than 5 years with identified degraded conditions receiving more frequent inspection, as warranted, until repaired.** The AMP includes preventive actions to ensure structural bolting integrity. Results from periodic inspections are trended. Due the presence of aggressive groundwater chemistry (Chlorides > 500 parts per million (ppm)), the AMP includes a site-specific enhancement to conduct a baseline visual inspection, pH analysis, and evaluation to evaluate the degradation of concrete due to exposure of aggressive chemical attack. The baseline evaluation will consider site-specific OE and the baseline inspection results and will determine the additional actions that are warranted. Periodic inspections (either focused or opportunistic) and evaluation updates (not to exceed 5 years) will be performed throughout the SPEO to ensure aging of inaccessible concrete is adequately managed.

Revise the current commitments for the Structures Monitoring AMP in Table 17-3, item 39, updated via L-2018-193 Attachment 14 (pg 4 of 6), Attachment 15 (pg 3 of 4), and Attachment 16 (pg 9 of 10) as follows:

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
39	Structures Monitoring (17.2.2.35)	XI.S6	Continue the existing PTN Structures Monitoring AMP, including enhancement to: a) Add the following components and commodity groups to the list of inspected items (see B.2.3.35 enhancement below) b) Revise storage requirements for high strength bolts in accordance with Section 2 of RSCS publication "Specification for Structural Joints Using High-Strength Bolts";. c) Revise inspection procedure to include monitoring for loss of material, missing or loose nuts/bolts, and other conditions that indicate loss of preload for structural bolting with acceptance criteria that these are not acceptable without engineering evaluation. d) Clarify that inspections of elastomers will include tactile manipulation and the acceptance criteria for inspections of structural sealants will ensure loss of material, cracking, and hardening will not result in loss of sealing. e) Revise inspections procedures to reference SEI/ASCE 11 and the American Institute of Steel Construction Manual, and to clarify that inspector qualification will be per ACI	No later than 6 months prior to the SPEO, i.e.: PTN3: 1/19/2032 PTN4: 10/10/2032

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
			349.3R. f) Develop a new implementing procedure or attachment to an existing implementing procedure to address aging management of inaccessible areas exposed to groundwater/soil. The document will include guidance to conduct a baseline visual inspection, pH analysis, and a chloride concentration test prior to the SPEO at a location close to the coastline/intake and a location in the main plant area for comparison. The baseline inspection results will be used to conduct a baseline evaluation that will determine the additional actions that are warranted. Additionally, the baseline evaluation results will set the subsequent inspection requirements and inspection intervals (not to exceed 5 years). Periodic inspections (either focused or opportunistic) and evaluation updates (not to exceed 5 years) will be performed throughout the SPEO to ensure aging of inaccessible concrete is adequately managed. g) Revise inspection procedures to include guidance on monitoring for indications of cracking and expansion due to reaction with aggregates in concrete structures. h) Update inspection procedure(s) to include monitoring volumes and chemistry, more	

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
			frequent inspections or destructive testing, and analyzing concrete pH, along with pH and content of the leakage water when possible, IF through-wall groundwater in-leakage is identified. i) Revise inspection procedures to include guidance on inspection for cracking due to SCC for stainless steel and aluminum components. j) **Revise the governing AMP procedure regarding use of quantitative criteria and more frequent inspections, with operating experience specifically considered and trended, for identified degradation until repaired.**	

Revise the current Structures Monitoring AMP description, through exception, in SLRA Section B.2.3.35, updated via L-2018-193 Attachment 14 (pg 5 of 6); Attachment 16 (pgs 4 to 6 of 10); Attachment 17 (pgs 2, 3 of 3); and Attachment 18 (pgs 2, 3 of 7) as follows:

Program Description

The PTN Structures Monitoring AMP, formerly a portion of the PTN Systems and Structures Monitoring Program, is an existing AMP that manages the aging effects of loss of material, cracking, fouling, loss of seal, and change in material properties, and provides assurance that structures and structural components within the scope of SLR will not degrade to the point of loss of component intended function during the SPEO. This AMP provides for periodic visual inspection, by qualified personnel, and examination for degradation of accessible surfaces of specific SSCs (including condition of concrete and steel structures, structural components, component supports, and structural commodities). **Inspections and evaluations are performed at no interval greater than 5 years with identified degraded conditions receiving more frequent inspection, as warranted, until repaired.** Corrective actions are performed as required based on these inspections.

Implementation of structures monitoring is required under 10 CFR 50.65 (the Maintenance Rule) and is addressed in NRC RG 1.160 (Reference B.3.27), "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and Nuclear Management and Resources Council (NUMARC) 93-01 (Reference B.3.88), "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants."

The PTN Structures Monitoring AMP consists primarily of periodic visual inspections by personnel qualified to monitor structures and components for applicable aging effects from degradation mechanisms, such as those described in the ACI 349.3R-02 (Reference B.3.118), "Evaluation of Existing Nuclear Safety-Related Concrete Structures," ACI 201.1R-08 (Reference B.3.116), "Guide for Conducting a Visual Inspection of Concrete Service," and Structural Engineering Institute/American Society of Civil Engineers Standard (SEI/ASCE) 11-99 (Reference B.3.121), "Guideline for Structural Condition Assessment of Existing Buildings." Identified aging effects are evaluated by qualified personnel using criteria derived from industry codes and standards contained in the plant CLB including but not limited to ACI 349.3R, ACI 318 (Reference B.3.117), SEI/ASCE 11, and the American Institute of Steel Construction (AISC) specifications, as applicable. For the SPEO, inspection and evaluation personnel will be qualified per ACI 349.3R.

Concrete surfaces are inspected for cracking, scaling, spalling, pitting, erosion, corrosion of reinforcing bars, settlement, deformation, leaching, discoloration, groundwater leakage, rust stains, exposed rebar, rust bleeding, and other surface irregularities. Structural steel is inspected for loss of material (corrosion), deflection, and distortion. Bracing connections associated with masonry walls are also inspected for degradation. Additionally, stainless steel and aluminum components are inspected for cracking due to SCC. Loose, missing, or damaged anchor bolts are visually inspected. High-strength bolts are visually inspected. Each structure's foundation is monitored for overall settlement and differential settlement. Structures are monitored to confirm the absence of water in-leakage or signs of concrete leaching, chemical attack or steel reinforcement degradation. Elastomers will be inspected for signs of hardening. PTN has no sliding surfaces outside of containment that require aging management.

A dewatering system is not used or part of the CLB for PTN. Structures are monitored to confirm the absence of water in-leakage or signs of concrete leaching, chemical attack or steel reinforcement degradation. Due to the presence of high chloride levels in the groundwater a site-specific enhancement to manage the concrete aging during SPEO will include a baseline visual inspection, pH analysis, and chloride concentration test prior to the SPEO. The inspection will include a location close to the coastline/intake and a location in the main plant area for comparison and consider site-specific OE. The baseline inspection results will be used to conduct a baseline evaluation that will determine the additional actions that are warranted. Additionally, the baseline evaluation results will set the subsequent inspection requirements and inspection intervals (not to exceed 5 years). Periodic inspections (either focused or opportunistic) and evaluation updates (not to exceed 5 years) will be performed throughout the SPEO to ensure aging of inaccessible concrete is adequately managed.

This AMP includes preventive actions to ensure structural bolting integrity. Proper selection of bolting material, appropriate installation torque or tension, lubricant selection, and bolting material selection are emphasized.

Concrete structures at PTN were designed and constructed in accordance with ACI 318-63 using ingredients/materials conforming to ACI and ASTM standards. The concrete mix used Portland cement conforming to ASTM C-150-64, Florida Type II. Also the cement contains no more than 0.60 percent by weight of total alkalis which prevents harmful expansion due to alkali aggregate reaction. Concrete aggregates conformed to the requirements of ASTM C-33-64 (fine and coarse aggregate) and conformed to the requirements of ASTM C33, "Standard Specification of Concrete Aggregates." Water used for mixing concrete or processing concrete aggregates is free from any injurious amounts of acid, alkali, salts, oil, sediment and organic matter. Materials for concrete used in PTN concrete structures and components were specifically investigated, tested, and examined in accordance with pertinent ASTM standards at the time of construction. However, this testing did not fully conform to ASTM C295 specified in NUREG-2192 and therefore, cracking due to expansion and reaction with aggregates, including alkali silicate reactions (ASR), is an applicable aging effect in concrete for PTN. PTN operating experience does not indicate issues of cracking due to ASR or dimensional expansions affecting PTN structures, but to provide additional direction on detecting this potential aging effect the implementing procedures will be enhanced to include specific directions with respect to inspections for signs of cracking and expansion due to reaction with aggregates in concrete structures.

NUREG-2191 Consistency

The PTN Structures Monitoring AMP, with exception and enhancements, will be consistent with the 10 elements of NUREG-2191, Section XI.S6, "Structures Monitoring."

Exceptions to NUREG-2191

The PTN Structures Monitoring AMP takes an exception to the groundwater and soil testing recommended by NUREG-2191.

The groundwater/soil at PTN is aggressive (chlorides > 500 ppm). Since the chloride levels for seawater are much greater than 500 ppm, there is reasonable certainty that any groundwater/soil chemistry tests will consistently result in chloride level readings that are greater than 500 ppm which indicates an aggressive groundwater/soil classification, and periodic sampling and testing is not necessary and of little value. Rather, the PTN Structures Monitoring AMP includes a site specific enhancement to address aggressive groundwater soil. The site-specific enhancement includes the following:

1. A baseline inspection of inaccessible concrete will be conducted prior to the SPEO.
    a) The baseline inspection locations will consider site-specific OE. OE considered will include known degradation due to chlorides in ambient air and the potential for further degradation due to the aggressive groundwater.
    b) The baseline inspection will include excavation, visual inspection, pH analysis, and a chloride concentration test of inaccessible concrete at a location close to the coastline/intake and a location in the main plant area for comparison.
2. A baseline evaluation will be performed prior to the SPEO.
    a) The baseline evaluation will consider the baseline inspection results to determine the additional actions (if any) that are warranted. Additional actions may include: enhanced inspection techniques and/or frequency, destructive testing, and focused inspections of representative accessible concrete (leading indicator) or below grade, inaccessible concrete structural elements exposed to aggressive groundwater/soil.
    b) The baseline inspection and evaluation results will set the subsequent inspection requirements and inspection intervals (not to exceed 5 years) for the SPEO.
3. Periodic inspections at a frequency determined in the baseline evaluation (not to exceed 5 years) will be performed, either focused or opportunistic when locations are excavated for other reasons.
4. Periodic evaluation updates will be performed (not to exceed 5 years) throughout the SPEO.
    a) Updates will be based on OE, periodic inspections, and
    b) will consider opportunistic or focused inspection results during the interval. The periodic evaluation results will update subsequent inspection requirements and inspection intervals (not to exceed 5 years) for the SPEO as required.

Revise the current Structures Monitoring AMP Enhancements in SLRA Section B.2.3.35, updated via L-2018-193 Attachment 14 (pgs 5, 6 of 6); Attachment 15 (pg 4 of 4); Attachment 16 (pgs 7, 8 of 10); and Attachment 18 (pg 3 of 7) as follows:

Enhancements

The PTN Structures Monitoring AMP will be enhanced as follows, for alignment with NUREG- 2191. The changes and enhancements are to be implemented no later than six months prior to entering the SPEO.

Element Affected	Enhancement
1. Scope	Update the governing AMP procedure to add the following components and commodity groups to the list of inspected items: • Fan/filter intake hood (Auxiliary Building) • Pipe trench penetration and fire seals used for flood protection • Stop logs • Doors (Diesel Driven Fire Pump Enclosure) • Louvers (Diesel Driven Fire Pump Enclosure) • HVAC roof hoods (Emergency Diesel Generator Building) • Louvers (Emergency Diesel Generator Building) • U4 Diesel Oil Storage Tank liner • Electrical Enclosures (Intake Structure) • Structural Truck Bridge (Intake Structure) • New Fuel Storage Components • NaTB sump fluid pH control basket • Drains, drain plugs (stored in various locations) that are credited for external flood protection • Berms and paved ramps that are credited for external flood protection
2. Preventive Actions	Update the pertinent AMP specification to include the preventive action requirements for proper storage of high strength bolts.
3. Parameters Monitored or Inspected	Update the governing AMP procedure to include the monitoring of loss of material, loose bolts, missing or loose nuts, and other conditions that indicate loss of preload. Update the governing AMP procedure with a minor editorial change to include SEI/ASCE 11 (Reference B.3.121) and AISC in the references section to account for any design parameters used for evaluation. Update the governing AMP procedure to include monitoring for cracking due to SCC for stainless steel and aluminum components.

Element Affected	Enhancement
4. Detection of Aging Effects	Update the governing AMP procedure to clarify that inspector qualification, including proficiency criteria and proficiency maintenance, be per ACI 349.3R. Update the governing AMP procedure with guidance on monitoring for indications of cracking and expansion due to reaction with aggregates in concrete structures. Update the governing AMP procedure to clarify that tactile inspection may be needed for detection of elastomer hardening. Update the governing AMP procedure to clarify that engineering evaluation, more frequent inspections, or destructive testing of affected concrete (to validate properties and determine pH) are required, along with analysis of the leakage water when possible, IF groundwater leakage is identified.
5. **Monitoring and Trending**	**Revise the governing AMP procedure to direct detailed evaluation and trending of on-going degradation that includes:** • **best estimate projection of functionality based on quantitative criteria (developed from industry standards, operating experience and site operating experience) or link to the criteria for comparative evaluations,** • **consistent classification with previous inspections, and** • **adjustment of inspection frequency or requirements as warranted to ensure function is maintained between inspections, with** • **documentation of the evaluation in accessible location/database.**
6. Acceptance Criteria	Update the governing AMP procedure to state that loose bolts and nuts are not acceptable unless accepted by an engineering evaluation. Update the governing AMP procedure acceptance criteria to state that structural sealants are not acceptable unless the observed loss of material, cracking, and hardening will not result in loss of sealing.

A new implementing procedure, or new attachment to the AMP governing procedure, for management of concrete exposure to aggressive groundwater/soil will also be developed that addresses:

Element Affected	Enhancement
1. Scope	Inaccessible concrete/foundations exposed to groundwater/soil in scope.
3. Parameters Monitored or Inspected	Monitoring of the condition of inaccessible concrete, including pH and chloride concentration, of concrete exposed to groundwater/soil.
4. Detection of Aging Effects	Guidance on baseline excavation with visual inspection, pH analysis, and a chloride concentration test of a location near the coastline and a location in the main plant area for comparison prior to the SPEO. Include periodic inspections (either focused or opportunistic) at a frequency determined in the baseline evaluation (not to exceed 5 years).
5. Monitoring and Trending	Guidance for the evaluation of the baseline inspection results and related OE, with concrete exposed to ambient air and to groundwater/soil prior to the SPEO to determine subsequent inspection/evaluation requirements and intervals (not to exceed 5 years), with periodic updates based on periodic inspections (either focused or opportunistic) and OE.
6. Acceptance Criteria	Acceptance criteria for inaccessible concrete exposed to groundwater through baseline inspection and evaluation, with periodic updates based on periodic inspections (either focused or opportunistic) and OE.

Revise the current Structures Monitoring AMP operating experience in SLRA Section B.2.3.35, updated via L-2018-193 Attachment 17 (pg 3 of 3) as follows:

Operating Experience

Industry Operating Experience

External (industry) operating experience is evaluated through the AR process to confirm applicability to PTN and identify the appropriate adjustments/improvements to the pertinent AMP(s), if any. For example:

- Information Notice (IN) 2011-20 describes an instance of groundwater infiltration leading to ASR degradation in below-grade concrete structures.

  PTN evaluated the preliminary and subsequent operating experience on this topic, with no evidence of degradation of PTN concrete. PTN continues to follow this issue through the condition report of another plant (Seabrook) in the fleet.

Additionally, PTN will enhance the PTN Structures Monitoring AMP as described above to include guidance on monitoring for indications of cracking and expansion due to reaction with aggregates as well as exposure to aggressive groundwater/soil.

- IN 2006-13 addresses nine issues relative to groundwater contamination (tritium), one of which is spent fuel pool leakage. Spent fuel pool leakage is also addressed in IN 2004-05.

  This operating experience has been evaluated at the fleet level. As described in Table 3.5.2-15, PTN monitors spent fuel pool water level and leakage from leak chase channels. Instances of minor spent fuel pool liner leakage have been identified, evaluated to ensure no loss of intended function, and cleaned up (housekeeping). Spent fuel pool leakage has not resulted in groundwater contamination.

Site-Specific Operating Experience

Structures and piping/component support material condition inspections have been performed at PTN since the mid-1980s. The inspection requirements in support of the Maintenance Rule have been in effect since 1996, and have proven effective at maintaining structure and structural component material conditions. Unsatisfactory conditions are detected and resolved through the CAP prior to a loss of intended function. While the PTN Structures Monitoring AMP inspects for settlement and differential settlement as described above, there have been no occurrences of settlement at PTN, as described in Sections 3.5.2.2.1.1 and 3.5.2.2.2.1. Elastomer seal degradation has been identified and corrected through visual inspections. The PTN Structures Monitoring AMP will be enhanced to include tactile inspection of elastomeric materials for detection of hardening.

The Systems and Structures Monitoring Program operating experience, from renewed license issuance in June 2002 to entering the PEO in 2012, is described in inspection notebooks compiled in support of the 2012 NRC post-approval site inspections (Inspection reports 05000250/2012007, 05000250/2012008, 05000251/2012008, 05000250/2012009, and 05000251/2012009).

The March, July and December 2012 post-approval NRC inspections each addressed some aspect of the Systems and Structures Monitoring Program and concluded that:

- License renewal commitment, to restructure the program to address inspection requirements to manage certain aging effects, modify the scope of specific inspections and improve documentation requirements (procedures associated with this PEO enhancement are cited in UFSAR Section 16.3.7, had been implemented;

- Aging management of structural components that were inaccessible for inspection was accomplished by inspecting accessible structural components with similar materials and environments for aging effects that may be indicative of aging effects for the inaccessible structural components;

- The essential attributes of Spring 2012 RFO examinations, such as calibration and disposition of indications, were performed in accordance with the license renewal commitment;

- Program was implemented in accordance with the license renewal application and NRC safety evaluation report (NUREG-1759) and in-scope structural walkdowns were completed prior to the PEO for Unit 3; and
- There is reasonable assurance that FPL would adequately manage the aging effects associated with the Systems and Structures Monitoring Program and continue it during the PEO.

The PTN Structures Monitoring AMP is also the subject of periodic internal and external assessments. Quarterly PTN Structures Monitoring AMP health reports are developed and trended. Program health reports from 2012 to present indicate that inspections, procedures and plans meet the program requirements. The overall performance of the PTN Structures Monitoring AMP is currently YELLOW with the path to GREEN by 2020 associated with a long-term asset management items and backlog reduction effort.

Identified backlogged items are degraded concrete and structural steel conditions that ~~do not require near term corrective action, but~~ warrant future attention, and repair. These conditions have been noted, evaluated and determined to have no loss of intended function, with work orders issued. The most significant of these include:

1. The auxiliary building is considered to be functional but degraded and a Maintenance Rule (MR) (a)(1) structure. Repair activities started in 2014 to address seven internal wall or floor locations at various elevations with identified concrete degradation, such as cracked plaster in stairwells. Engineering changes and repairs were completed for three of the seven locations in 2015, including excavation and repair of spalled concrete, with the remaining four items addressed through the CAP and currently scheduled for resolution by the end of 2020.
2. The Unit 3 spent fuel building is also considered to be functional but degraded, with the Unit 4 spent fuel building showing signs of degradation. Spalling and exposed reinforcement on exterior walls above the water level in the spent fuel pit have been identified and **quantitatively** evaluated relative to external and internal loading and water loss with the determination that there has been no loss of function. The issue is being addressed through **more frequent inspections via** the CAP and currently scheduled for resolution by the end of 2020.
3. The Unit 3 and Unit 4 intake structures have bays that are operable but degraded, with ICW pump slab reinforcing steel beams which evidence corrosion that warrants removal/repair prior to recoating. Two of the six bays were repaired and recoated in 2016, as described for the PTN Inspection of Water Control Structures Associated with Nuclear Power Plants AMP (Section B.2.3.36).

