TURKEY POINT NUCLEAR GENERATING UNITS 3 AND 4 (TURKEY POINT)
SUBSEQUENT LICENSE RENEWAL APPLICATION (SLRA)
REQUESTS FOR ADDITIONAL INFORMATION (RAIS)
SAFETY - SET 7

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.

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.

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.

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.

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).

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 ºF) routed through penetrations in the concrete walls by design does not result in temperatures exceeding 200 ºF 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 to

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 ºF, 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 ºF. 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 ºF, 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 ºF 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.

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.

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.

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 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. …

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.
>
> 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) 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.

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. Thereforeit 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.

RAI 2.3.4.4-1

Regulatory Basis:

Section 54.4(a) of 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. …"

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 feedwater 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 feedwater 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.

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

RAI B.2.3.31-1

Background:

Section54.21(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 inleakage, 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.