August 09, 2022

L-2022-115
10 CFR 54.17

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
11545 Rockville Pike
One White Flint North
Rockville, MD 20852-2746

St. Lucie Nuclear Plant Units 1 and 2
Dockets 50-335 and 50-389
Renewed Facility Operating Licenses DPR-67 and NPF-16

SUBSEQUENT LICENSE RENEWAL APPLICATION - AGING MANAGEMENT REQUESTS FOR ADDITIONAL INFORMATION (RAI) SET 3 RESPONSE AND SUBMITTAL OF SUPERSEDED RESPONSE FOR ONE SET 2 RAI AND ONE SUPPLEMENT 1 ATTACHMENT

References:

1. FPL Letter L-2021-192 dated October 12, 2021 – Subsequent License Renewal Application – Revision 1 (ADAMS Accession No. ML21285A107)
2. FPL Letter L-2022-043 dated April 7, 2022 – Subsequent License Renewal Application Revision 1 – Supplement 1 (ADAMS Accession No. ML22097A202)
3. FPL Letter L-2022-044 dated April 13, 2022 – Subsequent License Renewal Application Revision 1 – Supplement 2 (ADAMS Accession No. ML22103A014)
4. FPL Letter L-2022-071 dated May 19, 2022 – Subsequent License Renewal Application Revision 1 – Supplement 3 (ADAMS Accession No. ML22139A083)
5. NRC Email and Attachment dated July 11, 2022, St. Lucie SLRA RAI Safety Set 3 Final (ADAMS Accession Nos. ML22193A086, ML22193A087)
6. FPL Letter L-2022-108 dated July 11, 2022 – Subsequent License Renewal Application – Aging Management Requests for Additional Information (RAI) Set 2 Response

Florida Power & Light Company (FPL), owner and licensee for St. Lucie Nuclear Plant (PSL) Units 1 and 2, has submitted a revised and supplemented subsequent license renewal application (SLRA) for the Facility Operating Licenses for PSL Units 1 and 2 (References 1-4). Based on the NRC's review of the SLRA, the NRC issued its Set 3 RAIs to FPL (Reference 5). Attachments 1-5 to this letter provide the response to those information requests. In addition, Attachment 6 to this letter provides a response to RAI B.2.3.34-2 that supersedes the previous Set 2, Attachment 14 response (Reference 6). Attachment 7 to this letter supersedes the previously submitted SLRA Revision 1, Supplement 1, Attachment 18 submittal (Reference 2).

For ease of reference, the index of attached information is provided on page 3 of this letter. Certain attachments include associated revisions to the SLRA (Enclosure 3 Attachment 1 of Reference 1, as supplemented by References 2 - 4) denoted by ~~strikethrough~~ (deletion) and/or **bold red underline** (insertion) text. Previous SLRA revisions are denoted by **bold black** text. SLRA table revisions are included as excerpts from each affected table.

Should you have any questions regarding this submittal, please contact me at (561) 304-6256 or William.Maher@fpl.com.

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

Executed on the 9th day of August 2022.

Sincerely,

William Maher Digitally signed by William Maher DN: cn=William Maher, o=Nuclear, ou=Nuclear Licensing Projects, email=william.maher@fpl.com, c=US Date: 2022.08.09 12:13:09 -04'00'

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TLAA – Upper Shelf Energy

RAI 4.2-1

Regulatory Basis:

10 CFR § 54.21(c) requires the applicant to evaluate time limited aging analyses (TLAA) and disposition them in accordance with (c)(1)(i), (c)(1)(ii), or (c)(1)(iii). 10 CFR § 54.21(d) requires that the FSAR supplement for the facility must contain a summary description of the programs and activities for managing the effects of aging and evaluation of the TLAA for the period of extended operation determined by 54.21(a) and 54.21(c).

Background:

SLRA Tables 4.2.2-1 and 4.2.3-1 provide the unirradiated RT_{NDT} and upper-shelf energy (USE) values, respectively, for the Unit 1 RPV materials at 72 effective full power years (EFPY). The footnotes for SLRA Tables 4.2.2-1 and 4.2.3-1 indicate that Westinghouse report WCAP-18609-NP, Revision 2 (herein after referred to as WCAP-18609-NP), is the source document for these unirradiated values.

Table 3-1 of WCAP-18609-NP indicates the following for the Upper to Intermediate Shell Girth Weld Seam 8-203 (Heat Number 21935):

- Footnote (g) - USE for Heat # 21935 is from Diablo Canyon 1 (WCAP-17315-NP, Intermediate to Lower Shell Weld Seam 9-442. Both materials were made with Heat #21935 and Linde 1092 flux).