Examples of structural areas where degradation has been effectively identified, evaluated, and repaired include the turbine building, and plant vent stack:

1. In 2015, pieces of concrete and corroded rebar were determined to be falling from the turbine deck to the mezzanine near the penetration at the ceiling where the steam pipes go to the turbine deck. Nearby areas of the ceiling and turbine deck

were inspected and determined that degradation was localized and there was no concern with structural integrity of the turbine deck. Instrumentation and equipment were not adversely affected in the area congested with steam piping and relatively low ceiling. It was also determined there was no immediate concern for personnel safety, as long as individuals entering the area were wearing required personal protective equipment (PPE). As a precaution, the area was marked to warn of the falling and loose concrete. The 2015 condition is bounded by an apparent cause evaluation (ACE), for concrete spalling from the bottom side of the turbine deck, performed in 2007. The 2015 evaluation agreed with the ACE conclusion, in that the condition does not present a significant structural concern and repairs should be performed in a timely manner to prevent additional corrosion and material loss of the exposed rebar. Work orders were issued and Plant Engineering continued to monitor the condition of the structure every 18 months until repairs were completed in late 2016.

2. Water intrusion issues into the switchgear/load center rooms, which are located in the turbine building, have been an ongoing issue at PTN. As part of the long-term asset management program at PTN, a specific action item was generated to track and perform a remediation. The issue was partially corrected in 2014 by applying a roofing system to the impacted areas, with follow-up actions and repair completed in the fourth quarter of 2015 for Unit 4 and in the first quarter of 2016 for Unit 3. To date, there has been no recurrence of water intrusion into the switchgear / load center rooms since post-modification confirmation of the roofing system.

3. Degradation of the plant vent stack was reported in 2003. In 2007, the plant vent stack cat walk was determined to be unsafe for personnel use. In 2009, a plant operability determination was performed and concluded that the plant vent stack was capable of withstanding design basis loads. In 2010, the plant vent stack was determined to have low margin. In 2012, the plant vent stack was determined to be a nonconformance. Further inspection and evaluation were performed through the CAP. Contingency shoring (cable/rope) was installed for the plant vent stack in preparation for inclement weather and to ensure that the structure could sustain design basis events prior to work order completion. The corroded platform was repaired and the structure restored to original design condition in 2013.

As stated in Section B.1.1, the System and Structures Monitoring Program, credited for the PEO, was found to ~~be~~ **have** ineffective **elements** in the December 2017 PTN License Renewal AMP Effectiveness Review. At PTN, the Systems and Structures Monitoring AMP is treated as two separate AMPs. The Structures sub-part of the AMP will be discussed here, since it is most associated with the Structures Monitoring AMP which will be credited for the SPEO. The Structures sub-part of the AMP failed Element 2, Preventive Actions, Element 4, Detection of Aging Effects, and Element 7, Corrective Actions. Failed elements were due to the deficiencies listed below, with the associated resolutions also described:

a. Scheduled Unit 3 walkdowns had not been completed within the 5-year interval. The Unit 3 walkdowns that had exceeded the 5-year interval were completed in December 2017. The evaluation of these walkdowns results concluded there would be no loss of function prior to the next scheduled inspection.

b. Follow-up inspections for evidence of correction of degradation were not tracked to completion. Follow-up inspections were completed in December of 2017. The evaluation of these follow-up inspections concluded that the lack of inspections did not result in component loss of function.

PTN is actively scoping and implementing appropriate repairs of structures with on-going degraded areas and performing more frequent inspections until the repairs have been implemented. PTN is **also** actively implementing and managing its AMPs overall and seeking to identify areas that would improve the effectiveness of aging management. As described, corrective actions have been initiated and completed to resolve AMP issues regarding the identified ineffectiveness of the Systems and Structures Monitoring AMP. As an extent of condition, the latest AMP effectiveness assessment requires all AMP owners to review the assessment findings and take corrective action, as necessary, to resolve any similar weaknesses. In addition, AMP effectiveness for this AMP will be re-assessed in 2018 per NEI 14-12.

Conclusion

The PTN Structures Monitoring AMP, with an exception and enhancements, will provide reasonable assurance that the effects of aging will be managed so that the intended function(s) of components within the scope of the AMP will be maintained consistent with the CLB during the SPEO.

Associated Enclosures:

Nones

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

RAI B.2.3.35-6

Background:

SRP-SLR Section 1.2 states that if an applicant takes credit for a program in the GALL-SLR Report, it is incumbent on the applicant to ensure that the conditions and OpE at the plant are bounded by the conditions and OpE for which the GALL-SLR Report program was evaluated. If these bounding conditions are not met, the applicant must address the additional effects of aging and augment the AMP(s) in the GALL-SLR Report in the SLRA, as appropriate. SRP-SLR Section A.4 provides that OpE should provide objective evidence to support the conclusion that the effects of aging are managed adequately so that the SCs' intended function(s) will be maintained during the subsequent period of extended operation.

SLRA Section B.2.3.35 states that the PTN Structures Monitoring AMP, with an exception and enhancements, will be consistent with the ten elements GALL-SLR Report, Section XI.S6, "Structures Monitoring." The SLRA concludes that the SMP, with an exception and enhancements, will provide reasonable assurance that the effects of aging will be managed so that the intended function(s) of components within the scope of the AMP will be maintained consistent with the CLB during the SPEO.

During the in-office and on-site audits, the staff interviewed the applicant's staff, reviewed onsite documentations, performed walkdowns, and made the following observations:

- During the walkdowns the staff observed significant corrosion degradations in the exterior of the Unit 4 fuel handling building. Concrete was cracked, delaminated, and spalled, and uncovered rebar was corroded. The staff also observed similar degradations in the exterior of the Unit 3 fuel handling building.
- The staff reviewed report No. 400149-CA-001, and noted that the engineering assessment of the structure concluded that the Unit 4 fuel handling building west and north wall currently have active corrosion at a medium to high corrosion rate. The staff also noted that the report attributed the on-ongoing corrosion degradation to the harsh environment present at the site (i.e. the outdoor air contains a high concentration of airborne chlorides). The report also recommends implementing a cathodic protection system to minimize the continued repeat cycle of repairs and further deterioration of the surrounding concrete.

Issue:

Based on the staff review of on-site documentation and staff observed conditions during the audit walkdowns of the Unit 3 and 4 fuel handling buildings, it is not clear how the structures monitoring program-specified inspection frequency of 5 years remains adequate for the inspection of the fuel handling buildings considering the current condition of the structures and the structural assessment which concludes that the evaluated portions of the structures have an "active corrosion at a medium to high corrosion rate."

Request:

Clarify the basis for the SMP specified inspection frequency of 5 years for the fuel handling buildings considering the Unit 3 and 4 fuel handling building current conditions, operating experience, and the latest structural assessment (with or without additional mitigation systems to reduce the expected further degradation of the structures).

FPL Response:

The basis for the specified Turkey Point Structures Monitoring AMP 5 year inspection frequency is described in the response to B.2.3.35-5 (L-2018-191 Attachment 4). More frequent inspections of the appropriate degraded areas are being performed, in accordance with the implementing procedure for the Structures Monitoring program, that are based on quantitative criteria and corresponding best estimate functionality projections from the latest structural assessment. Inspections are also conducted for scoping, prioritization and implementation of repair to other degraded areas. Operating experience is that the Unit 4 Fuel Handling Building is under increased inspection frequency. Per the ongoing corrective actions, fuel handling building degradation is inspected on a quarterly basis. Since the Unit 4 Fuel Handling Building is in a state of increased degradation, this condition serves as the leading indicator for the Unit 3 Fuel Handling Building condition.

Revisions to SLRA Section 17.2.2.35; Table 17-3, item 39; and Section B.2.3.35 that reflect the updates of the Structures Monitoring AMP related to the more frequent inspections discussed above are detailed in the response to Set 7 RAI B.2.3.35-5 (L-2018-191 Attachment 4) and are not repeated here.

References:

None

Associated SLRA Revisions:

None

Associated Enclosures:

None

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

4. Concrete, GALL AMP XI.S6, and Inaccessible Areas

Regulatory Basis:

Section 54.21(a)(3) of 10 CFR requires the applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the SCs' intended functions will be maintained consistent with the current licensing basis for the period of extended operation. As described in the SRP-SLR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL-SLR Report and explaining when evaluation of the matter in the GALL-SLR Report applies to the plant.

RAI 3.5.1.48-1

Background:

The GALL-SLR Report (AMR 3.5.1-48) and SRP-SLR Section 3.5.2.2.2.2 recommend further evaluation of a plant-specific program for the aging effect of reduction of strength and modulus of concrete of Group 1-5 structures if any portion of concrete is exposed to temperatures that exceed 150 °F for general areas or 200 °F for local areas (Note: Group 2 is for BWR reactor buildings which is not applicable to Turkey Point). SLRA Section 3.5.2.2.2.2 addresses the further evaluation by stating in part the following:

> Turkey Point structures are maintained below a bulk average temperature of 120 °F by plant cooling systems. [...] Process piping carrying hot fluid (pipe temperature greater than 200 °F) routed through penetrations in the concrete walls by design does not result in temperatures exceeding 200 °F locally or result in a "hot spot" on the concrete surface. The penetration configuration includes guard pipes and insulation of the process piping to minimize heat transfer from the process pipe to the exterior environment surrounding the process piping. Therefore, reduction of strength and modulus due to elevated temperature is not an aging effect requiring management for Turkey Point Group 1, 3–5 structures.

The GALL-SLR Report defines reduced thermal insulation resistance as an aging effect in which there is a decrease in the effectiveness of the thermal insulation inhibit/prevent heat transfer across a thermal gradient. The GALL-SLR Report (specifically AMR 3.4.1-64) recommends that this aging effect be managed in non-metallic thermal insulation structures and components exposed to air and/or condensation by the GALL-SLR AMP XI.M36, "External Surfaces Monitoring of Mechanical Components." SLRA Section B.2.3.23 states that the External Surfaces Monitoring of Mechanical Components Program is an existing AMP that will be consistent, with enhancements, with the GALL-SLR AMP XI.M36.

Issue:

Although the SLRA states that insulation of process piping is used to minimize heat transfer such that the temperature at local areas of concrete does not exceed 200 °F, there is no AMR addressing the aging effect of reduced thermal insulation resistance due to moisture intrusion. Absent the management of this aging effect, it is not clear how piping insulation will continue to perform its intended function and prevent concrete from being exposed to temperatures greater than 200 °F. Since the applicant has not proposed to manage degradation of the insulation, it is not clear that local areas of concrete will not be exposed to temperatures greater than 200 °F, and thus the staff needs additional information to justify the assertion that the aging effect of reduction of strength and modulus of concrete due to elevated temperatures is not an applicable aging effect for Turkey Point Group 1, 3–5 structures.

Request:

(1) State whether and how the aging effect of reduced thermal insulation resistance will be managed for the thermal insulation in the process pipes referenced in SLRA Section 3.5.2.2.2.2.

(2) If the aging effect of reduced thermal insulation resistance will not be age-managed:

(a) Clarify why concrete will not be exposed to local area temperatures greater than 200 °F through the SPEO; or,

(b) State how the aging effect of reduction of strength and modulus of concrete due to elevated temperatures will be managed.

FPL Response:

The Turkey Point Group 1 and 3–5 structures with concrete that is penetrated by piping containing fluids that have temperatures that could be above 200°F include the auxiliary building, turbine building, emergency diesel generator buildings, main steam and feedwater platforms, containment internals, and the containments. The in-scope buildings that do not contain piping above 200 °F include the control building, switchgear rooms, yard structures (excluding the main steam and feedwater platforms), and the refueling canals.

Non-Containment Penetrations

The systems that contain piping that could operate above 200°F and pass through concrete in non-containment penetrations include the reactor coolant system, residual heat removal system, the chemical and volume control system, primary sampling system, secondary sampling system, emergency diesel generator air system, main steam and turbine system, feedwater and blowdown system, auxiliary feedwater system, auxiliary steam system, condensate system, and feedwater heater drains and vents system.

The piping penetrations for the systems described above contain pipe sleeves and are designed such that air flow around the penetration would prevent overheating of the concrete. However, analyses to show that the concrete temperatures around hot (>200°F) piping would remain below 200°F could not be located. Therefore, insulation of the process piping near penetration locations is conservatively included within the scope of subsequent license renewal to assist in maintaining local concrete temperatures below 200°F. Per the insulation specification, insulation consists of either stainless steel or aluminum jacketing and the insulation itself consists of either calcium silicate, glass fiber, mineral fiber, or reflective type insulation. The SLRA is revised to include the screening and aging management review results based on adding insulation to the scope of subsequent license renewal. The External Surfaces Monitoring of Mechanical Component AMP already manages aging effects associated with metallic insulation jacketing and non-metallic insulating materials as described in SLRA Section B.2.3.23.

Containment Penetrations

With regard to containment penetrations, the concrete surrounding these penetrations will not be exposed to local area temperatures greater than 200 °F per Section 5.1.3.2 and Figure 5.1-8 of the UFSAR. Steady state computer analysis, using a generalized heat transfer program for the idealized conditions with no cooling, indicate that concrete temperatures near hot piping penetrations will remain below 150 °F during normal operation.

The defense in depth features related to maintaining the concrete temperature below 200 °F include thermocouples that have been embedded in the concrete at the large hot process piping penetrations (main steam, feedwater, blowdown, and the chemical volume and control system non-regenerative letdown line) to monitor the actual concrete temperatures, and identify the need for corrective actions if temperatures approach 200 °F. Although not credited for SLR, these hot process piping penetrations have also been provided with forced air cooling to facilitate maintaining concrete temperatures below design limits.

The SLRA is revised to clarify the differences between containment and non-containment penetrations as related to how associated concrete temperatures are maintained below 200°F.

References:

None

Associated SLRA Revisions:

SLRA Table 2.1-3 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.1-3
Passive Structure/Component Intended Function

Intended Functions	Definition
Thermal insulation jacket integrity	**Provide physical support of thermal insulation**

SLRA Section 2.1.6.1 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

With regard to thermal insulation on mechanical components, no insulation was included in the scope of original license renewal because the insulation did not perform an intended function or directly support the intended functions of other SCs within the scope of license renewal. **For SLR, insulation is relied upon near non-containment penetrations to ensure local concrete temperatures remain below 200°F. Containment penetrations include guard pipes to minimize heat transfer from the process pipe to the exterior environment surrounding the process piping, and thermocouples embedded in the concrete at hot containment process piping penetrations to monitor actual concrete temperatures. Analysis was performed to demonstrate that the containment concrete temperatures remain below 200°F in the absence of insulation.**

The systems that contain non-containment penetrations through concrete and also contain fluids with temperatures above 200°F include the reactor coolant system, chemical and volume control system, primary sampling system, residual heat removal system, secondary sampling system, emergency diesel generator air system, main steam system, condensate system, feedwater and blowdown system, auxiliary feedwater system, and turbine system. For these systems, insulation is credited to assist the pipe sleeves to maintain local concrete temperatures below 200°F.

~~Based on a review of modifications performed since original license renewal, no changes have occurred that require that insulation be included in the scope of subsequent license renewal. Turkey Point ensures building temperatures are maintained within normal operating environmental qualification design limits, and takes specific corrective action if a condition occurs that would challenge those temperatures. Additionally, adverse localized environments are addressed as part of the Environmental Qualification AMP (B.2.2.4) and the Electrical Insulation for Electrical Cables and Connections not Subject to 10 CFR 50.49 EQ Requirements AMP (B.2.3.38)~~

The system intended functions in SLRA Section 2.3.1 on page 2.3-3 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Nonsafety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

(1) Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function. **This includes nonsafety-related insulation and associated jacketing on piping that prevents excessive localized concrete temperatures.**

SLRA Table 2.3.1-1 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.3.1-1
Reactor Coolant and Connected Piping
Components Subject to Aging Management Review

Component Type	Component Intended Function(s)
Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**
Insulation – Thermal	**Insulate (thermal)**

The system intended functions in SLRA Section 2.3.2.5 on page 2.3-38 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Nonsafety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

(1) Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function. **This includes nonsafety-related insulation on piping that prevents excessive localized concrete temperatures.**

SLRA Table 2.3.1-5 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.3.2-5
Residual Heat Removal Components Subject to Aging Management Review

Component Type	Component Intended Function(s)
Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**
Insulation – Thermal	**Insulate (thermal)**

SLRA Section 2.3.3.4 paragraph 6 on page 2.3-58 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Insulation **associated with non-containment piping penetrations is relied upon to maintain local concrete below 200°F.**~~is not within the scope of SLR for CVCS because the systems do not contain boric acid solutions at concentrations that require heat tracing, tank heaters, and/or insulation to prevent precipitation.~~

The system intended functions in SLRA Section 2.3.3.4 on page 2.3-60 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Nonsafety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

(1) Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function. **This includes nonsafety-related insulation on piping that prevents excessive localized concrete temperatures.**

SLRA Table 2.3.3-4 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.3.3-4
Chemical and Volume Control
Components Subject to Aging Management Review

Component Type	Component Intended Function(s)
Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**
Insulation – Thermal	**Insulate (thermal)**

The system intended functions in SLRA Section 2.3.3.6 on page 2.3-66 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Nonsafety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

(1) Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function. **This includes nonsafety-related insulation on piping that prevents excessive localized concrete temperatures.**

SLRA Table 2.3.3-6 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.3.3-6
Primary Sampling Components
Subject to Aging Management Review

Component Type	Component Intended Function(s)
Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**
Insulation – Thermal	**Insulate (thermal)**

The system intended functions in SLRA Section 2.3.3.7 on page 2.3-70 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Nonsafety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

(1) Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function. **This includes nonsafety-related insulation on piping that prevents excessive localized concrete temperatures.**

SLRA Table 2.3.3-7 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.3.3-7
Secondary Sampling Components
Subject to Aging Management Review

Component Type	Component Intended Function(s)
Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**
Insulation – Thermal	**Insulate (thermal)**

The system intended functions in SLRA Section 2.3.3.14 on page 2.3-106 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Nonsafety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

(1) Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety

function. **This includes nonsafety-related insulation on piping that prevents excessive localized concrete temperatures.**

SLRA Table 2.3.3-14 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.3.3-14
Emergency Diesel Generator Air
Components Subject to Aging Management Review

Component Type	Component Intended Function(s)
Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**
Insulation – Thermal	**Insulate (thermal)**

The system intended functions in SLRA Section 2.3.4.1 on page 2.3-121 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Nonsafety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

(1) Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function. **This includes nonsafety-related insulation on piping that prevents excessive localized concrete temperatures.**

SLRA Table 2.3.4-1 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.3.4-1
Main Steam and Turbine Components
Subject to Aging Management Review

Component Type	Component Intended Function(s)
Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**
Insulation – Thermal	**Insulate (thermal)**

The system intended functions in SLRA Section 2.3.4.2 on page 2.3-126 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Nonsafety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

(1) Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function. **This includes nonsafety-related insulation on piping that prevents excessive localized concrete temperatures.**

SLRA Table 2.3.4-2 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.3.4-2
Feedwater and Blowdown Components
Subject to Aging Management Review

Component Type	Component Intended Function(s)
Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**
Insulation – Thermal	**Insulate (thermal)**

The system intended functions in SLRA Section 2.3.4.3 on page 2.3-129 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Nonsafety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

(1) Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function. **This includes nonsafety-related insulation on piping that prevents excessive localized concrete temperatures.**

SLRA Table 2.3.4-3 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.3.4-3
Auxiliary Feedwater and Condensate Storage
Components Subject to Aging Management Review

Component Type	Component Intended Function(s)
Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**
Insulation – Thermal	**Insulate (thermal)**

SLRA Section 2.3.4-4 paragraph 1 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

As discussed in Section 2.1.3.3, systems within the scope of SLR based on the criterion of 10 CFR 54.4(a)(2) interact with safety-related systems in one of two ways: functional or physical. A functional failure is one where the failure of the nonsafety-related SSC to perform its function impacts a safety function. A physical failure is one where a safety function is impacted by the loss of structural or mechanical integrity of a nonsafety-related SSC in physical proximity to a safety-related SSC. Functional failures of nonsafety-related SSCs that could impact a safety function, and physical failures of nonsafety-related SSCs directly connected to safety-related SSCs, are identified with the individual system's screening evaluation. Scoping and screening for physical failures of nonsafety-related SSCs that could impact a safety function based on spatial interactions with steam and power conversion systems are addressed in this section. **Piping insulation is also screened in for steam and power conversion system components in the scope of 10 CFR 54.4(a)(2) because it assists in maintaining local concrete temperatures surrounding penetrations below 200°F.**

SLRA Table 2.3.4-4 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Table 2.3.4-4-1
Component Intended Functions for 10 CFR 54.4(a)(2) Components in the Turbine Building Subject to Aging Management Review

System	Component Type	Intended Function	AMR Results
Auxiliary steam[1]	Bolting	Leakage boundary (spatial)	Table 3.4.2-4
	Piping		
	Piping and piping components		
	Valve body		
	Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**	
	Insulation – Thermal	**Insulate (thermal)**	
Main steam and Turbine Generators[2]	See Table 2.3.4-1 for a list of component types	Leakage boundary (spatial)	Table 3.4.2-1
Condensate[3]	Bolting	Leakage boundary (spatial)	Table 3.4.2-5
	Orifice		
	Piping		
	Piping and piping components		
	Thermowell		
	Valve body		
	Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**	
	Insulation – Thermal	**Insulate (thermal)**	
Feedwater and Blowdown[4]	See Table 2.3.4-2 for a list of component types	Leakage boundary (spatial)	Table 3.4.2-2
Feedwater heater drains and vents[5]	Bolting	Leakage boundary (spatial)	Table 3.4.2-6
	Flow element		
	Piping		
	Piping and piping components		
	Thermowell		
	Valve body		
	Insulation Jacketing – Thermal	**Thermal insulation jacket integrity**	
	Insulation – Thermal	**Insulate (thermal)**	

The materials and aging effects requiring management in SLRA Section 3.1.2.1.1 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for the Reactor Coolant and Connected Piping components are:

- **Aluminum**
- Carbon steel
- Cast austenitic stainless steel (CASS)
- Coating
- **Non-metallic insulation**
- Stainless steel

Aging Effects Requiring Management

The following aging effects associated with the Reactor Coolant and Connected Piping require management:

- Cracking
- Loss of coating or lining integrity
- Loss of material
- Loss of preload
- Reduction in fracture toughness
- Reduction of heat transfer
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.2.2.1.5 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for residual heat removal are:

- **Aluminum**
- Carbon steel
- **Non-metallic insulation**
- Stainless steel
- CASS

Aging Effects Requiring Management

The following aging effects associated with the residual heat removal require management:

- Cracking
- Cumulative fatigue damage
- Loss of material
- Loss of preload

- Reduction of heat transfer
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.3.2.1.4 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for Chemical and Volume Control components are:

- **Aluminum**
- Carbon steel
- Copper alloy
- Copper alloy >15% Zn
- Gray cast iron
- **Non-metallic insulation**
- Stainless steel

Aging Effects Requiring Management

The following aging effects associated with the Chemical and Volume Control components require management:

- Cracking
- Cumulative fatigue damage
- Loss of material
- Loss of preload
- Reduction of heat transfer
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.3.2.1.6 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for the primary sampling system components are:

- **Aluminum**
- Carbon steel
- **Non-metallic insulation**
- Stainless steel

Aging Effect Requiring Management

The following aging effects associated with the primary sampling system components require management:

- Cracking
- Cumulative fatigue damage
- Loss of material

- Loss of preload
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.3.2.1.7 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for the Secondary Sampling components are:

- **Aluminum**
- Carbon steel
- **Non-metallic insulation**
- Stainless steel

Aging Effect Requiring Management

The following aging effects associated with the Secondary Sampling components require management:

- Cracking
- Cumulative fatigue damage
- Loss of material
- Loss of preload
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.3.2.1.17 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for the Emergency Diesel Generator Air components are:

- **Aluminum**
- Aluminum alloy
- Carbon steel
- CASS
- Cast iron
- Copper alloy
- Elastomer
- Galvanized steel
- **Non-metallic insulation**
- Stainless steel

Aging Effect Requiring Management

The following aging effects associated with the Emergency Diesel Generator Air components require management:

- Cracking

- Cumulative fatigue damage
- Hardening or loss of strength
- Loss of material
- Loss of preload
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.4.2.1.1 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for the Main Steam and Turbine Generators components are:

- **Aluminum**
- Carbon steel
- Copper alloy > 15% Zn
- Low-alloy steel
- **Non-metallic insulation**
- Stainless steel

Aging Effects Requiring Management

The following aging effects associated with the Main Steam and Turbine Generators components require management:

- Cracking
- Cumulative fatigue damage
- Loss of material
- Loss of preload
- Wall thinning – erosion
- Wall thinning – FAC
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.4.2.1.2 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for the Feedwater and Blowdown components are:

- **Aluminum**
- Carbon steel
- Coating
- Copper alloy
- **Non-metallic insulation**
- Stainless steel

Aging Effects Requiring Management

The following aging effects associated with the Feedwater and Blowdown components require management:

- Cracking
- Cumulative fatigue damage
- Loss of coating or lining integrity
- Loss of material
- Loss of preload
- Wall thinning – erosion
- Wall thinning – FAC
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.4.2.1.3 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for the Auxiliary Feedwater and Condensate Storage components are:

- **Aluminum**
- Carbon steel
- CASS
- Coating
- Copper alloy
- Gray cast iron
- Low-alloy steel
- **Non-metallic insulation**
- Stainless steel

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Feedwater and Condensate Storage components require management:

- Cracking
- Cumulative fatigue damage
- Loss of coating or lining integrity
- Loss of material
- Loss of preload
- Reduction of heat transfer
- Wall thinning – FAC
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.4.2.1.4 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for the Auxiliary Steam components are:

- **Aluminum**
- Carbon steel
- **Non-metallic insulation**
- **Stainless steel**

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Steam components require management:

- Cumulative fatigue damage
- Loss of material
- Loss of preload
- Wall thinning – erosion
- Wall thinning – FAC
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.4.2.1.5 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for the Condensate components are:

- **Aluminum**
- Carbon steel
- **Non-metallic insulation**
- Stainless steel

Aging Effects Requiring Management

The following aging effects associated with the Condensate components require management:

- Cracking
- Cumulative fatigue damage
- Loss of material
- Loss of preload
- Wall thinning – erosion
- Wall thinning – FAC
- **Reduction in thermal insulation resistance**

The materials and aging effects requiring management in SLRA Section 3.4.2.1.6 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

Materials

The materials of construction for the Feedwater Heater Drains and Vents components are:

- **Aluminum**
- Carbon steel
- **Non-metallic insulation**
- Stainless steel

Aging Effects Requiring Management

The following aging effects associated with the Feedwater Heater Drains and Vents components require management:

- Cracking
- Loss of material
- Loss of preload
- **Reduction in thermal insulation resistance**

The last paragraph of SLRA Section 3.2.2.2.8 on page 3.2-15 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

~~As the Engineered Safety Features systems do not contain any aluminum or aluminum alloy components, cracking of aluminum alloys is not an applicable aging effect.~~

The only aluminum components in the Engineered Safety Features systems are insulation jacketing. Consistent with the recommendation of NUREG-2191, cracking of aluminum insulation jacketing will be managed via the External Surfaces Monitoring of Mechanical Components AMP. This AMP provides for the management of aging effects through periodic visual inspection. Any visual evidence of cracking will be evaluated for acceptability. Deficiencies will be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components AMP is described in Appendix B.

The last paragraph of SLRA Section 3.2.2.2.10 on page 3.2-18 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

~~As the Engineered Safety Features systems do not contain any aluminum or aluminum alloy components, loss of material of aluminum alloys is not an applicable aging effect.~~

The only aluminum components in the Engineered Safety Features systems are insulation jacketing. Consistent with the recommendation of NUREG-2191, loss of material of aluminum insulation jacketing will be managed via the External Surfaces Monitoring of Mechanical Components AMP. This AMP provides for the management of aging effects through periodic visual inspection. Any visual evidence of loss of material will be evaluated for acceptability. Deficiencies will

be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components AMP is described in Appendix B.

The last paragraph of SLRA Section 3.4.2.2.7 on page 3.4-15 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

~~As the Steam and Power Conversion systems do not contain any aluminum or aluminum alloy components, cracking of aluminum alloys is not an applicable aging effect.~~

The only aluminum components in the Steam and Power Conversion systems are insulation jacketing. Consistent with the recommendation of NUREG-2191, cracking of aluminum insulation jacketing will be managed via the External Surfaces Monitoring of Mechanical Components AMP. This AMP provides for the management of aging effects through periodic visual inspection. Any visual evidence of cracking will be evaluated for acceptability. Deficiencies will be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components AMP is described in Appendix B.

The last paragraph of SLRA Section 3.4.2.2.9 on page 3.4-17 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

~~As the Steam and Power Conversion systems do not contain any aluminum or aluminum alloy components, loss of material of aluminum alloys is not an applicable aging effect.~~**The only aluminum components in the Steam and Power Conversion systems are insulation jacketing. Consistent with the recommendation of NUREG-2191, loss of material of aluminum insulation jacketing will be managed via the External Surfaces Monitoring of Mechanical Components AMP. This AMP provides for the management of aging effects through periodic visual inspection. Any visual evidence of loss of material will be evaluated for acceptability. Deficiencies will be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components AMP is described in Appendix B.**

SLRA Section 3.5.2.2.1.2 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

The containment bulk ambient temperature during operation is between 50°F and 120°F. Operation with elevated normal bulk containment temperatures up to 125°F for short periods of time during the summer months has also been evaluated. ACI 349, Code Requirements for Nuclear Safety Related Concrete Structures, specifies concrete temperature limits for normal operations or any other long-term period. Process piping carrying hot fluid (pipe temperature greater than 200°F) routed through penetrations in the concrete walls by design **(per Section 5.1.3.2 and Figure 5.1-8 of the UFSAR)** does not result in temperatures exceeding 200°F locally or result in a "hot spot" on the concrete surface. Therefore, reduction of strength and modulus due to elevated temperature is not an aging effect requiring management for the containment structure.

SLRA Section 3.5.2.2.2.2 is amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions:

During normal operation, structures at Turkey Point are maintained below a bulk average temperature of 120°F by plant cooling systems. ACI 349, Code Requirements for Nuclear Safety Related Concrete Structures, specifies concrete temperature limits for normal operations or any other long-term period. Process piping carrying hot fluid (pipe temperature greater than 200°F) routed through penetrations in the ~~concrete~~ **containment** walls~~s~~ by design **(per Section 5.1.3.2 and Figure 5.1-8 of the UFSAR)** does not result in temperatures exceeding 200°F locally or result in a "hot spot" on the concrete surface. **Non-containment** ~~The~~ penetration configuration**s** include~~s~~ ~~guard pipes~~ **pipe sleeves** and insulation of the process piping to minimize heat transfer from the process pipe to the exterior environment surrounding the process piping **to ensure local concrete temperatures remain below 200°F**. Therefore, reduction of strength and modulus due to elevated temperature is not an aging effect requiring management for Turkey Point Group 1, 3–5 structures.

SLRA Tables 3.1-1, 3.2-1, 3.3-1, 3.4-1, 3.1.2-1, 3.2.2-5, 3.3.2-4, 3.3.2-6, 3.3.2-7, 3.3.2-17, 3.4.2-1, 3.4.2-2, 3.4.2-3, 3.4.2-4, 3.4.2-5, and 3.4.2-6 are amended as indicated by the following text deletion (strikethrough text) and text addition (red underlined font) revisions.

Revise Table 3.1-1 item 134 as follows:

Table 3.1-1: Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Program (AMP)/TLAA**	**Further Evaluation Recommended**	**Discussion**
3.1-1, 134	Non-metallic thermal insulation exposed to air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	~~Not applicable.~~ ~~No non-metallic thermal insulation associated with reactor coolant piping and piping components performs a SLR intended function.~~ **Consistent with NUREG-2191. The External Surfaces Monitoring of Mechanical Components AMP is used to manage reduced thermal insulation resistance due to moisture intrusion.**

Revise Table 3.2-1 items 042, 087, and 101 as follows:

Table 3.2-1: Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Program (AMP)/TLAA**	**Further Evaluation Recommended**	**Discussion**
3.2-1, 042	Aluminum piping, piping components, tanks exposed to air, condensation (external)	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection," AMP XI.M36, "External Surfaces Monitoring of Mechanical Components," or AMP XI.M42, "Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes (SRP-SLR Section 3.2.2.2.10)	~~Not applicable.~~ ~~There are no aluminum piping, piping components or tanks in the Engineered Safety Features systems.~~ **Consistent with NUREG-2191.** **The External Surfaces Monitoring of Mechanical Components AMP is used to manage loss of material for aluminum insulation jacketing.** **Further evaluation is documented in Section 3.2.2.2.10.**

Table 3.2-1: Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Program (AMP)/TLAA	Further Evaluation Recommended	Discussion
3.2-1, 087	Non-metallic thermal insulation exposed to air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	~~Not applicable.~~ ~~The Engineered Safety Features systems do not include any thermal insulation that is within the scope of SLR.~~ **Consistent with NUREG-2191. The External Surfaces Monitoring of Mechanical Components AMP is used to manage reduced thermal insulation resistance due to moisture intrusion.**

Table 3.2-1: Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Program (AMP)/TLAA	Further Evaluation Recommended	Discussion
3.2-1, 101	Aluminum piping, piping components, tanks exposed to air, condensation (external)	Cracking due to SCC	AMP XI.M32, "One Time Inspection," AMP XI.M36, "External Surfaces Monitoring of Mechanical Components," or AMP XI.M42, "Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes (SRP-SLR Section 3.2.2.2.8)	~~Not applicable.~~ ~~The Engineered Safety Features systems do not include any aluminum piping, piping components or tanks.~~ **Consistent with NUREG-2191.** **The External Surfaces Monitoring of Mechanical Components AMP is used to manage cracking for aluminum insulation jacketing.** **Further evaluation is documented in Section 3.2.2.2.8.**

Revise Table 3.3-1 item 182 as follows:

Table 3.3-1: Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Program (AMP)/TLAA	Further Evaluation Recommended	Discussion
3.3-1, 182	Non-metallic thermal insulation exposed to air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	~~Not applicable.~~ ~~There is no thermal insulation in the Auxiliary Systems that require management.~~ **Consistent with NUREG-2191. The External Surfaces Monitoring of Mechanical Components AMP is used to manage reduced thermal insulation resistance due to moisture intrusion.**

Revise Table 3.4-1 items 035, 064, and 109 as follows:

Table 3.4-1: Summary of Aging Management Evaluations for the Steam and Power Conversion Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Program (AMP)/TLAA**	**Further Evaluation Recommended**	**Discussion**
3.4-1, 035	Aluminum piping, piping components, tanks exposed to air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection," AMP XI.M36, "External Surfaces Monitoring of Mechanical Components," AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," or AMP XI.M42, "Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes (SRP-SLR Section 3.4.2.2.9)	~~Not applicable.~~ ~~There are no aluminum piping or piping components in the Steam and Power Conversion Systems.~~ **<u>Consistent with NUREG-2191.</u>** **<u>The External Surfaces Monitoring of Mechanical Components AMP is used to manage cracking for aluminum insulation jacketing.</u>** **<u>Further evaluation is documented in Section 3.4.2.2.9.</u>**

Table 3.4-1: Summary of Aging Management Evaluations for the Steam and Power Conversion Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Program (AMP)/TLAA	Further Evaluation Recommended	Discussion
3.4-1, 064	Non-metallic thermal insulation exposed to air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	~~Not applicable.~~ ~~There is no thermal insulation in the scope of SLR in the Steam and Power Conversion Systems.~~ **Consistent with NUREG-2191.** **The External Surfaces Monitoring of Mechanical Components AMP is used to manage reduced thermal insulation resistance due to moisture intrusion.**

Table 3.4-1: Summary of Aging Management Evaluations for the Steam and Power Conversion Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Program (AMP)/TLAA**	**Further Evaluation Recommended**	**Discussion**
3.4-1, 109	Aluminum piping, piping components, tanks exposed to air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection," AMP XI.M36, "External Surfaces Monitoring of Mechanical Components," AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," or AMP XI.M42, "Internal Coatings/Linings for In Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes (SRP-SLR Section 3.4.2.2.7)	~~Not applicable.~~ ~~There are no aluminum components in the Steam and Power Conversion Systems.~~ **Consistent with NUREG-2191.** **The External Surfaces Monitoring of Mechanical Components AMP is used to manage cracking for aluminum insulation jacketing.** **Further evaluation is documented in Section 3.4.2.2.7.**

Revise Table 3.5-1 items 003 and 048 as follows:

Table 3.5-1: Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Program (AMP)/TLAA**	**Further Evaluation Recommended**	**Discussion**
3.5-1, 003	Concrete: dome; wall; basemat; ring girders; buttresses, concrete: containment; wall; basemat concrete: basemat, concrete fill in annulus	Reduction of strength and modulus of elasticity due to elevated temperature (>150°F general; >200°F local)	Plant-specific AMP	No	Not applicable. The containment structure bulk ambient temperature during operation is between 50°F and 120°F. **Process piping carrying hot fluid (pipe temperature greater than 200°F) routed through penetrations in the containment wall by design do not result in temperatures exceeding 200°F.** Further evaluation is documented in Section 3.5.2.2.1.2.

Table 3.5-1: Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Program (AMP)/TLAA**	**Further Evaluation Recommended**	**Discussion**
3.5-1, 048	Groups 1-5: concrete: all	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific AMP	Yes (SRP-SLR Section 3.5.2.2.2.2)	Not applicable. During normal operation, structures at Turkey Point are maintained below a bulk average temperatures of 120°F. Process piping carrying hot fluid (pipe temperature greater than 200°F) routed through penetrations in the concrete ~~walls by design~~ do not result in temperatures exceeding 200°F **<u>due to protection by pipe sleeves and insulation</u>**. Further evaluation is documented in Section 3.5.2.2.2.2.

Revise SLRA Table 3.1.2-1 by adding the following line items as follows:

Table 3.1.2-1: Reactor Coolant and Connected Piping — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - indoor uncontrolled (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	IV.C2.R-450	3.1-1, 134	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VII.E1.A-451b	3.3-1, 189	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VII.F2.A-763b	3.3-1, 234	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	V.D1.EP-103c	3.2-1, 007	A

Table 3.1.2-1: Reactor Coolant and Connected Piping — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	IV.C2.R- 452b	3.1-1, 136	A

Revise SLRA Table 3.2.2-5 by adding the following line items as follows:

Table 3.2.2-5: Residual Heat Removal — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - indoor uncontrolled (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	V.E.E-422	3.2-1, 087	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	V.E.E-444c	3.2-1, 101	A

Table 3.2.2-5: Residual Heat Removal — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	V.E.EP-114c	3.2-1, 042	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	V.D1.EP-103c	3.2-1, 007	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	V.D1.EP-107b	3.2-1, 004	A

Revise SLRA Table 3.3.2-4 by adding the following line items as follows:

Table 3.3.2-4: Chemical and Volume Control — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	**Insulate (thermal)**	**Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)**	**Air - indoor uncontrolled (ext)**	**Reduced thermal insulation resistance**	**External Surfaces Monitoring of Mechanical Components**	**VII.I.A-704**	**3.3-1, 182**	**A**
Insulation jacketing – thermal	**Thermal insulation jacket integrity**	**Aluminum**	**Air - indoor uncontrolled (ext)**	**Cracking**	**External Surfaces Monitoring of Mechanical Components**	**VII.E1.A-451b**	**3.3-1, 189**	**A**
Insulation jacketing – thermal	**Thermal insulation jacket integrity**	**Aluminum**	**Air - indoor uncontrolled (ext)**	**Loss of material**	**External Surfaces Monitoring of Mechanical Components**	**VII.F2.A-763b**	**3.3-1, 234**	**A**
Insulation jacketing – thermal	**Thermal insulation jacket integrity**	**Stainless steel**	**Air - indoor uncontrolled (ext)**	**Cracking**	**External Surfaces Monitoring of Mechanical Components**	**VII.E1.AP-209b**	**3.3-1, 004**	**A**

Table 3.3.2-4: Chemical and Volume Control — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VII.E1.AP-221b	3.3-1, 006	A

Revise SLRA Table 3.3.2-6 by adding the following line items as follows:

Table 3.3.2-6: Primary Sampling — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - indoor uncontrolled (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	VII.I.A-704	3.3-1, 182	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VII.E1.A-451b	3.3-1, 189	A

Table 3.3.2-6: Primary Sampling — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VII.F2.A-763b	3.3-1, 234	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VII.E1.AP-209b	3.3-1, 004	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VII.E1.AP-221b	3.3-1, 006	A

Revise SLRA Table 3.3.2-7 by adding the following line items as follows:

Table 3.3.2-7: Secondary Sampling — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - indoor uncontrolled (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	VII.I.A-704	3.3-1, 182	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VII.E1.A-451b	3.3-1, 189	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VII.F2.A-763b	3.3-1, 234	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VII.E1.AP-209b	3.3-1, 004	A

Table 3.3.2-7: Secondary Sampling — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VII.E1.AP-221b	3.3-1, 006	A

Revise SLRA Table 3.3.2-17 by adding the following line items as follows:

Table 3.3.2-17: Emergency Diesel Generator Air — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - indoor uncontrolled (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	VII.I.A-704	3.3-1, 182	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VII.E1.A-451b	3.3-1, 189	A

Table 3.3.2-17: Emergency Diesel Generator Air — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VII.F2.A-763b	3.3-1, 234	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VII.E1.AP-209b	3.3-1, 004	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VII.E1.AP-221b	3.3-1, 006	A

Revise SLRA Table 3.4.2-1 by adding the following line items as follows:

Table 3.4.2-1: Main Steam and Turbine Generators — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - outdoor (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	VIII.H.S-403	3.4-1, 064	A
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - indoor uncontrolled (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	VIII.H.S-403	3.4-1, 064	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - outdoor (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.H.S-457c	3.4-1, 109	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - outdoor (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.E.SP-147b	3.4-1, 035	A

Table 3.4.2-1: Main Steam and Turbine Generators — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - outdoor (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-118b	3.4-1, 002	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - outdoor (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-127b	3.4-1, 003	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.H.S-457c	3.4-1, 109	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.E.SP-147b	3.4-1, 035	A

Table 3.4.2-1: Main Steam and Turbine Generators — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-118b	3.4-1, 002	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-127b	3.4-1, 003	A

Revise SLRA Table 3.4.2-2 by adding the following line items as follows:

Table 3.4.2-2: Feedwater and Blowdown — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - outdoor (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	VIII.H.S-403	3.4-1, 064	A

Table 3.4.2-2: Feedwater and Blowdown — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - indoor uncontrolled (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	VIII.H.S-403	3.4-1, 064	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - outdoor (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.H.S-457c	3.4-1, 109	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - outdoor (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.E.SP-147b	3.4-1, 035	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - outdoor (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-118b	3.4-1, 002	A

Table 3.4.2-2: Feedwater and Blowdown — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - outdoor (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-127b	3.4-1, 003	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.H.S-457c	3.4-1, 109	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.E.SP-147b	3.4-1, 035	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-118b	3.4-1, 002	A

Table 3.4.2-2: Feedwater and Blowdown — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-127b	3.4-1, 003	A

Revise SLRA Table 3.4.2-3 by adding the following line items as follows:

Table 3.4.2-3: Auxiliary Feedwater and Condensate Storage — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - outdoor (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	VIII.H.S-403	3.4-1, 064	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - outdoor (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.H.S-457c	3.4-1, 109	A

Table 3.4.2-3: Auxiliary Feedwater and Condensate Storage — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	**Thermal insulation jacket integrity**	**Aluminum**	**Air - outdoor (ext)**	**Loss of material**	**External Surfaces Monitoring of Mechanical Components**	**VIII.G.SP-147b**	**3.4-1, 035**	**A**
Insulation jacketing – thermal	**Thermal insulation jacket integrity**	**Stainless steel**	**Air - outdoor (ext)**	**Cracking**	**External Surfaces Monitoring of Mechanical Components**	**VIII.B1.SP-118b**	**3.4-1, 002**	**A**
Insulation jacketing – thermal	**Thermal insulation jacket integrity**	**Stainless steel**	**Air - outdoor (ext)**	**Loss of material**	**External Surfaces Monitoring of Mechanical Components**	**VIII.B1.SP-127b**	**3.4-1, 003**	**A**

Revise SLRA Table 3.4.2-4 by adding the following line items as follows:

Table 3.4.2-4: Auxiliary Steam 10 CFR 54.4(a)(2) Spatial Interactions — Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	**Insulate (thermal)**	**Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)**	**Air - outdoor (ext)**	**Reduced thermal insulation resistance**	**External Surfaces Monitoring of Mechanical Components**	**VIII.H.S-403**	**3.4-1, 064**	**A**
Insulation jacketing – thermal	**Thermal insulation jacket integrity**	**Aluminum**	**Air - outdoor (ext)**	**Cracking**	**External Surfaces Monitoring of Mechanical Components**	**VIII.H.S-457c**	**3.4-1, 109**	**A**
Insulation jacketing – thermal	**Thermal insulation jacket integrity**	**Aluminum**	**Air - outdoor (ext)**	**Loss of material**	**External Surfaces Monitoring of Mechanical Components**	**VIII.E.SP-147b**	**3.4-1, 035**	**A**
Insulation jacketing – thermal	**Thermal insulation jacket integrity**	**Stainless steel**	**Air - outdoor (ext)**	**Cracking**	**External Surfaces Monitoring of Mechanical Components**	**VIII.B1.SP-118b**	**3.4-1, 002**	**A**

Table 3.4.2-4: Auxiliary Steam 10 CFR 54.4(a)(2) Spatial Interactions — Summary of Aging Management Evaluation								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-2191 Item**	**Table 1 Item**	**Notes**
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - outdoor (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-127b	3.4-1, 003	A

Revise SLRA Table 3.4.2-5 by adding the following line items as follows:

Table 3.4.2-5: Condensate 10 CFR 54.4(a)(2) Spatial Interactions — Summary of Aging Management Evaluation								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-2191 Item**	**Table 1 Item**	**Notes**
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - outdoor (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	VIII.H.S-403	3.4-1, 064	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - outdoor (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.H.S-457c	3.4-1, 109	A

Table 3.4.2-5: Condensate 10 CFR 54.4(a)(2) Spatial Interactions — Summary of Aging Management Evaluation								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-2191 Item**	**Table 1 Item**	**Notes**
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - outdoor (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.E.SP-147b	3.4-1, 035	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - outdoor (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-118b	3.4-1, 002	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - outdoor (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-127b	3.4-1, 003	A

Revise SLRA Table 3.4.2-6 by adding the following line items as follows:

Table 3.4.2-6: Feedwater Heater, Drains, and Vents 10 CFR 54.4(a)(2) Spatial Interactions — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation – thermal	Insulate (thermal)	Non-metallic insulation (calcium silicate, glass fiber, mineral fiber, or reflective type)	Air - outdoor (ext)	Reduced thermal insulation resistance	External Surfaces Monitoring of Mechanical Components	VIII.H.S-403	3.4-1, 064	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - outdoor (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.H.S-457c	3.4-1, 109	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Aluminum	Air - outdoor (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.E.SP-147b	3.4-1, 035	A
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - outdoor (ext)	Cracking	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-118b	3.4-1, 002	A

Table 3.4.2-6: Feedwater Heater, Drains, and Vents 10 CFR 54.4(a)(2) Spatial Interactions — Summary of Aging Management Evaluation								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Insulation jacketing – thermal	Thermal insulation jacket integrity	Stainless steel	Air - outdoor (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components	VIII.B1.SP-127b	3.4-1, 003	A

Associated Enclosures:

None

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

RAI 3.5.1.47-1

Background:

For the SCs in SRP-SLR AMR items 3.5.1-14, 20, 47, and 63, the GALL-SLR Report recommends that accessible and inaccessible areas of concrete structures exposed to a water-flowing environment be managed for the aging effect of increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation. GALL-SLR Report Table IX.D defines a water-flowing environment as "water that is refreshed; thus, it has a greater impact on leaching and can include rainwater, raw water, groundwater, or water flowing under a foundation."

SLRA Table 3.5-1, AMR items 3.5.1-20 and 63, state that this aging effect is not applicable to the accessible areas of concrete of the containment and group structures 1-3, 5, and 7-9 because these structures are not exposed to a water-flowing environment.

SLRA Table 3.5-1, in further evaluation AMR items 3.5.1-14 and 47, states that this aging effect is not applicable to inaccessible areas of concrete of the containment and group structures 1-5, 7-9 because these structures "are not exposed to water-flowing environments or water accumulation in accessible areas that impacts intended functions." The associated SLRA further evaluation Sections 3.5.2.2.1.9 and 3.5.2.2.2.1, item 4 (for AMR items 3.5.1-14 and 47 respectively), state that "there has been no recent Turkey Point evidence of leaching or water accumulation in below-grade accessible concrete areas of the containment and Group 1, 3-5, 7, and 8 structures that impact intended functions." SLRA Section 3.5.2.2.2.1, item 4, states that "[g]roups 2 and 9 structures are not applicable at Turkey Point." The SLRA also states that "Turkey Point tendon galleries were excessively humid, and floors and walls of the galleries were damaged by sustained water infiltration. The water infiltration in the below-grade structures resulted more from the improper drainage of the surface water rather than from the groundwater infiltration."

Issue:

The staff noted that the discussion of tendon galleries being damaged by sustained water infiltration provided in the SLRA sections 3.5.2.2.1.9 and 3.5.2.2.2.1, item 4, indicates that there has been evidence of leaching and water accumulation in below-grade accessible areas of concrete for the containment and Group 1, 3-5, 7, and 8 structures at Turkey Point. In addition, it is not clear how these structures will not be exposed to a water-flowing environment, as described in the SLRA, since as defined by GALL-SLR Report Table IX.D, structures exposed to rainwater are considered to have a water-flowing environment. In addition, during the on-site audit the staff reviewed condition report AR 01793860 (dated September 2012) and noted that the applicant documented indications of concrete leaching on the Turkey Point Unit 4 auxiliary building concrete east wall. Based on its review of the SLRA and operating experience reviewed during the audit it is not clear why the aging effect of leaching of concrete is not applicable to SCs associated with AMRs 3.5.1-14, 20, 47, and 63, and why these SCs are not exposed to a water-flowing environment as defined in the GALL-SLR Report. The staff notes that based on Turkey Point's operating experience, this aging effect appears to be applicable and would need to be managed during the SPEO.

Request:

(1) Clarify whether there has been any operating experience of leaching of concrete and concrete exposed to water-flowing (as defined in the GALL-SLR Report) at Turkey Point for SCs associated with AMRs 3.5.1-14, 20, 47, and 63.

(2) Considering Turkey Point's operating experience and the GALL-SLR Report definition of water-flowing, clarify whether and how the aging effect of increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation will be managed during the SPEO for SCs associated to AMRs 3.5.1-14, 20, 47, and 63. If this aging effect will not be managed for these SCs during the SPEO, provide the technical basis.

FPL Response:

Responses to the above numbered requests are as follows:

(1) There has been no operating experience of leaching of concrete in accessible areas, including below-grade accessible areas, at Turkey Point for SCs associated with SLRA Table 3.5-1 items 014, 020, 047, and 063. As described in SLRA Section 3.5.2.2.1.9 (pgs 3.5-24, 3.5-25) and for item 4 of SLRA Section 3.5.2.2.2.1 (pg 3.5-27), the water infiltration in the tendon galleries observed during the 1992 walk down resulted more from improper drainage of surface water than from groundwater intrusion and was not attributed to leaching of calcium hydroxide or carbonation. Furthermore, staining on the PTN Unit 4 Auxiliary Building east wall identified by the 2012 action request described in the issue above was evaluated by engineering and determined to have resulted from corrosion of a nearby baseplate and hose leakage (rather than leaching of the concrete) as the wall was painted with staining on the paint.

During construction of PTN Units 3 and 4, the building site area was backfilled to the existing grade at elevation 18'-0", and the containment sub-structures are laying on compacted backfill. Based on the building site configuration and as listed in SLRA Sections 3.5.2.1.1 (summary of Table 3.5.2-1) and 3.5.2.2 (summary of Table 3.5.2-2), the containment and auxiliary building (Group 3) respectively are the only non-water control structures exposed to groundwater. The other Group 1, 3-5, 7, and 8 structures are exposed to a soil environment that includes groundwater (i.e., rainwater soaking into the soil). Additionally, the tendon gallery water intrusion described in item 4 of SLRA 3.5.2.2.2.1 and water intrusion addressed for Set 7 RAI B.2.3.31-1 (L-2018-191 Attachment 12) serve as operating experience of accessible concrete exposed to water-flowing. As such, the PTN containment structures and Group 1, 3-5, 7, and 8 structures are exposed to water-flowing (as defined in the GALL-SLR report).

(2) Considering this OE indication of accessible concrete areas exposed to water-flowing and the GALL-SLR definition of water-flowing, increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation are applicable aging effects for accessible and inaccessible concrete at PTN for SCs associated to SLRA Table 3.5-1 items 014, 020, 047, and 063.

Accessible areas of in-scope concrete structures are monitored through the Structures Monitoring AMP to confirm the absence of water, including rainwater, in-leakage or signs of concrete leaching as described in SLRA Section B.2.3.35 (pg B-255).

Because leaching can occur when water passes through the concrete, structures that are subject to flowing liquid, ponding, or hydraulic pressure are more susceptible to degradation by leaching than those structures that water merely passes over. Therefore, inspections will be focused on locations where water collects in accessible areas as a leading indicator of reinforced concrete conditions in inaccessible areas for leaching.

If the pores of concrete are saturated with water, the amount of carbonation occurring will be negligible (Reference 2). As a result, carbonation is more of a concern in accessible air and precipitation (rain) environments than in inaccessible groundwater/soil or raw water. Therefore, accessible areas can be used as an indicator of reinforced concrete conditions in inaccessible areas for carbonation as well.

Additionally, the Structures Monitoring AMP includes a site-specific enhancement, clarified in response to Set 6 RAI B.2.3.35-3, L-2018-193 (Reference 1) Attachment 16, to address exposure of inaccessible concrete to aggressive groundwater/soil. This site-specific enhancement can also manage leaching of calcium hydroxide and carbonation of inaccessible concrete for the SPEO.

Pertinent SLRA sections, including current, as-amended sections 17.2.2.35, B.2.3.35 and Table 17-3, item 39, are revised to reflect the adjustment of the Structures Monitoring AMP site-specific enhancement to address the aging effects of increase in porosity and permeability and loss of strength associated with leaching of calcium hydroxide and carbonation in water-flowing environments.

References:

1. FPL Letter L-2018-193 to NRC dated November 2, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application, Safety Review Requests for Additional Information (RAI) Set 6 Responses (ADAMS Accession No. ML18311A299)
2. NUREG/CR-5466 (NISTIR 89-4086), Service Life of Concrete, Published November 1989 (ADAMS Accession No. ML061430380)

Associated SLRA Revisions:

SLRA Sections, including the current, as-amended Structures Monitoring AMP (L-2018-191 Attachment 4), are amended as indicated by the following text deletion (strikethrough) and text addition (red underlined font) revisions.

Revise SLRA Section 3.5.2.1.1 on page 3.5-3 as follows:

Environments

The Containment Structure and Internal Structural components are exposed to the following environments:

- Air – indoor controlled
- Air – outdoor
- Air with borated water leakage
- Groundwater/soil
- **Water-flowing**

Aging Effect Requiring Management

The following aging effects associated with the Containment Structure and Internal Structural Components require management:

- Cracking
- Cumulative fatigue damage
- Increase in porosity and permeability
- Loss of bond
- Loss of coating or lining integrity
- Loss of leak tightness
- Loss of material
- Loss of mechanical function
- Loss of preload
- Loss of prestress
- Loss of sealing
- **Loss of strength**
- Reduction in concrete anchor capacity
- Reduction or loss of isolation function

Revise Section 3.5.2.1.2 on page 3.5-4 as follows:

The Auxiliary Building components are exposed to the following environments:

- Air – indoor controlled
- Air – indoor uncontrolled
- Air – outdoor
- Air with borated water leakage
- Groundwater/soil
- **Water-flowing**

Aging Effect Requiring Management

The following aging effects associated with the Auxiliary Building components require management:

- Cracking
- Cumulative fatigue damage
- Deformation
- Increase in porosity and permeability
- Loss of bond
- Loss of material
- Loss of preload
- Loss of sealing
- **Loss of strength**
- Reduction in concrete anchor capacity

Revise Section 3.5.2.1.18 on page 3.5-19 as follows:

Environments

The Yard Structures components are exposed to the following environments:

- Air – outdoor
- Air with borated water leakage
- **Soil**
- **Water-flowing**

Aging Effect Requiring Management

The following aging effects associated with the Yard Structures require management:

- Cracking
- Cumulative fatigue damage
- Deformation
- Increase in porosity and permeability
- Loss of bond
- Loss of material

- Loss of preload
- **Loss of strength**
- Reduction in concrete anchor capacity

Revise Section 3.5.2.2.1.9 on page 3.5-24 as follows:

Increase in porosity and permeability due to leaching of calcium hydroxide and carbonation could occur in inaccessible areas of concrete elements of PWR and BWR concrete and steel containments. Further evaluation is recommended if leaching is observed in accessible areas that impact intended functions. Acceptance criteria are described in BTP RLSB-1 (Appendix A.1 of this SRP-SLR).

Each containment structure is a right-vertical, post-tensioned, reinforced-concrete cylinder with prestressed tendons in the vertical wall, a reinforced and post-tensioned concrete hemispherical domed roof, and a substantial base slab of reinforced concrete. The Turkey Point containment structures are designed and constructed in accordance with ACI 318-63 using ingredients/materials conforming to ACI and ASTM standards. The concrete mix uses Portland cement conforming to ASTM C- 150-64 150, Florida Type II. Concrete aggregates conform to the requirements of ASTM C-33-64 (fine and coarse aggregate). During construction of PTN Units 3 and 4, the building site area was backfilled to the existing grade at elevation 18'-0", and the containment sub-structure is laying on compacted backfill. ~~Therefore, PTN Units 3 and 4 structures, other than the intake or discharge structure, are not exposed to a water flowing environment.~~ In addition, NUREG-1522 described OE that Turkey Point tendon galleries were excessively humid, and floors and walls of the galleries were damaged by sustained water infiltration. The water infiltration in the below-grade structures resulted more from the improper drainage of the surface water rather than from the groundwater infiltration. The findings from the 1992 audit described in Appendix A of NUREG-1522 were evaluated in accordance with the corrective action program and determined to have no impact on intended functions. The OE from NUREG-1522 is addressed in the original Turkey Point license renewal application (LRA). There has been no recent Turkey Point evidence of leaching ~~of water accumulation~~ in below-grade accessible concrete areas of the containment structure that impact intended functions. **A 2012 action request to evaluate indications of possible leaching determined the staining to be from corrosion of a nearby baseplate and hose leakage.** ~~Therefore, increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation in below grade inaccessible concrete areas is not an applicable aging effect for the inaccessible concrete of Turkey Point containment structures.~~ **Based on the containment site configuration and as listed in SLRA Section 3.5.2.1.1 (summary of Table 3.5.2-1), portions of the containment structures are exposed to groundwater. The GALL-SLR definition of "water-flowing" is "water that is refreshed; thus, it has a greater impact on leaching and can include rainwater, raw water, groundwater, or water flowing under a foundation." As such, the PTN**

containment structures are exposed to a water-flowing environment. Therefore, increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation in below-grade inaccessible concrete areas are applicable aging effects and will be managed by the Turkey Point Structures Monitoring AMP. The Structures Monitoring AMP contains a site-specific enhancement to address management of inaccessible concrete.

Revise Section 3.5.2.2.2.1 on page 3.5-25 as follows:

4. *Increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation could occur in below-grade inaccessible concrete areas of Groups 1–5 and 7–9 structures. Further evaluation is recommended if leaching is observed in accessible areas that impact intended functions.*

Inaccessible areas at Turkey Point are addressed as follows:

Groups 2 and 9 structures are not applicable at Turkey Point. Groups 1, 3-5, 7, and 8 structures at Turkey Point are designed and constructed in accordance with ACI 318-63 using ingredients/materials conforming to ACI and ASTM standards. The concrete mix uses Portland cement conforming to ASTM C-150-64 150, Florida Type II. Concrete aggregates conform to the requirements of ASTM C-33-64 (fine and coarse aggregate). Materials for concrete used in Turkey Point concrete SCs were specifically investigated, tested, and examined in accordance with pertinent ASTM standards. The type and size of aggregate, slump, cement and additives have been established to produce durable concrete in accordance with ACI. Cracking is controlled through proper arrangement and distribution of reinforcing steel. Concrete structures and concrete components are constructed of a dense, well-cured concrete with an amount of cement suitable for strength development and achievement of a water-to-cement ratio that is characteristic of concrete having low permeability. This is consistent with the recommendations and guidance provided by ACI 201.2R. During construction of PTN Units 3 and 4, the building site area was backfilled to the existing grade at elevation 18'-0", and the containment sub-structure is laying on compacted backfill. ~~Therefore, Turkey Point Groups 1, 3-5, 7, and 8 structures are not exposed to a water-flowing environment~~. In addition, NUREG-1522 described that Turkey Point tendon galleries were excessively humid, and floors and walls of the galleries were damaged by sustained water infiltration. The water infiltration in the below-grade structures resulted more from the improper drainage of the surface water rather than from the groundwater infiltration. The findings from the 1992 audit described in Appendix A of NUREG-1522 were evaluated in accordance with the corrective action program and determined to have no impact on intended functions. The OE from NUREG-1522 is addressed in the original Turkey Point license renewal application (LRA). There has been no recent Turkey Point evidence of leaching~~ or water accumulation~~ in below-grade accessible concrete areas of the Turkey Point Groups 1, 3–5, 7, and 8 structures that impact intended functions. **A 2012 action**

request to evaluate indications of possible leaching determined the staining to be from corrosion of a nearby baseplate and hose leakage. ~~Therefore, increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation in below grade inaccessible concrete areas, are not applicable aging effects for the inaccessible Turkey Point Groups 1, 3-5, 7, and 8 concrete structures.~~ **Based on the Turkey Point building site configuration, the Groups 1, 3-5, 7, and 8 structures, except the Group 3 auxiliary building, are not exposed to a groundwater environment other than rain water passing through soil. However, the GALL-SLR definition of "water-flowing" is, "water that is refreshed; thus, it has a greater impact on leaching and can include rainwater, raw water, groundwater, or water flowing under a foundation." As listed in SLRA Tables 3.0-2 and 3.5.2-2, portions of the auxiliary buildings are exposed to groundwater. In addition, yard structures such as duct banks, manholes, curbs, trenches, drains, and catch basins are susceptible to a water flowing environment (primarily from rainwater accumulation). As such, the PTN Group 3 auxiliary building structures and select yard structures are exposed to a water-flowing environment and serve as leading indicators relative to the soil environments of other PTN Group 1, 3-5, 7 and 8 structures.**

Therefore, increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation in concrete areas are applicable aging effects for the PTN auxiliary buildings and select yard structures and will be managed by the Turkey Point Structures Monitoring AMP. The Structures Monitoring AMP contains a site-specific enhancement to address management of inaccessible concrete.

Revise the following line items in Table 3.5-1, Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports:

Table 3.5-1: Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports					
Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5-1, 014	Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses, containment	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific AMP	Yes (SRP-SLR Section 3.5.2.2.1.9)	~~Not applicable. The Turkey Point containment structures are not exposed to water flowing environments or water accumulation in accessible areas that impacts intended functions.~~ Consistent with NUREG-2191. The Structures Monitoring AMP is the plant-specific AMP that will be used to manage increase in porosity and permeability and loss of strength of inaccessible concrete exposed to water-flowing. Further evaluation is documented in Section 3.5.2.2.1.9.

Table 3.5-1: Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5-1, 020	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses, containment	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S2, "ASME Section XI, Section IWL"	No	~~Not applicable. The Turkey Point containment structures are not exposed to water-flowing environments.~~ Consistent with NUREG-2191. The ASME Section XI, Subsection IWL AMP will be used to manage increase in porosity and permeability and loss of strength of accessible concrete exposed to water-flowing.

Table 3.5-1: Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5-1, 047	Groups 1-3, 5, 7-9: concrete (accessible areas): exterior above- and below-grade; foundation	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific AMP	Yes (SRP-SLR Section 3.5.2.2.2.1 Item 4)	~~Not applicable. Turkey Point Groups 1-5, 7-9 structures are not exposed to water-flowing environments or water accumulation in accessible areas that impacts intended functions.~~ Consistent with NUREG-2191. The Structures Monitoring AMP is the plant-specific AMP that will be used to manage increase in porosity and permeability and loss of strength of accessible auxiliary building and select yard structure concrete exposed to water-flowing. Further evaluation is documented in Section 3.5.2.2.2.1 Item 4.

Table 3.5-1: Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports					
Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5-1, 063	Groups 1-5, 7-9: concrete (inaccessible areas): exterior above- and below-grade; foundation	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S6, "Structures Monitoring"	No`	~~Not applicable. Turkey Point Groups 1-3, 5, 7-9 structures are not exposed to water flowing environments.~~ Consistent with NUREG-2191. The Structures Monitoring AMP will be used to manage increase in porosity and permeability and loss of strength of inaccessible auxiliary building concrete exposed to water-flowing.

Add the following line items to Table 3.5.2-1, Containment Structure and Internal Structural Components – Summary of Aging Management Evaluation, as follows:

Table 3.5.2-1: Containment Structure and Internal Structural Components – Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Reinforced concrete containment structure (accessible)	Structural support Shelter, protection Fire barrier Missile barrier Flood barrier	Concrete	Water – flowing	Increase in porosity and permeability Loss of strength	ASME Section XI, Subsection IWL	II.A1.CP-32	3.5-1, 020	A
Reinforced concrete containment structure (inaccessible)	Structural support Shelter, protection Fire barrier Missile barrier Flood barrier	Concrete	Water – flowing	Increase in porosity and permeability Loss of strength	Structures Monitoring	II.A1.CP-102	3.5-1, 014	E, 2

Notes for Table 3.5.2-1

A. Consistent with component, material, environment, aging effect and AMP listed for NUREG-2191 line item. AMP is consistent with NUREG-2191 AMP description.
B. Consistent with component, material, environment, aging effect and AMP listed for NUREG-2191 line item. AMP has exceptions to NUREG-2191 AMP description.
C. Component is different, but consistent with material, environment, aging effect and AMP listed for NUREG-2191 line item. AMP is consistent with NUREG-2191 AMP description.
D. Component is different, but consistent with material, environment, aging effect and AMP listed for NUREG-2191 line item. AMP has exceptions to NUREG-2191 AMP description.
E. Consistent with NUREG-2191 material, environment, and aging effect but a different AMP is credited or NUREG-2191 identifies a plant-specific AMP.

Plant-Specific Notes for Table 3.5.2-1

1. Note B applies to the Structures Monitoring AMP only.
2. **The Structures Monitoring AMP will be used to manage increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation.**

Add the following line items to Table 3.5.2-2, Auxiliary Building – Summary of Aging Management Evaluation as follows:

Table 3.5.2-2: Auxiliary Building – Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Reinforced concrete foundation (accessible)	**Structural support**	**Concrete**	**Water – flowing**	**Increase in porosity and permeability** **Loss of strength**	**Structures Monitoring**	**III.A3.TP-24**	**3.5-1, 063**	**B**
Reinforced concrete foundation (inaccessible)	**Structural support**	**Concrete**	**Water – flowing**	**Increase in porosity and permeability** **Loss of strength**	**Structures Monitoring**	**III.A3.TP-67**	**3.5-1, 047**	**E, 5**

Plant-Specific Notes for Table 3.5.2-2

1. Some grating performs missile barrier function.
2. The components that are exposed to indoor controlled air are assumed to experience the same aging effects as if the components were exposed to indoor uncontrolled air.
3. The Structures Monitoring AMP will be used to manage cracking due to expansion from reaction with aggregates.
4. Note B applies to the Structures Monitoring AMP only.
5. **The Structures Monitoring AMP will be used to manage increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation.**

Add the following line items to Table 3.5.2-18, Yard Structures – Summary of Aging Management Evaluation, as follows:

Table 3.5.2-18: Yard Structures – Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Duct banks	Structural support	Concrete	Water – flowing	Increase in porosity and permeability Loss of strength	Structures Monitoring	III.A3.TP-24	3.5-1, 063	B
Duct banks (inaccessible areas)	Structural support	Concrete	Water – flowing	Increase in porosity and permeability Loss of strength	Structures Monitoring	III.A3.TP-67	3.5-1, 047	E, 2
Electrical manholes	Structural support	Concrete	Water – flowing	Increase in porosity and permeability Loss of strength	Structures Monitoring	III.A3.TP-24	3.5-1, 063	B
Electrical manholes (inaccessible areas)	Structural support	Concrete	Water – flowing	Increase in porosity and permeability Loss of strength	Structures Monitoring	III.A3.TP-67	3.5-1, 047	E, 2
Gravel pits and curbs	Structural support	Concrete	Water – flowing	Increase in porosity and permeability Loss of strength	Structures Monitoring	III.A3.TP-24	3.5-1, 063	B
Gravel pits and curbs (inaccessible areas)	Structural support	Concrete	Water – flowing	Increase in porosity and permeability Loss of strength	Structures Monitoring	III.A3.TP-67	3.5-1, 047	E, 2
Pipe trenches	Structural support	Concrete	Water – flowing	Increase in porosity and permeability Loss of strength	Structures Monitoring	III.A3.TP-24	3.5-1, 063	B

Table 3.5.2-18: Yard Structures – Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Pipe trenches (inaccessible areas)	**Structural support**	**Concrete**	**Water – flowing**	**Increase in porosity and permeability** **Loss of strength**	**Structures Monitoring**	**III.A3.TP-67**	**3.5-1, 047**	**E, 2**
Storm drains and catch basins	**Structural support**	**Concrete**	**Water – flowing**	**Increase in porosity and permeability** **Loss of strength**	**Structures Monitoring**	**III.A3.TP-24**	**3.5-1, 063**	**B**
Storm drains and catch basins (inaccessible areas)	**Structural support**	**Concrete**	**Water – flowing**	**Increase in porosity and permeability** **Loss of strength**	**Structures Monitoring**	**III.A3.TP-67**	**3.5-1, 047**	**E, 2**

Plant-Specific Notes for Table 3.5.2-18

1. The Structures Monitoring AMP will be used to manage cracking due to expansion from reaction with aggregates.
2. **The Structures Monitoring AMP will be used to manage increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation.**

Revise SLRA Section 17.2.2.35 of the current Structures Monitoring AMP, on L-2018-191 Attachment 4 (pg 6 of 19), as follows:

Due the presence of aggressive groundwater chemistry (Chlorides > 500 parts per million (ppm)), the AMP includes a site-specific enhancement to conduct a baseline visual inspection, pH analysis, and evaluation to evaluate the degradation of concrete due to exposure of aggressive chemical attack **in groundwater/soil or leaching and carbonation in water-flowing**. The baseline evaluation will consider site-specific OE and the baseline inspection results and will determine the additional actions that are warranted. Periodic inspections (either focused or opportunistic) and evaluation updates (not to exceed 5 years) will be performed throughout the SPEO to ensure aging of inaccessible concrete is adequately managed.

Revise the Table 17-3, Item 39 f) of the current Structures Monitoring AMP, on L-2018-191 Attachment 4 (pgs 7, 8 of 19), as follows:

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
39	Structures Monitoring (17.2.2.35)	XI.S6	f) Develop a new implementing procedure or attachment to an existing implementing procedure to address aging management of inaccessible areas exposed to groundwater/soil **and water-flowing**. The document will include guidance to conduct a baseline visual inspection, pH analysis, and a chloride concentration test prior to the SPEO at a location close to the coastline/intake and a location in the main plant area for comparison. The baseline inspection results will be used to conduct a baseline evaluation that will determine the additional actions that are warranted. Additionally, the baseline evaluation results will set the subsequent inspection requirements and inspection intervals (not to exceed 5 years). Periodic inspections (either focused or opportunistic) and evaluation updates (not to exceed 5 years) will be performed throughout the SPEO to ensure aging of inaccessible concrete is adequately managed.	No later than 6 months prior to the SPEO, i.e.: PTN3: 1/19/2032 PTN4: 10/10/2032

Revise the program description for the current Structures Monitoring AMP, on L-2018-191 Attachment 4 (pg 12 of 19), as follows:

Rather, the PTN Structures Monitoring AMP includes a site specific enhancement to address aggressive groundwater/soil **and water-flowing**. The site-specific enhancement includes the following:

1. A baseline inspection of inaccessible concrete will be conducted prior to the SPEO.
    a) The baseline inspection locations will consider site-specific OE. OE considered will include known degradation due to chlorides in ambient air and the potential for further degradation due to the aggressive groundwater **as well as whether leaching and carbonation is occurring in the water-flowing**.
    b) The baseline inspection will include excavation, visual inspection, pH analysis, and a chloride concentration test of inaccessible concrete at a location close to the coastline/intake and a location in the main plant area for comparison.
2. A baseline evaluation will be performed prior to the SPEO.
    a) The baseline evaluation will consider the baseline inspection results to determine the additional actions (if any) that are warranted. Additional actions may include: enhanced inspection techniques and/or frequency, destructive testing, and focused inspections of representative accessible concrete (leading indicator) or below grade, inaccessible concrete structural elements exposed to aggressive groundwater/soil **(or to leaching and carbonation in water-flowing if determined to impact intended function)**.

Revise the plant-specific enhancements in Section B.2.3.35 for the current Structures Monitoring AMP, on L-2018-191 Attachment 4 (pg 15, 16 of 19), as follows:

A new implementing procedure, or new attachment to the AMP governing procedure, for management of concrete exposure to aggressive groundwater/soil **and water-flowing** will also be developed that addresses:

Element Affected	Enhancement
1. Scope	Inaccessible concrete/foundations exposed to groundwater/soil **and water-flowing** in scope.
2. Parameters Monitored or Inspected	Monitoring of the condition of inaccessible concrete, including pH, and chloride concentration of concrete exposed to groundwater/soil **and water-flowing environment for evidence of aggressive chemical attack or leaching and carbonation**.
4. Detection of Aging Effects	Guidance on baseline excavation with visual inspection, pH analysis, and a chloride concentration test of concrete **exposed to groundwater/soil and water-flowing** at a location near the coastline and a location in the main plant

Element Affected	Enhancement
	area for comparison prior to the SPEO. Include periodic inspections (either focused or opportunistic) at a frequency determined in the baseline evaluation (not exceed 5 years). **Accessible areas can be used as an indicator of reinforced concrete conditions in inaccessible areas for carbonation.**
5. Monitoring and Trending	Guidance for the evaluation of the baseline inspection results and related OE, with concrete exposed to ambient air and to groundwater/soil**, for concrete susceptible to aging effects related to an aggressive environment** prior to the SPEO to determine subsequent inspection/evaluation requirements and intervals (not to exceed 5 years), with periodic updates based on periodic inspections (either focused or opportunistic) and OE. **Guidance for the evaluation of baseline inspection results and related OE related to concrete exposed to water-flowing for evidence of leaching of calcium hydroxide and carbonation, prior to the SPEO.** **The baseline evaluation will determine whether leaching and carbonation are occurring and the impact to intended function, if so. Subsequent inspection/evaluation requirements and intervals (not to exceed 5 years), with periodic updates based on periodic inspections (either focused or opportunistic) and OE will be developed if leaching or carbonation is occurring in accessible or inaccessible areas that impacts intended function.**
6. Acceptance Criteria	Acceptance criteria for inaccessible concrete exposed to groundwater **and water-flowing** through baseline inspection and evaluation, with periodic updates based on periodic inspections (either focused or opportunistic) and OE.

Associated Enclosures:

None

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

RAI 3.5.1-51

Background:

The GALL-SLR Report references SRP-SLR AMR item 3.5.1-51 in its recommendation to manage the aging effect of increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation for Group 6 structures' inaccessible areas of concrete exposed to a water-flowing environment. SRP-SLR AMR item 3.5.1-51 and associated Section 3.5.2.2.2.3, item 3, state that further evaluation is recommended to determine if a plant-specific AMP is needed. The SRP-SLR also states that a plant-specific program is not required for the reinforced structures exposed to flowing water if (1) there is evidence in the accessible areas that the flowing water has not caused leaching and carbonation, or (2) evaluation determined that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure.

SLRA Section 3.5.2.2.2.3, item 3, states that this aging effect is applicable to Group 6 structures and will be managed under the Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP which is a program consistent with GALL-SLR Report AMP XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants."

Issue:

Contrary to the recommendation in the SRP-SLR, SLRA Section 3.5.2.2.2.3, item 3, does not state whether leaching has been observed in accessible areas of concrete and had an impact on the intended functions of Group 6 structures at Turkey Point. Absent this information it is not clear how the Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP is adequate to manage this aging effect and why a plant-specific AMP is not necessary to manage this aging effect, consistent with the SRP-SLR recommendation.

There are inconsistencies in the SLRA with respect to which AMP will manage this aging effect because AMR item 3.5.1-51 in SLRA Tables 3.5-1, Table 3.5.2-7, and 3.5.2-11, credits the Structures Monitoring AMP, instead of the Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP credited in SLRA Section 3.5.2.2.2.3, item 3. The SLRA states that the Structures Monitoring AMP is a program consistent with the GALL-SLR Report AMP XI.S6, "Structures Monitoring."

Request:

(1) State whether there is operating experience at Turkey Point of leaching of accessible areas of Group 6 structures concrete that have had an impact on the structures intended function(s). Discuss whether a plant-specific AMP is needed based on Turkey Point's operating experience; if a plant-specific AMP is needed provide the description of such AMP and the basis for its adequacy to manage this aging effect.

(2) Clarify the inconsistencies in the SLRA Section 3.5.2.2.2.3, item 3 and AMR item 3.5.1-51 in Tables 3.5-1, Table 3.5.2-7, and 3.5.2-11, with regard to which AMP will manage this aging effect.

FPL Response:

Responses to the above numbered requests are as follows:

(1) There is no known OE at Turkey Point of leaching or carbonation of accessible concrete of Group 6 structures. As described in L-2018-193 (Reference 1) Attachment 16, the Structures Monitoring AMP includes a site-specific enhancement to address management of inaccessible concrete for the Turkey Point structures due to exposure to aggressive groundwater/soil. This site-specific enhancement is updated to address leaching and carbonation in the water-flowing environment for inaccessible areas of Turkey Point structures (including Group 6 structures). The site-specific enhancement to the Structures Monitoring AMP is described in the response to Set 7 RAI 3.5.1.47-1 (L-2018-191 Attachment 7).

(2) As described in SLRA Table 3.5-1 item 061, accessible areas of in-scope Group 6 structures are inspected through the Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP for aging affects related to leaching of calcium hydroxide and carbonation which are increase in porosity and permeability and loss of strength consistent with NUREG-2191 (XI.S7). As described in L-2018-176 (Reference 2) Attachment 1, Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP is a new AMP for the SPEO.

As described for (1), the Structures Monitoring AMP includes a site-specific enhancement to address management of inaccessible concrete for the Turkey Point structures (including Group 6 structures). Accessible areas of Group 6 structures are considered to be structures in outdoor air, submerged, or above grade. Submerged concrete structures may be inspected during periods of low tide or when dewatered or using divers. Areas covered by silt, vegetation, or marine growth are not considered inaccessible and are cleaned. Inaccessible areas of Group 6 structures are considered to be structures that are below grade.

The revision of SLRA sections 17.2.2.35 and B.2.3.35 to reflect the site-specific enhancement of the Structures Monitoring AMP is detailed in the response to Set 7 RAI 3.5.1.47-1. SLRA Section 3.5.2.2.2.3 item 2 and 3; Table 3.5-1 items 050, 051, and 061; Table 3.5.2-7, Table 3.5.2-11; Section 17.2.2.36; Table 17-3 item 40; and Section B.2.3.36 are also revised to clarify the AMPs credited with aging management for accessible and inaccessible concrete of Group 6 structures.

References:

1. FPL Letter L-2018-193 to NRC dated November 2, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application, Safety Review Requests for Additional

Information (RAI) Set 6 Responses (ADAMS Accession No. ML18311A299)

2. FPL Letter L-2018-176 to NRC, dated October 17, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application, Response to NRC On-Site Regulatory Audit Follow Up Items (ADAMS Accession No. ML18292A641)

Associated SLRA Revisions:

SLRA Section 3.5.2.2.2.3 item 2 and 3; Table 3.5-1 items 050, 051, and 061; Table 3.5.2-7; Table 3.5.2-11; Section 17.2.2.36, Table 17-3 item 40, and Section B.2.3.36 are amended as indicated by the following text deletion (strikethrough) and text addition (red underlined font) revisions.

Revise Section 3.5.2.2.2.3 item 2 and 3, on page 3.5-29 and 3.5-30 as follows:

2. The Group 6 structures at Turkey Point are designed and constructed in accordance with ACI 318-63 using ingredients/materials conforming to ACI and ASTM standards. The concrete mix uses Portland cement conforming to ASTM C-150-64 150, Florida Type II. Also, the cement contains no more than 0.60 percent by weight of total alkalis, which prevents harmful expansion due to alkali aggregate reaction. Concrete aggregates conform to the requirements of ASTM C-33-64 (fine and coarse aggregate) and conform to the requirements of ASTM C33, "Standard Specification of Concrete Aggregates." Water used for mixing concrete or processing concrete aggregates is free from any injurious amounts of acid, alkali, salts, oil, sediment and organic matter. Materials for concrete used in Turkey Point concrete SCs were specifically investigated, tested, and examined in accordance with pertinent ASTM standards at the time of construction. However, this testing may not fully conform to ASTM C295 specified in NUREG- 2192, and, therefore, cracking due to expansion and reaction with aggregates is an applicable aging effect in below-grade inaccessible concrete areas for Turkey Point Group 6 structures and will be managed by the Turkey Point **Structures Monitoring AMP.** ~~Inspection of Water Control Structures Associated with Nuclear Power Plants.~~

3. The Group 6 Structures at Turkey Point are designed and constructed in accordance with ACI 318-63 using ingredients/materials conforming to ACI and ASTM standards. The concrete mix uses Portland cement conforming to ASTM C-150-64 150, Florida Type II. Concrete aggregates conform to the requirements of ASTM C-33-64 (fine and coarse aggregate). Materials for concrete used in Turkey Point concrete SCs were specifically investigated, tested, and examined in accordance with pertinent ASTM standards. The type and size of aggregate, slump, cement and additives have been established to produce durable concrete in accordance with ACI. Cracking is controlled through proper arrangement and distribution of reinforcing steel. Concrete structures and concrete components are constructed of a dense, well-cured concrete with an amount of cement suitable for strength development and achievement of a water-to-cement ratio that is

characteristic of concrete having low permeability. This is consistent with the recommendations and guidance provided by ACI 201.2R. The below-grade inaccessible concrete areas of Group 6 concrete structures at Turkey Point are exposed to groundwater that is considered equivalent to a flowing water environment which leads to the same aging effects. From comparison with the chloride level for seawater, the groundwater/soil at Turkey Point is considered as aggressive since the chloride level is much greater than 500 ppm due to seawater. The criteria for plants to determine aggressive groundwater/soil is as follows: pH < 5.5, chlorides > 500 ppm, or sulfates > 1,500 ppm.~~-~~**There is no known OE at Turkey Point of leaching or carbonation of accessible concrete of Group 6 structures. As a precaution, the inaccessible areas of Group 6 structures are managed by the site-specific enhancement to the Turkey Point Structures Monitoring AMP.**

Therefore, increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation in below-grade inaccessible concrete areas, are **considered** applicable aging effects for the inaccessible concrete of Turkey Point Group 6 concrete structures **and will be managed by the Turkey Point Structures Monitoring AMP**~~The Turkey Point Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP manages increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation in below grade inaccessible concrete~~ areas ~~of Turkey Point Group 6 concrete structures~~.

Revise the following line items in Table 3.5-1, Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports, as follows:

Table 3.5-1: Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5-1,050	Groups 6: concrete (inaccessible areas): all	Cracking due to expansion from reaction with aggregates	Plant-specific AMP	Yes (SRP-SLR Section 3.5.2.2.2.3 Item 2)	Consistent with NUREG-2191 with exception. The Structures Monitoring AMP **is the plant-specific AMP that** will be used to manage cracking for inaccessible concrete for Group 6 structures exposed to outdoor air, water – flowing or standing, and groundwater/soil environments. Further evaluation is documented in Section 3.5.2.2.2.3, Item 2.

Table 3.5-1: Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5-1, 051	Groups 6: concrete (inaccessible areas): exterior above- and below-grade; foundation; interior slab	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific AMP	Yes (SRP-SLR Section 3.5.2.2.2.3 Item 3)	Consistent with NUREG-2191 with exception. The Structures Monitoring AMP **<u>is the plant-specific AMP that</u>** will be used to manage increase in porosity and permeability and loss of strength for inaccessible concrete for Group 6 structures exposed to water – flowing environments. Further evaluation is documented in Section 3.5.2.2.2.3, Item 3.

Table 3.5-1: Summary of Aging Management Evaluations for the Containment, Structures, and Component Supports

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5-1, 061	Group 6: concrete (accessible areas): exterior above- and below-grade; foundation; interior slab	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/US Army Corp of Engineers dam inspections and maintenance programs.	No	Consistent with NUREG-2191. The Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP will be used to manage increase in porosity and permeability and loss of strength for accessible concrete exposed to outdoor air ~~groundwater/soil,~~ and water-flowing or standing environments.

Revise the following line items in Table 3.5.2-7, Discharge Structure – Summary of Aging Management Evaluation, as follows:

Table 3.5.2-7: Discharge Structure – Summary of Aging Management Evaluation

	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Reinforced concrete North and South headwall (accessible)	Structural support	Concrete	Air – outdoor **Water – flowing or standing**	Increase in porosity and permeability Loss of strength	Inspection of Water-Control Structures Associated with Nuclear Power Plants	III.A6.TP-37	3.5-1, 061	A
Reinforced concrete North and South headwall (inaccessible)	Structural support	Concrete	Water – flowing **or standing**	Increase in porosity and permeability ~~Cracking~~ ~~Loss of material~~ **Loss of strength**	Structures Monitoring	III.A6.TP-109	3.5-1, 051	E, 2
~~Reinforced concrete North and South headwall (inaccessible)~~	~~Structural support~~	~~Concrete~~	~~Water – flowing~~	~~Loss of material~~	~~Inspection of Water-Control Structures Associated with Nuclear Power Plants~~	~~III.A6.T-20~~	~~3.5-1, 056~~	~~A~~

Table 3.5.2-7: Discharge Structure – Summary of Aging Management Evaluation

	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-2191 Item	Table 1 Item	Notes
Reinforced concrete seal wall (accessible)	Structural support	Concrete	Air - outdoor	Cracking	Inspection of Water-Control Structures Associated with Nuclear Power Plants	III.A6.T-34	3.5-1, 096	~~B~~**A**
Reinforced concrete seal wall (accessible)	Structural support	Concrete	Air - outdoor	Cracking Loss of bond Loss of material	Inspection of Water-Control Structures Associated with Nuclear Power Plants	III.A6.TP-38	3.5-1, 059	~~B~~**A**
Reinforced concrete seal wall (accessible)	Structural support	Concrete	Air – outdoor **Water – flowing or standing**	Increase in porosity and permeability Loss of strength	Inspection of Water-Control Structures Associated with Nuclear Power Plants	III.A6.TP-37	3.5-1, 061	~~B~~**A**
~~Reinforced concrete seal wall (inaccessible)~~	~~Structural support~~	~~Concrete~~	~~Water – flowing~~	~~Loss of material~~	~~Inspection of Water-Control Structures Associated with Nuclear Power Plants~~	~~III.A6.T-20~~	~~3.5-1, 056~~	~~C~~

Revise the following line items in Table 3.5.2-11, Intake Structure – Summary of Aging Management Evaluation, as follows:

Table 3.5.2-11: Intake Structure – Summary of Aging Management Evaluation

	Intended Function	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-2191 Item**	**Table 1 Item**	**Notes**
Anchorage/ embedment (above Intake canal level)	Structural support	Carbon steel Galvanized steel	Air - outdoor	Loss of preload	Structures Monitoring	III.A6.TP-261	3.5-1, 088	~~A~~**B**
Anchorage/ embedment (below Intake canal level)	Structural support	Carbon steel Galvanized steel	Air - outdoor	Loss of preload	Structures Monitoring	III.A6.TP-261	3.5-1, 088	~~A~~**B**
Reinforced concrete foundation, beams, columns, walls and floors/slabs (above Intake Canal level)	Structural support	Concrete	Air – outdoor	Cracking	Inspection of Water-Control Structures Associated with Nuclear Power Plants	III.A6.TP-34	3.5-1, 096	~~B~~**A**

Table 3.5.2-11: Intake Structure – Summary of Aging Management Evaluation

	Intended Function	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-2191 Item**	**Table 1 Item**	**Notes**
Reinforced concrete foundation, beams, columns, walls and floors/slabs (above Intake Canal level)	Structural support	Concrete	Air – outdoor	Cracking Loss of bond Loss of material	Inspection of Water-Control Structures Associated with Nuclear Power Plants	III.A6.TP-38	3.5-1, 059	~~B~~**A**
Reinforced concrete foundation, beams, columns, walls and floors/slabs (above Intake Canal level)	Structural support	Concrete	Air – outdoor **Water – flowing or standing**	Increase in porosity and permeability Loss of strength	Inspection of Water-Control Structures Associated with Nuclear Power Plants	III.A6.TP-37	3.5-1, 061	~~B~~**A**

Revise Section 17.2.2.36 on page A-38 as follows:

~~PTN water control structures are exposed to aggressive ground water (Chlorides > 500 ppm); therefore, focused inspections of below-grade, inaccessible concrete structural elements exposed to aggressive groundwater/soil is performed on an interval not to exceed five years.~~ Submerged concrete structures may be inspected during periods of low tide, when dewatered or by using divers. Areas covered by silt, vegetation, or marine growth are not considered inaccessible, and are cleaned and inspected in accordance with the standard inspection frequency.

Revise Table 17-3, Item 40 on page A-108 as follows:

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
40	Inspection of Water-Control Structures Associated with Nuclear Power Plants (17.2.2.36)	XI.S7	~~d) Perform focused inspections of below-grade, inaccessible concrete structural elements exposed to aggressive groundwater/soil, on an interval not to exceed 5 years. Submerged concrete structures may be inspected during periods of low tide or when dewatered or using divers. Areas covered by silt, vegetation, or marine growth are not considered inaccessible and are cleaned and inspected in accordance with the standard inspection frequency;~~ ~~e~~d) Include monitoring for siltation or undesirable vegetation, with respect to cooling canal inspections, so that the cooling canal function does not become impaired; ~~f~~e) Include the Reinforced Concrete Shield Wall for the Discharge Structure in the list of components inspected in the pertinent implementing procedure.	No later than 6 months prior to the SPEO, i.e.: PTN3: 1/19/2032 PTN4: 10/10/2032

Revise Section B.2.3.36 description on page B-264 as follows:

~~From comparison with the chloride level for seawater, the groundwater/soil at PTN is considered aggressive (chlorides > 500 ppm). Therefore, PTN will perform a focused inspection of below grade, inaccessible concrete structural elements exposed to aggressive groundwater/soil, on an interval not to exceed 5 years.~~ Submerged concrete structures may be inspected during periods of low tide, when dewatered or using divers. Areas covered by silt, vegetation, or marine growth are not considered inaccessible and are cleaned and inspected in accordance with the standard inspection frequency.

Revise Section B.2.3.36 enhancements on page B-265 as follows:

Element Affected	Enhancement
4. Detection of Aging Effects	~~Update the governing AMP procedure to include focused inspections of below grade, inaccessible concrete structural elements exposed to aggressive groundwater/soil, on an interval not to exceed 5 years.~~ Update the governing AMP procedure to include inspection of cooling canals for siltation or undesirable vegetation that could impair the cooling canal function.

Associated Enclosures:

None

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

5. Scoping and Screening – Auxiliary Systems

Regulatory Basis:

In accordance with 10 CFR 54.33, the plant-specific CLB continues in effect during the subsequent renewal term in the same manner and to the same extent as during the original and initial extended licensing terms, unless specifically modified in the renewed license. In implementing this principle, the rule in 10 CFR 54.4, defines the scope of license renewal to include those plant SSCs (a) that are safety-related; (b) whose failure could prevent the accomplishment of safety-related functions; and (c) that are relied on to demonstrate compliance with the NRC's regulations for fire protection, environmental qualification, pressurized thermal shock, anticipated transients without scram, and station blackout.

In accordance with the criteria of 10 CFR 54.29(a), the staff must evaluate whether actions have been identified and have been or will be taken with respect to the managing the effects of aging during the period of extended operation, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB. In order to complete its review and enable making a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

RAI 2.3.3.1-1

Regulation:

Section 54.4(a) of 10 CFR "Scope" reads in part:

(a) Plant systems, structures, and components within the scope of this part are--

(1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions—

(i) The integrity of the reactor coolant pressure boundary;

(ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or

(iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in § 50.34(a)(1), § 50.67(b)(2), or § 100.11 of this chapter, as applicable.

(2) All non safety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) of this section. ...

Section 54.21(a) "Contents of application--technical information" reads, in part:

Each application must contain the following information:

(a) An integrated plant assessment (IPA). The IPA must--

(1) For those systems, structures, and components within the scope of this part, as delineated in § 54.4, identify and list those structures and components subject to an aging management review. Structures and components subject to an aging management review shall encompass those structures and components--

(i) That perform an intended function, as described in § 54.4, without moving parts or without a change in configuration or properties. ...

Issue:

Section 2.3.3.1, "Intake Cooling Water" (ICW), of the SLRA specifies the system intended functions as:

Safety-related functions (10 CFR 54.4(a)(1)):

(1) Remove the heat load from the CCW system during DBA [design basis accident] conditions to support both reactor heat removal and containment heat removal requirements.

Non safety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

(1) The ICW system shall remove the heat load from the CCW system to support the spent fuel cooling requirements.

(2) The ICW system shall remove the heat load from the CCW system during refueling operation (Mode 6) to support the core decay heat removal requirements.

(3) Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function.

Fire protection, EQ [equipment qualification], PTS [pressurized thermal shock], ATWS [Anticipated Transient Without Scram], and SBO [station blackout] functions (10 CFR 54.4(a)(3)):

(1) Perform a function that demonstrates compliance with the Commission's regulations for fire protection and for SBO.

The staff' is concerned that this list of intended functions may be inconsistent with licensing basis information and, in combination with the list of component types and component intended functions, insufficient to conform with the requirements of 10 CFR 54.21(a)(1) to identify the components subject to an aging management review. Section 1.9, "Quality Assurance Program," and Appendix 5A, "Seismic Classification & Design Basis for Structures, Systems and Equipment for Turkey Point," of the Turkey Point UFSAR describe the portion of the intake cooling water system from the system pumps to the component cooling water (CCW) heat exchanger inlet nozzle as subject to the facility quality assurance program and designated as Class I, respectively. Components in the CCW, spent fuel pool cooling, and residual heat removal (RHR) systems are similarly classified. Furthermore, in SLRA Sections 2.3.3.2, "Component Cooling Water," and 2.3.3.3, "Spent Fuel Pool Cooling," the core decay heat removal and spent fuel pool cooling functions are classified under 10 CFR 54.4(a)(1) as safety-related intended functions.

Request:

Clarify the intended functions of the ICW system in a manner that is consistent with the system licensing basis and that, in combination with the list of component types, supports identification of the ICW system components that are subject to an aging management program.

FPL Response:

The intended functions outlined in PTN SLRA Section 2.3.3.1 for the Intake Cooling Water (ICW) system are consistent with the system licensing basis. The only safety-related intended function of the PTN ICW system is to remove the heat load from Component Cooling Water (CCW) system during design basis accident conditions. However, all of the ICW system components that implement the following intended functions, identified in the current licensing basis as quality-related, are safety-related components:

(1) The ICW system shall remove the heat load from the CCW system to support the spent fuel cooling requirements.

(2) The ICW system shall remove the heat load from the CCW system during refueling operation (Mode 6) to support the core decay heat removal requirements.

PTN SLRA Sections 2.3.3.2 and 2.3.3.3 for the Component Cooling Water (CCW) and Spent Fuel Pool Cooling systems screen these quality-related functions in the 10 CFR 54.4(a)(1) intended function category to recognize the appropriate classification of the components. PTN SLRA Section 2.3.3.1 is amended as shown below to be consistent with the CCW and Spent Fuel Pool Cooling systems handling of this issue. Note that the change in designation of a system intended function between safety-related (10 CFR 54.4(a)(1)) and nonsafety-related which could affect safety-related functions (10 CFR 54.4(a)(2)) does not impact the license renewal system boundaries nor the screening which the components within those boundaries are subjected to. As such, there is no change to the list of system components or their intended functions.

References:

None

Associated SLRA Revisions:

SLRA Section 2.3.3.1 is amended as indicated by the following text deletion (strikethrough) and text addition (red underlined font) revisions.

Revise SLRA Section 2.3.3.1 as follows:

System Intended Functions

Safety-related functions (10 CFR 54.4(a)(1)):

(1) Remove the heat load from the CCW system during DBA conditions to support both reactor heat removal and containment heat removal requirements.

(2) **The ICW system shall remove the heat load from the CCW system to support the spent fuel cooling requirements.**

(3) **The ICW system shall remove the heat load from the CCW system during refueling operation (Mode 6) to support the core decay heat removal requirements.**

Nonsafety-related components that could affect safety-related functions (10 CFR 54.4(a)(2)):

~~(1) The ICW system shall remove the heat load from the CCW system to support the spent fuel cooling requirements.~~

~~(2) The ICW system shall remove the heat load from the CCW system during refueling operation (Mode 6) to support the core decay heat removal requirements.~~

~~(3)~~ **(1)** Maintain integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function.

Associated Enclosures:

None

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

RAI 2.3.3.4-1

Regulation:

Section 54.4(a) 10 CFR "Scope" reads in part: "(a) Plant systems, structures, and components within the scope of this part are--... (2) All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) of this section. ..."

Issue:

Section 2.3.3.4, "Chemical and Volume Control" (CVCS), of the SLRA specifies that the system's intended functions include maintaining the integrity of nonsafety-related components such that no interaction with safety-related components could prevent satisfactory accomplishment of a safety function. However, the seal water head tanks and associated piping directly connected to the charging pumps are not identified as subject to an aging management program by either SLRA Table 2.3.3-4, "Chemical and Volume Control Components Subject to Aging Management Review," or Detail 1 through Detail 3 (charging pumps) shown on SLRA Drawings 5613-M-3047, Sheet 2, and 5614-M-3047, Sheet 2, "Chemical and Volume Control System Charging and Letdown." Section 4, "Non-Safety SSCs Directly Connected to Safety-Related SSCs," of Appendix F to NEI 95-10, Revision 6, states the following:

> For non-safety SSCs directly connected to safety-related SSCs (typically piping systems), the non-safety piping and supports, up to and including the first equivalent anchor beyond the safety/non-safety interface, are within the scope of license renewal per 10 CFR 54.4(a)(2).

The drawings indicate the seal water head tanks are directly connected to the charging pump bodies. Therefore it is unclear why the seal water tanks are excluded from the scope of components that are subject to an aging management review.

Request:

Justify the exclusion of the charging pump seal water head tanks and associated piping connecting the tanks to the charging pump bodies to the scope of equipment subject to an aging management review, or amend the applicable program as appropriate.

FPL Response:

The charging pump seal water head tanks and associated piping connecting the tanks to the charging pump bodies are within the scope of equipment subject to an aging management review as non-safety SSCs directly connected to safety-related SSCs. The seal water head tanks, tubing, and valves are managed in PTN SLRA Table 3.3.2-4 as piping and piping components with a structural integrity "attached" intended function exposed to an external environment of air indoor uncontrolled and an internal environment of treated borated water.

SLRA boundary drawings 5613-M-3047, Sheet 2 and 5614-M-3047, Sheet 2 are revised to reflect that the charging pump seal water head tanks and associated piping connecting the tanks to the charging pump bodies are subject to aging management review as non-safety SSCs directly connected to safety-related SSCs.

References:

None

Associated SLRA Revisions:

None

Associated Enclosures:

None

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

RAI 2.3.4.4-1

Regulatory Basis:

Section 54.4(a) of 10 CFR "Scope" reads in part "i(a) Plant systems, structures, and components within the scope of this part are-... (2) All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) of this section. ..."

NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants," "Table 2.1-5, "Typical 'Passive' Structure-Intended Functions" describes the "Intended Function" "Leakage Boundary (Spatial)" as "Nonsafety-related component that maintains mechanical and structural integrity to prevent spatial interactions that could cause failure of safety-related SSCs."

Issue:

SLRA Section 2.3.4.4, "Steam and Power Conversion Systems in the Scope of 10 CFR 54.4(a)(2) for Spatial Interactions," (page 2.3-86) indicates that segments of the auxiliary steam, condensate, feedwater, and feedwater heater drains and vents systems could potentially affect safety-related cable trays and conduit in certain areas of the turbine building if age-related failures are assumed. However, the SLRA does not define criteria for exclusion of piping segments in these high-energy systems from the scope of components subject to aging management review. The staff is concerned that the following piping segments on the indicated SLRA drawings were not shown as being subject to an aging management review and lacked a clear basis for this exclusion:

- Drawing 5613-M-3073, Sheet 3, "Condensate System": The 14 inch piping bypassing the 3rd, 4th, and 5th stage feedwater heaters is not indicated as subject to an aging management review, but the piping through the feetwater heaters is subject to an aging management review.
- Drawing 5614-M-3073, Sheet 3, "Condensate System": The 14 inch piping bypassing the 3rd, 4th, and 5th stage feedwater heaters is not indicated as subject to an aging management review, but the piping through the feetwater heaters is subject to an aging management review.
- Drawing 5613-M-3081, Sheets 2 & 3, "Feedwater Heater Drains & Vents System": The 10 inch piping from the reheater drain tank and the 6th stage feedwater heater is indicated as subject to an aging management review in two segments, but adjacent piping segments are not subject to an aging management review.
- Drawing 5614-M-3081, Sheets 2 & 3, "Feedwater Heater Drains & Vents System": The 10 inch piping from the reheater drain tank and the 6th stage feedwater heater is indicated as subject to an aging management review in one segment, but adjacent piping segments and similar piping segments in a parallel flow path are not subject to an aging management review.

During the NRC staff's audit of non-safety piping systems conducted on August 25 and 26, 2018, the NextEra staff indicated that piping above the operating deck and piping that meets high energy criteria for less than 2 percent of the operating time is excluded from being subject to an aging management program.

Request:

Provide the basis for excluding the above identified piping segments from being subject to an aging management review. For piping sections that infrequently exceed the criteria to be considered high-energy piping systems, provide justification that supports their continued infrequent operation as high-energy piping.

FPL Response:

- The normally isolated 14 inch condensate piping bypassing the Unit 3 and 4 third (3rd), fourth (4th), and fifth (5th) stage feedwater heaters should have been identified as being within the scope of SLR on the associated SLR system boundary drawings 5613-M-3073, Sheet 3 and 5614-M-3073, Sheet 3. Even though this portion of condensate piping is normally isolated, failure of the piping is assumed to have the potential to impact safety related SSCs located in the turbine building. Therefore, this portion of condensate piping is subject to an aging management review.

  From a review of SLRA Table 3.4.2-5, carbon steel condensate piping that has an intended function of "Leakage boundary (spatial)", would be subject to "Air outdoor (ext)" and "Treated water (int)" environments. Consistent with SLRA Table 3.4.2-5, the aging effect of loss of material would be managed by the External Surfaces Monitoring of Mechanical Components AMP (external surfaces) and the Water Chemistry and One-Time Inspection AMPs (internal surfaces). The aging effect of wall thinning due to both flow accelerated corrosion and erosion would be managed by the Flow-Accelerated Corrosion (FAC) AMP. However, this portion of condensate piping meets the FAC AMP exclusion criteria identified in the response to RAI B.2.3.8-2 which was included as Attachment 5 to FPL letter L-2018-175 (Reference 1). The specific exclusion criteria that this piping meets "is systems with no flow or infrequently used piping with a total operating and testing time that is less than 2% of the plant operating time." The basis for this exclusion is as follows.

  In accordance with the PTN controlled document database, the normally closed isolation valves for the 14 inch piping bypassing the 3rd, 4th, and 5th stage feedwater heaters are only opened as part of three (3) normal operating procedures. The first procedure only opens these isolation valves when flushing of the 3rd, 4th, or 5th stage feedwater heater bypass piping is required. Flushing of the feedwater heater bypass piping would only be performed during plant startup or shutdown and not while the unit is at power operating conditions. Under these conditions the 14 inch bypass piping would be below 200 °F and would not meet the criteria for being considered "high energy piping" per the criteria outlined in SLRA Section 2.1.5.2.1.

  The second procedure only opens these isolation valves if the condenser and condensate and heater drain systems are required to be drained. Similar to the procedure described above, draining of these systems would only be performed during plant startup or shutdown and not while the unit is at power operating conditions. Under these conditions, the 14 inch bypass piping would be below 200 °F and would not meet the criteria for being considered "high energy piping" per the criteria outlined in SLRA Section 2.1.5.2.1.

The third procedure only opens these isolation valves if a feedwater heater is required to be removed from service for replacement or maintenance during power operation when the piping would be considered a "high energy line" per the criteria outlined in the SLRA, section 2.1.5.2.1. Discussions with plant Operations and Engineering departments confirmed that bypassing of the feedwater heaters during normal operation has only been attempted once in the last twelve years and was unsuccessful. Therefore, it is reasonable to assume that the 14 inch normally isolated feedwater heater bypass piping meets the less than 2% of the plant operating time basis for exclusion from the FAC program inspection requirements.

Listed below are the PTN Unit 3 and 4 condensate system SLR boundary drawings which will be updated to include the subject feedwater heater bypass piping within the scope of SLR and requiring aging management.

- 5613-M-3073, Sheet 3
- 5614-M-3073, Sheet 3

- Regarding the portions of the 10 inch piping from the Unit 3 and 4 reheater drain tanks and 6th stage feedwater heaters currently excluded from the scope of SLR, refer to SLRA Section 2.1.5.2.3, which describes the methodology used by PTN to determine those nonsafety-related systems that are not connected to safety-related piping and have a spatial relationship such that their failure could adversely impact the performance of a safety-related SSC intended function. Section 2.1.5.2.3 states that during the original Turkey Point LRA review, NRC staff requested clarification of the Turkey Point scoping criteria for 54.4(a)(2). Specifically, the NRC issued a draft Turkey Point License Renewal Safety Evaluation Report (SER) with several open items (Reference 2). Open Item 2.1.2-1 requested additional justification be provided to demonstrate that age-related failures of nonsafety-related SSCs would not adversely affect safety-related SSCs. The Turkey Point response to Open Item 2.1.2-1 was provided to NRC in FPL letter L-2001-236 (Reference 3), and it addressed all nonsafety-related SSCs that affect safety-related SSCs that are within the scope of license renewal as defined in 10 CFR 54.4(a)(2).

  Page 11 of Attachment 1 of Reference 3 provided descriptions of the non-safety related high energy piping systems in the PTN turbine building, including the feedwater heater drain and vent system. Attachment 1, Table 4 on page 12 and 13 of Reference 3 provided further description that "portions of the feedwater heater drains and vents system" were included in the scope of license renewal for Turkey Point. The PTN original license renewal (LR) boundary drawings indicated that these portions of the feedwater heater drain and vent system piping were not in the scope of LR as their failure could not adversely impact the performance of safety-related SSCs. The "LR" flags on the SLRA boundary drawings are consistent with the flag locations on the original LR boundary drawings.

Subsequent to this Turkey Point response to SER Open Item 2.1.2-1, the NRC issued the final SER for Turkey Point license renewal (Reference 4), which states the following:

> *As a result of this supplemental review the applicant brought additional non-safety-related piping segments into the scope of license renewal, provided the results of the associated AMRs, and provided a summary of the programs and activities that will be used to manage aging in these piping systems. The staff's review of the applicant's aging management of components in these piping systems is provided in SER. On the basis of the additional information provided by the applicant, the staff concludes that the applicant has provided sufficient information to demonstrate that all SSCs that meet the 54.4(a)(2) scoping criterion, have been identified as being within the scope of license renewal. Open Item 2.1.2-1 is closed.*

Given the information provided above, the portions of the 10 inch piping from the Unit 3 and 4 reheater drain tanks and the 6th stage feedwater heaters not included in the SLR boundaries depicted on 5613-M-3081 Sheet 2, 5613-M-3081 Sheet 3, 5614-M-3081 Sheet 2, and 5614-M-3081 Sheet 3 (refer to SLRA, section 2.3.4.4, page 2.3-134) are not within the scope of PTN SLR.

References:

1. FPL Letter L-2018-175 to NRC dated October 17, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application, Safety Review Requests for Additional Information (RAI) Set 5 Responses (ADAMS Accession No. ML18292A642)
2. NRC Safety Evaluation Report with Open Items Related to the License Renewal of Turkey Point Nuclear Plant, Units 3 and 4, August 2001 (ADAMS Accession No. ML012320225)
3. FPL Letter to NRC, L-2001-236, License Renewal Safety Evaluation Report Open Item and Confirmatory Item Responses and Revised License Renewal Application Appendix A, dated November 1, 2001 (ADAMS Accession No. ML013470150)
4. NRC Letter to J. A. Stall (FPL), "License Renewal Safety Evaluation Report for Turkey Point Nuclear Plant, Units 3 and 4, dated February 27, 2002 (ADAMS Accession No. ML020580582)

Associated SLRA Revisions:

SLRA Sections 2.1.5.2.3 and 2.1.9 are amended as indicated by the following text deletion (strikethrough) and text addition (red underlined font).

Revise the third paragraph of SLRA section 2.1.5.2.3, page 2.1-20 to update the Reference number associated with the NRC letter that issued the final SER for the Turkey Point license renewal as follows:

During the original Turkey Point LRA review, NRC staff requested clarification of the Turkey Point scoping criteria for 54.4(a)(2). Specifically, the NRC issued a draft Turkey

Point License Renewal Safety Evaluation Report (SER) with several open items (Reference 2.1.9.15). Open Item 2.1.2-1 requested additional justification be provided to demonstrate that age-related failures of nonsafety-related SSCs would not adversely affect safety-related SSCs. The Turkey Point response to Open Item 2.1.2-1 was provided to NRC in FPL letter L-2001-236 (Reference 2.1.9.16), and it addressed all nonsafety-related SSCs that affect safety-related SSCs that are within the scope of license renewal as defined in 10 CFR 54.4(a)(2). Subsequent to this Turkey Point response to initial SER Open Item 2.1.2-1, the ~~(Reference 2.1.9.16)~~ NRC letter **(Reference 2.1.9.20)** issued the final SER for Turkey Point license renewal.

Revise SLRA Section 2.1.9, page 2.1-34 to add Reference 2.1.9.20 as follows:

2.1.9.20 NRC Letter to J. A. Stall (FPL), "License Renewal Safety Evaluation Report for Turkey Point Nuclear Plant, Units 3 and 4, dated February 27, 2002, Accession No. ML020580582.

Associated Enclosures:

None

NRC RAI Letter No. ML18292A745 and ML18292A746 Dated October 31, 2018

ASME Section XI, Subsection IWL (GALL-SLR AMP XI.S2)

RAI B.2.3.31-1

Background:

Section 54.21(a)(3) of 10 CFR requires the applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function will be maintained consistent with the current licensing basis for the period of extended operation. As described in SRP-SLR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL-SLR Report and when evaluation of the matter in the GALL-SLR Report applies to the plant.

SLRA Section B.2.3.31 states that the ASME Section XI Subsection IWL aging management program (AMP) is an existing program consistent with the GALL-SLR Report AMP XI.S2, "ASME Section XI, Subsection IWL." The "parameters monitored or inspected" program element of XI.S2 recommends the tendon corrosion protection medium to be monitored and tested for compliance with ASME Section XI, Subsection IWL requirements which include chemical analyses of the medium for free water, alkalinity, and its amount in the tendon ducts. The "monitoring and trending" program element of XI.S2 states that these quantities are monitored and trended over the life of the plant. In addition, ASME Section XI, Subsection IWL requires examination of grease caps to assure their integrity for containing the corrosion protection medium within the tendon sheathings.

In addition to the tendon corrosion protection system and its monitoring discussed above, the staff also noted in chapter five of the Turkey Point Updated Final Safety Analysis Report the existence of a cathodic protection system (CP) for mitigating corrosion to the tendon system and to the reinforcing steel at the base slab. SLRA Section B.2.3.31 states that that the CP system is not credited for aging management, and that Turkey Point "established plans to monitor the potentially impacted inaccessible areas through continued performance of the ASME Section XI, Subsection IWE and IWL AMPs."

Issue:

The GALL Report states that the conditions and operating experience at the plant must be bound by the conditions and operating experience for which the GALL program was evaluated, otherwise it is incumbent on the applicant to augment the GALL program as appropriate to address the additional aging effects. The GALL Report also states that operating experience involving the AMP, including past corrective actions resulting in program enhancements or additional programs, should provide objective evidence to support a determination that the effects of aging will be adequately managed so that the structure and component intended functions will be maintained during the period of extended operation. During the review of the applicant's operating experience (OpE) and ASME Section XI, Subsection IWL inspection results, the staff noted instances of water infiltration in tendon sheathing (in as indicated, for example, in PTNPSC-01-TP-

004 and condition reports (AR) 1679310) and tendon end-cap grease leakages. Some ARs indicated unusual stains at tendon end caps suggesting the infiltration of contaminated water in tendon sheathings to be a probable cause. The staff reviewed documentation showing that at times grease loss has exceeded the limitation imposed by IWL 3221.4 of 10 percent of the net duct volume (as indicated, for example, in AR 2184466), confirming that significant leakage is occurring. In addition, inspection of tendon anchorages have revealed signs of corrosion and inspected tendons have shown that water seepage has occurred inside tendons (as indicated, for example, in PTNPSC 01-TP-004 and AR 1679310). Although tendons were covered with a grease residue some corrosion was found in areas originally filled with grease. Corrosion coupled with high stresses could lead to premature tendon wire failures, especially in the high temperatures and salt water environment that exists at Turkey Point. The staff also noted that the CP has been inoperative (as indicated in Turkey Point AR 1920613) since 2009 for mitigating corrosion to the tendon assemblies. Given the noted operating experience and the fact that Turkey Point is exposed to a salt-water moist environment, often at high temperatures, the staff needs additional information to justify whether a five-year frequency of inspection is adequate for corrosion prevention of tendon assemblies.

In addition, the staff noted during its onsite audit that the below ground level horizontal tendons and their assemblies are accessible for service through galleries or enclosures external to the containment. These were noted often to have been flooded due to lack of drainage, which can lead to submergence of tendon assemblies, in-leakage of water into tendons, and subsequent corrosion to both. SRLA Section 2.4.1 states that the tendon access galleries are not in the scope of subsequent license renewal. Discussions with plant personnel also indicated the same applies to tendon access enclosures. It is not clear how the ASME Section XI, Subsection IWL AMP will ensure that the lower horizontal tendon anchorages and surrounding concrete and rebar will be managed such that the flooded environment will not impact the structural integrity of the affected concrete area and functionality of the tendons.

Request:

Considering the observed operating experience, state how the proposed frequency of inspections of the tendon assembly (including end caps) will ensure that possible age-related degradation due to grease leakage out, or water in leakage, to the tendons will be detected timely and managed such that the tendons will continue to perform their intended functions during the period of extended operation

1. Describe how the ASME Section XI Subsection IWL AMP can ensure functionality of the lower horizontal tendons if the environment of the tendon access gallery is not managed for chronic water intrusion.

FPL Response:

The frequency of tendon assembly (including end caps) inspections has and will continue to ensure that the tendons are capable of performing their intended functions through the subsequent period of extended operation. Code requirements are met, as described in SLRA Section B.2.3.31, or relief requests are submitted and approved. Indications of corrosion, water inleakage, grease discoloration, or excessive grease leakage receive an engineering evaluation and repair through the corrective action program. Furthermore, as described in L-2018-176 (Reference 1) Attachment 3, instances of excess grease leakage are typically resolved through repair and replacement of the gasket and replenishing the grease or draining water from the tendon sheath. As described in SLRA Sections 17.2.2.31 and B.2.3.31, the PTN ASME Section XI, Subsection IWL AMP includes testing for free water that is identified in a tendon.

During the most recent inspections (performed in 2017), sixty-two tendons were inspected with all but two found to be free of water intrusion and acceptable per IWL-3221.3(e). The remaining two Unit 3 vertical tendons had small amounts of free water, 6 ounces or less. The tendon with the greatest water intrusion was also subjected to tendon wire tensile testing per IWL-2523.1. The tested wire had an acceptable corrosion level and was free of physical damage. The removed and tested tendon wire was found to have a diameter within the acceptable range and acceptably high yield stress and ultimate tensile strength within prescribed limits. The IWL program also requires chemical tests of tendon grease for water content and contaminants (e.g., chlorides, nitrates, sulfides). All tendon grease chemical tests were acceptable, and acceptable grease coatings were found on all tendon ends inspected. While restoring the grease following grease cap replacement, the absolute difference in the quantity of grease replaced was observed to exceed the acceptance criteria of 10% of the tendon duct (sheath) volume for 8 tendons (6 in Unit 3 and 2 in Unit 4). These results were documented in the corrective action program and reported to the NRC per Technical Specification 3.6.1.6.c.

All three tendon groups (vertical, horizontal, dome) are of the same design with respect to configuration, tendon sheathing, and protective grease. The vertical tendons have historically shown the most instances of grease leakage and discoloration. In addition, the vertical tendons extend below-grade. Considering the subject operating experience relative to grease leakage or water drainage out of the tendons and the non-functional containment cathodic protection system, supplemental inspection is warranted. This supplemental inspection will confirm that a) the inspection frequency remains adequate, b) the lack of a functional containment cathodic protection for the last several years has not resulted in degradation requiring more frequent inspection, and c) that possible age-related degradation will be detected in a timely manner and managed to ensure the tendons perform their intended functions during the subsequent period of extended operation. This supplemental inspection will verify the effectiveness of the grease (even grease residue) in tendon wire protection or will establish the appropriate inspection frequency.

This baseline supplemental inspection will be a visual inspection performed in accordance with existing tendon inspection procedures of:

- a wire from a representative (random) vertical tendon from each unit, based on an evaluation of the relevant operating experience for the location of greatest and/or most frequent grease leakage; and
- a wire from a representative (random) dome or other tendon from each unit, based on evaluation of the relevant operating experience for the location of greatest or most frequent instances of water inleakage.

This supplemental inspection will be added into the 55th year interval, approximately five years prior to the SPEO. A follow-up to the baseline supplemental inspection will be added into the 60th year interval, at the beginning of the SPEO, to confirm there has been no unacceptable grease leakage or water intrusion from the previously inspected representative (random) tendons and the results trended. The direct comparison of supplemental inspection results will provide further objective evidence that possible tendon degradation is detected in a timely manner using the current IWL inspection frequency or establish the appropriate intervals for future inspections.

Acceptance criterion for this supplemental inspection is that each wire is free of any active corrosion. Acceptance criteria for the follow-up inspection is no evidence of unacceptable grease leakage or water intrusion for the end cap of the previously inspected (random) tendon. Acceptance criteria that are not met, e.g., active corrosion identified, will be addressed through the corrective action program. Such a condition would be evaluated to characterize the corrosion, determine the cause, the location, depth, and extent of the corrosion. Corrective actions may include grease analysis, replacement of grease within the tendon sheath, end cap and gasket repair, additional wire inspections from the same tendon, evaluation of the tendon capacity, potential replacement of the tendon, and augmented inspections and grease sampling of other leading indicator tendons, based, in part, on previous evidence of free water, observed grease leakage, grease discoloration, and grease chemistry results. Specific corrective actions would depend upon the cause, extent of condition, and grease properties and are consistent with those which would be evaluated during periodic required IWL examinations.

1. Additional considerations relative to the lower horizontal (hoop) tendons are:

   The lower horizontal (hoop) tendons for PTN Units 3 and 4 are at or above the 12' elevation, which is less than 6 feet below grade (18'). The tendon inspection pits (buttress pits) for these horizontal tendons are accessed through ground-level galvanized checkered cover plates adjacent to the containment. The periodic tendon inspections through the PTN ASME Section XI, Subsection IWL AMP include removal of any water in the tendon inspection pits at the beginning of each inspection, as well as removal of any water in the tendon galleries which are also accessed through ground-level cover plates for inspection of the bottom of the vertical tendons. Based on site operating experience, the tendon inspection pits and tendon galleries currently also receive periodic (annually, semi-annually, respectively) inspection and water removal through preventive maintenance activities.

Inspection of the lower horizontal tendons in the 35th year interval confirmed the conditions of sheath filler, end caps, etc. to be acceptable. However, given the lack of functioning containment cathodic protection for the last several years, experience relative to water accumulation in the tendon inspection pits and tendon galleries, and potential for exposure of the below-grade horizontal tendon sheaths and end caps to groundwater, the supplemental inspection will also include:

- a wire from a lower horizontal (hoop) tendon for each unit as a leading indicator for potential degradation or tendon surface corrosion.

In addition, the PTN ASME Section XI, Subsection IWL AMP, which was previously updated in L-2018-176 Attachment 3, will be enhanced to ensure that existing periodic inspections and water removal for the tendon inspection pits (buttress pits) and tendon galleries continue at appropriate intervals through the SPEO and are credited as preventive actions. Based on the configuration, with vertical tendon end caps at the top of the tendon gallery, the end caps cannot be submerged due to the depth of the tendon gallery and the periodic inspection/water removal.

The pertinent SLRA sections are revised to include the supplemental inspections and preventive actions in the PTN ASME Section XI, Subsection IWL AMP. Additionally, the SLRA is clarified based on the implementation of the 2007 edition with 2008 addenda (SLRA Reference B.3.122) to the ASME Section XI for the current 50th year interval of the Turkey Point ASME Section XI, Subsection IWL AMP.

References:

FPL Letter L-2018-176, dated October 17, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application Responses to the August 2018 NRC On-Site Regulatory Audit Follow-up Items (ADAMS Accession No. ML18292A641)

Associated SLRA Revisions:

SLRA Section 17.2.2.31, Table 17-3 (Item 35), Section B.2.2.3, and Section B.2.3.31, previously amended in L-2018-176 Attachment 3, are further amended as indicated by the following text deletion (strikethrough) and text addition (red underlined font) revisions.

Revise Section 17.2.2.31 description on pages A-35 and A-36, as amended by L-2018-176 Attachment 3 (pg 4 of 9), as follows:

The PTN ASME XI, Subsection IWL, AMP is an existing AMP that was formerly the PTN ASME Section XI, Subsection IWL, ISI Program. The inspections associated with this AMP assess the quality and structural performance of the containment structure post-tensioning system components. The current program complies with ASME Code Section XI, Subsection IWL, 200~~1~~**7** Edition through 200~~3~~**8** Addenda (Reference B.3.1~~3~~**2**2), supplemented with the applicable requirements of 10 CFR 50.55a(b)(2). This program is consistent with provisions in 10 CFR 50.55a that specify the use of the ASME Code edition in effect 12 months prior to the start of the start of the inspection interval. PTN will use the ASME Code edition consistent with the provisions of 10 CFR 50.55a during the SPEO. In accordance with 10 CFR 50.55a(g)(4)(ii), the ISI program is updated each successive 120-month inspection interval to comply with the requirements of the latest edition of the ASME Code specified twelve months before the start of the inspection interval.

This AMP manages the aging effects of loss of material and confirms the results of the containment tendon loss of prestress TLAA. This AMP includes inspection of tendon and anchorage hardware surfaces and measurement of tendon force and elongation. This AMP also includes inspection of containment reinforced concrete above ground for evidence of concrete degradation. This AMP consists of:

(a) Periodic visual inspection of accessible concrete surfaces for the reinforced and prestressed concrete containment structure;

(b) Periodic visual inspection and sample tendon-testing of un-bonded posttensioning system components for signs of degradation, assessment of damage, and corrective actions and;

(c) Testing of the tendon corrosion protection medium and free water in the sheath (duct).

Measured tendon lift-off forces in select common (historical/control) or random sample tendons are compared to predicted tendon forces calculated in accordance with NRC RG 1.35.1, "Determining Prestressing Forces for Inspection of Prestressed Concrete Containments." The Subsection IWL requirements are supplemented to include quantitative acceptance criteria for the evaluation of concrete surfaces based on the "Evaluation Criteria" provided in Chapter 5 of American Concrete Institute (ACI) 349.3R, "Evaluation of Existing Nuclear Safety-Related Concrete Structures." Inspection results are compared with prior recorded results in acceptance of components for continued service.

The PTN ASME Section XI, Subsection IWL AMP is further supplemented by a separate visual inspection of a wire from representative (random) vertical, dome or other, and lower horizontal tendon for each unit based on related operating experience regarding excessive and/or frequent grease leakage, water inleakage, and water intrusion in tendon inspection pits/galleries, respectively. This supplemental visual inspection will be performed in accordance with existing tendon inspection procedures and in the 55th year interval (approximately five years prior to the SPEO) for one unit and 60th year interval for the other unit. A follow-on supplemental inspection will be performed in the 60th year interval (at the beginning of the SPEO) for one unit and 65th year interval for the other unit to confirm no unacceptable grease leakage or water intrusion from the previously inspected (random) tendons with the results trended to provide further objective evidence that possible tendon degradation is detected in a timely manner using the current inspection frequency or establish the appropriate intervals for future inspections. The PTN ASME Section XI, Subsection IWL AMP is also enhanced to credit existing periodic tendon inspection pits/galleries water removal activities as preventive actions.

Inaccessible containment concrete surfaces, such as foundations below groundwater, are managed by the PTN Structures Monitoring AMP.

Revise SLRA Table 17-3, item 35 on page A-103 as follows:

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
35	ASME Section XI, Subsection IWL (17.2.2.31)	XI.S2	Continue the existing PTN ASME Section XI, Subsection IWL AMP, including enhancement to: a) Calculate the predicted tendon forces in accordance with NRC RG 1.35.1, which provides an acceptable methodology for use through the SPEO. b) **Include a supplemental visual inspection in the 55th year interval for one unit and 60th year interval for the other unit for:** ▪ **a wire of a representative (random) vertical tendon for each unit at location of greatest and/or frequent grease leakage;** ▪ **a wire of a representative (random) dome or other tendon for each unit at location of greatest and/or frequent water inleakage;** ▪ **a wire of a (random) lower horizontal tendon for each unit at location of highest susceptibility to water intrusion in tendon inspection pits.** c) **Include a confirmation in the 60th year interval for one unit and 65th year interval for the other unit that there has been no unacceptable grease leakage or water intrusion from the previously inspected (random) tendons.** d) **Ensure that existing periodic inspections and**	No later than 6 months prior to the SPEO, i.e.: PTN3: 1/19/2032 PTN4: 10/10/2032

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
			water removal for the tendon inspection pits (buttress pits) and tendon galleries continue at appropriate intervals through the SPEO. e) **Revise the AMP governing procedure, or develop a new implementing procedure, to direct the trending and evaluation of related operating experience and documentation of same.**	

Revise Section B.2.2.3 program description on the 1st paragraph of page B-36, as amended by L-2018-176 Attachment 3 (pg 5 of 9), as follows:

Program Description

The PTN Concrete Containment Unbonded Tendon Prestress AMP is an existing condition monitoring AMP. The PTN Concrete Containment Unbonded Tendon Prestress AMP is based on the ASME Code Section XI, Subsection IWL requirements in the 200~~1~~**7** Edition, with 200~~3~~**8** Addenda (Reference B.3.1~~3~~**2**2). The PTN Concrete Containment Unbonded Tendon Prestress AMP includes confirmatory actions that monitor and evaluate loss of containment tendon prestressing forces during the current term and will continue through the SPEO.

Revise the 2nd paragraph of Section B.2.3.31 program description on page B-236, as follows:

The current program complies with ASME Code Section XI, Subsection IWL, 200~~1~~**7** Edition through 200~~3~~**8** Addenda (Reference B.3.122), supplemented with the applicable requirements of 10 CFR 50.55a(b)(2). This program is consistent with provisions in 10 CFR 50.55a that specify the use of the ASME Code edition in effect 12 months prior to the start of the start of the inspection interval. PTN will use the ASME Code edition consistent with the provisions of 10 CFR 50.55a during the SPEO. In accordance with 10 CFR 50.55a(g)(4)(ii), the ISI program is updated each successive 120-month inspection interval to comply with the requirements of the latest edition of the ASME Code specified twelve months before the start of the inspection interval.

Revise Section B.2.3.31 enhancements on pages B-237 as follows:

Element Affected	Enhancement
2. Preventive Actions	**Ensure that existing periodic inspections and water removal for the tendon inspection pits (buttress pits) and tendon galleries continue at appropriate intervals through the SPEO**
3. Parameters Monitored or Inspected	**Include a supplemental visual inspection for:** ▪ **a wire of a representative (random) vertical tendon for each unit at location of greatest and/or frequent grease leakage;**

Element Affected	Enhancement
	▪ **a wire of a representative (random) dome or other tendon for each unit at location of greatest and/or frequent water inleakage;** ▪ **a wire of a (random) lower horizontal tendon for each unit at location of highest susceptibility to water intrusion in tendon inspection pits.**
4. Detection of Aging Effects	**Complete the supplemental inspection in the 55th year interval for one unit and 60th year interval for the other unit.** **Confirm no unacceptable grease leakage or water intrusion in the 60th year interval for one unit and 65th year interval for the other unit from the previously inspected (random) tendons.**
5. Monitoring and Trending	**Revise the AMP governing procedure, or develop a new implementing procedure, to direct the trending and evaluation of related operating experience and inspections, and documentation of same, to confirm the inspection frequency is adequate to detect aging in a timely manner or determine the appropriate inspection frequency to ensure tendons can perform their intended function through the SPEO.**
6. Acceptance Criteria	Update the pertinent AMP procedure to calculate the predicted tendon forces in accordance with NRC RG 1.35.1 (Reference B.3.19), "Determining Prestressing Forces for Inspection of Prestressed Concrete Containments," which provides an acceptable methodology for use through the SPEO. **Clarify the acceptance criterion for the supplemental inspection is that each wire is free of any active corrosion.** **Clarify the acceptance criteria for the follow-up inspection is no unacceptable grease leakage or water intrusion.**
7. Corrective Actions	**Update the pertinent AMP procedure to address corrective actions for supplemental**

Element Affected	Enhancement
	inspections should active corrosion be identified. **Such a condition would be evaluated to characterize the corrosion, determine the cause, the location, depth, and extent of the corrosion.** **Specific corrective actions would depend upon the cause, extent of condition, and grease properties and are consistent with those which would be evaluated during periodic required IWL examinations.**

Associated Enclosures:

None

NRC RAI Letter No. ML18218A199 and ML18218A200 Dated August 6, 2018

4. Fire Water System

Regulatory Basis:

Section 54.21(a)(3) of 10 CFR requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the staff must make to issue a renewed license (10 CFR Section 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the subsequent period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR Section 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis (CLB). In order to complete its review and enable making a finding under 10 CFR Section 54.29(a), the staff requires additional information in regard to the matters described below.

RAI B.2.3.16-3

Background:

During the audit, the staff reviewed two 2002 reports associated with the inspection of raw water tank Nos. 1 and 2. These reports stated that: (a) the drainage around the tanks is not adequate to prevent water from coming up over the concrete base and deteriorating the tank base; and b) the base seal will not prevent water from deteriorating the underside of the tank bottom plates.

Issue:

As a result of the potential for water to accumulate under the raw water tanks, the staff has determined that loss of material due to pitting and crevice corrosion could be occurring on the tank bottom. AMP XI.M29 (the recommended AMP for inspection of the bottom surface exposed to soil or concrete of fire water storage tanks) does not include specific recommendations for the quantity of data points or location of the bottom thickness measurements. However, given the potential for water intrusion under the tank, the staff requires this information to complete its evaluation.

It should be noted that the low-frequency electromagnetic testing (LFET) technique can be capable of scanning the entire bottom of the tank in order to detect discrete locations where augmented bottom thickness measurements should be conducted. The staff's evaluation of the use of this technique is documented in NUREG-2172, "Safety Evaluation Report Related to the License Renewal of Callaway Plant, Unit 1," Section 3.0.3.2.8.

Request:

1. State the quantity and location of data points for the periodic bottom thickness measurements of the raw water tanks. In addition, state the basis for why the quantity and location of data points will be sufficient to detect loss of material due to pitting or crevice corrosion.
2. If the LFET technique will be used, state the criteria for followup discrete tank thickness measurements.

If other scanning techniques will be used, state the basis for the effectiveness of these techniques in detecting loss of material due to pitting or crevice corrosion and the criteria for followup discrete tank thickness measurements.

FPL Supplemental Response:

This response supplements the response provided in Attachment 13 of the reference below. FPL is committed to developing a procedure to perform tank bottom inspections using the low-frequency electromagnetic testing (LFET) technique and, as necessary, followup ultrasonic examinations, to meet the requirements of NUREG-2191 Table XI.M29-1.

The SLRA is revised and changes to Table 17-3 and Section B.2.3.16 are made.

References:

FPL Letter L-2018-152 to NRC dated August 31, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application, Safety Review Requests for Additional Information (RAI) Set 1 Responses (ADAMS Accession No. ML18248A257)

Associated SLRA Revisions:

SLRA Table 17-3 (Commitment 20) and SLRA Sections B.2.3.16 (enhancements tables) are amended as indicated by the following text deletion (strikethrough) and text addition (red underlined font) revisions.

Revise SLRA Table 17-3, Commitment 20, as follows:

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
20	Fire Water System (17.2.2.16)	XI.M27	Continue the existing PTN Fire Water System AMP, including enhancement to: a) Replace sprinklers before they reach 50 years of service or test a representative sample of sprinklers from one or more sample areas using the guidance of NFPA 25; b) Perform volumetric wall thickness inspections on the portions of the water-based FPS components periodically subjected to flow but normally dry; c) Perform additional volumetric wall thickness inspections after surface irregularities, indicative of corrosion or erosion, are visually detected; d) Perform testing and visual inspections in accordance with the methods and intervals from Table XI.M27-1 from NUREG-2191, (based on NFPA 25, 2011 Ed.) and perform external visual inspections on a refueling outage interval. These inspections and tests include inspection parameters for items such as lighting, distance offset, presence of protective coatings, and cleaning processes. e) Perform volumetric inspections from the	This AMP is implemented and its inspections and tests begin 5 years prior to the SPEO. Inspections or test that are required to be completed prior to SPEO are completed no later than 6 months prior to SPEO or no later than the last RFO prior to SPEO. The corresponding dates are as follows: PTN3: 7/19/2027 - 1/19/2032 PTN4: 4/20/2028 - 10/10/2032 Perform the initial tank bottoms inspections no earlier than 10 years prior to the SPEO. The inspections are required to be completed no later than 6 months prior to SPEO. The corresponding dates are as follows: PTN3: 7/19/2022 - 1/19/2032 PTN4: 4/10/2023 - 10/10/2032

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
			inside surface of the raw water tanks (T63A/B) in accordance with NUREG-2191, Table XI.M29-1. These inspections are required to be performed for each 10-year period starting 10 years prior to the SPEO. **The new procedure performs tank bottom thickness inspections using the low-frequency electromagnetic testing (LFET) technique and, as necessary, followup ultrasonic examinations.**	

Revise SLRA Section B.2.3.16, enhancements table, as follows:

Element Affected	Enhancement
4. Detection of Aging Effects	Develop new AMP inspection/testing procedure(s) to state that the tanks that store fire water (RWTs T63A/B) must have their bottom surfaces inspected in accordance with the NUREG-2191, Table XI.M29-1. Specifically, for each 10-year period starting 10 years before the SPEO, a volumetric inspection is required to be performed from the inside surface of the tanks. **<u>The new procedure performs tank bottom thickness inspections using the low-frequency electromagnetic testing (LFET) technique and, as necessary, followup ultrasonic examinations.</u>**

Associated Enclosures:

None

NRC RAI Letter Nos. ML18260A242 and ML18260A243 dated September 17, 2018

9. Atmospheric Metallic Tanks, GALL AMP XI.M29

Regulatory Basis:

Section 54.21(a)(3) of 10 CFR requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the subsequent period of extended operation. One of the findings that the staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis (CLB). As described in SRP-LR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL Report. In order to complete its review and enable making a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

RAI B.2.3.17-3

Background:

SLRA Section B.2.3.17 states that the tank design of the condensate storage tanks (CST), refueling water storage tanks (RWST), and Unit 3 diesel oil storage tank (DOST) does not specify the use of sealant or caulking for the tank-to-concrete interface. During the on-site audit, the staff noted that the CSTs, RWSTs, and Unit 3 DOST 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.

During the audit, the staff also noted that the tank to concrete interface:

- For the CSTs, is above ground elevation; however, there is an approximately ½-inch deep depressed area that could accumulate moisture around the entire circumference of each tank.
- For the RWSTs, is essentially at ground elevation including some areas where the joint is covered with stone and some sediment and there are some locations where it appears that the ground slopes towards the tank to concrete interface.
- For the Unit 3 DOST, is approximately 3-inches above grade.

During the audit, the staff reviewed plant-specific documents and noted the following:

- For the CSTs: (a) there is a 1/8-inch layer of asphalt between the tank bottom and foundation; and (b) the concrete outside of the tank to concrete interface has a 1-inch slope away from the tank over the concrete foundation's width.
- For the RWST and Unit 3 DOST, the concrete outside of the tank to concrete

interface has a 1-inch slope away from the tank over the concrete foundation's width.

Issue:

The tank bottom to concrete interface joint is subject to loss of material that is not readily observable if the joint is not sealed or the tank configuration does not readily drain water away from the joint. GALL-SLR Report AMP XI.M29 recommends periodic wall thickness measurements of the tank bottom, but does not include specific recommendations for the quantity of data points or location of the bottom thickness measurements. However, when there is the potential for water intrusion under the tank; the staff requires further information in this regard to complete its evaluation.

Based on the walkdowns and the review of plant-specific documents, the staff has concluded that the following tanks could be susceptible to periodic wetting at the tank to concrete interface if the sealant is not a permanent part of the design of the tank to concrete interface and if permanently installed, inspections are not conducted on the sealant.

- For the CSTs because based on observation during the audit, water could accumulate in the depressed area sufficient to overcome the 1-inch slope away from the tank over the concrete foundation's width.
- For the RWSTs because the tanks are essentially at ground elevation including some areas where the area is covered with stone and some sediment and there are some locations where it appears that the ground slopes towards the tank to concrete interface.
- For the Unit 3 DOST because even though the tank is above grade and there is a 1-inch slope away from the tank over the concrete foundation's width, local weather conditions will probably result in periodic challenges to the sealant.

It should be noted that the low-frequency electromagnetic testing (LFET) technique can be capable of scanning the entire bottom of the tank in order to detect discrete locations where augmented bottom thickness measurements should be conducted. The staff's evaluation of the use of this technique is documented in NUREG-2172, "Safety Evaluation Report Related to the License Renewal of Callaway Plant, Unit 1," Section 3.0.3.2.8.

Request:

1. Is the installed sealant (elastomeric or other) at the base of the CSTs, RWSTs, and Unit 3 DOST a permanent plant feature that will be credited as a preventive action for the tank to concrete interface joint? If yes, what is the sealant material type and will the sealant be inspected?

If applicable, what is the method and what are the acceptance criteria for the inspection results?

If the response is no to either portion of this question, respond to questions 2 and 3.

2. State the quantity and location of data points for the periodic bottom thickness measurements of the tanks. In addition, state the basis for why the quantity and location of data points will be sufficient to detect loss of material due to pitting or crevice corrosion.
3. If the LFET technique will be used, state the criteria for followup discrete tank thickness measurements. If other scanning techniques will be used, state the basis for the effectiveness of these techniques in detecting loss of material due to pitting or crevice corrosion and the criteria for followup discrete tank thickness measurements.

FPL Supplemental Response:

This response supplements the response provided in Attachment 16 of the reference below. FPL is committed to developing a procedure to perform tank bottom inspections using the low-frequency electromagnetic testing (LFET) technique and, as necessary, followup ultrasonic examinations, to meet the requirements of NUREG-2191 Table XI.M29-1.

The SLRA is revised and changes to Table 17-3 and Section B.2.3.17 are made.

References:

FPL Letter L-2018-175 to NRC dated October 17, 2018, Turkey Point Units 3 and 4 Subsequent License Renewal Application, Safety Review Requests for Additional Information (RAI) Set 5 Responses (ADAMS Accession No. ML18292A642)

Associated SLRA Revisions:

SLRA Table 17-3 (Commitment 21) and SLRA Sections B.2.3.17 (enhancements tables) are amended as indicated by the following text deletion (strikethrough) and text addition (red underlined font) revisions.

Revise SLRA Table 17-3, Commitment 21, as follows:

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
21	Outdoor and Large Atmospheric Metallic Storage Tanks (17.2.2.17)	XI.M29	Continue the existing PTN Outdoor and Large Atmospheric Metallic Storage Tanks AMP, including enhancement to: a) Add the U3 EDG FOST and associated acceptance criteria to the scope of the AMP; b) Convert one-time inspections for original license renewal to the following periodic inspections, with the associated frequencies and acceptance criteria – • Visual examination of tank internal surfaces • ~~Tank bottom thickness measurements~~**Develop a new procedure to perform the tank bottom thickness inspections using the low-frequency electromagnetic testing (LFET) technique and, as necessary, followup ultrasonic examinations.** Note: These additional inspections will be conducted each 10-year interval starting 10 years prior to entering the SPEO. c) Clarify that increased inspections address each tank in a material environment combination in the same inspection interval, including tanks from both units, IF only one tank is inspected and does not meet acceptance criteria, which requires corrective action.	This AMP is implemented and inspections or tests begin no earlier than 10 years prior to the SPEO. Inspections or tests that are required to be completed prior to the SPEO are completed no later than 6 months prior to SPEO or no later than the last RFO prior to SPEO. The corresponding dates are as follows: PTN3: 7/19/2022 - 1/19/2032 PTN4: 4/10/2023 - 10/10/2032

Revise SLRA Section B.2.3.17, enhancements table, as follows:

Element Affected	Enhancement
1. Scope 6. Acceptance Criteria	Include U3 EDG FOST in the scope of the program (including design corrosion allowance which is the same as for the CSTs).
3. Parameters Monitored or Inspected 4. Detection of Aging Effects 5. Monitoring and Trending	Convert one-time inspections for original license renewal to the following periodic inspections: a. Visual examination of tank internal surfaces.* b. ~~Tank bottom thickness measurements.~~**Develop a new procedure to perform the tank bottom thickness inspections using the low-frequency electromagnetic testing (LFET) technique and, as necessary, followup ultrasonic examinations.*** * These additional inspections will be conducted each 10-year interval starting 10 years prior to entering the SPEO.

Associated Enclosures:

None