- Table 3-1 of WCAP-18609-NP indicates the following for the Upper Shell Axial Weld Seams 1-203 A, B, and C (Heat Number 21935/12008):

- Footnote (h) - $RT_{NDT}(U)$ for Heat # 21935/12008, Linde 1092, Lot 3869 is from identical material at Diablo Canyon 2 (WCAP-17315-NP).

- Footnote (i) - USE for Heat # 21935/12008, Linde 1092, Lot 3869 is from identical material at Diablo Canyon 2 (WCAP-17315-NP), specifically Intermediate Shell Axial Welds 2-201 A/B/C.

Issue:

The staff noted the following was not provided in Section 4.2 of the SLRA:

- The applicant did not provide an adequate justification demonstrating that the unirradiated USE value from Diablo Canyon, Unit 1 (as referenced in footnote (g) of Table 3-1 of WCAP-18609-NP) is conservative, representative, or applicable for use as the unirradiated USE value for the upper to intermediate shell girth weld seam 8-203 at St. Lucie, Unit 1.

- The applicant did not provide an adequate justification demonstrating that the unirradiated USE value from Diablo Canyon, Unit 2 (as referenced in footnote (i) of Table 3-1 of WCAP-18609-NP) is conservative, representative, or applicable for use as the unirradiated USE value for the upper shell axial weld seams 1-203 A, B, and C in St. Lucie, Unit 1.

- The applicant did not provide an adequate justification demonstrating that the unirradiated RT_{NDT} value from Diablo Canyon, Unit 2 (as referenced in footnote (h) of Table 3-1 of WCAP-18609-NP) is conservative, representative, or applicable for use as the unirradiated RT_{NDT} value for the upper shell axial weld seams 1-203 A, B, and C in St. Lucie, Unit 1.

The staff noted that inherent characteristics of manufacturing the RPV such as, but not limited to, welding processes, procedures and qualifications, post weld heat treatment activities, manufacturer/fabricator, and time of fabrication, have the potential to impact the unirradiated values for USE and RT_{NDT} for RPV materials from plant to plant.

Additionally, the applicant did not describe how Diablo Canyon determined these initial values of USE and RT_{NDT}, and whether this information supports the applicant's determination that these initial values are conservative, appropriate, or applicable for use at St Lucie, Unit 1.

Request:

1. Describe and justify the process the applicant went through for assessing how Diablo Canyon obtained the above referenced values.

2. Taking into consideration the inherent characteristics that could affect the unirradiated USE and RT_{NDT} values, as described above, justify how the methods, processes, or analysis used by Diablo Canyon to obtain or develop these values are conservative, representative, or applicable to use for St. Lucie, Unit 1 RPV materials.

PSL Response:

1. To justify the use of this data, the Heat, flux type, and lot numbers were compared as shown below in Table 1.

Table 1

Heat #	Plant	Weld Seam	Flux Type (Lot)
21935	St. Lucie 1	Upper to Intermediate Shell Girth Weld Seam 8-203	Linde 1092 (3889)
	Diablo Canyon 1	Intermediate to Lower Shell Weld Seam 9-442	Linde 1092 (3869)
	Diablo Canyon 2	Upper to Intermediate Shell Girth Weld Seam 8-201	Linde 1092 (3889)
21935 / 12008	St. Lucie 1	Upper Shell Axial Weld Seams 1-203 A, B, & C	Linde 1092 (3869)
	Diablo Canyon 2	Intermediate Shell Axial Welds 2- 201A/B/C	Linde 1092 (3869)
	Diablo Canyon 2	Upper Shell Axial Welds 1-201A/B/C	Linde 1092 (3869)
	Diablo Canyon 2	Surveillance Weld	Linde 1092 (3869)

For the respective heat numbers, all the welds were constructed of very similar, if not identical, materials. The only exception is the Diablo Canyon Unit 1 Intermediate to Lower Shell Weld Seam 9-442 is made of Lot # 3869 versus the St. Lucie Unit 1 Upper to Intermediate Shell Girth Weld Seam 8-203 which used Lot # 3889. However, lot numbers are not typically considered relevant when considering the applicability of sister-plant data. The critical factors are heat number and flux type. In addition, for Diablo Canyon Unit 2, the Upper to Intermediate Shell Girth Weld Seam 8-201 uses a lot number identical to St. Lucie Unit 1 Upper to Intermediate Shell Girth Weld Seam 8-203 and has the same exact material properties as Diablo Canyon Unit 1 Intermediate to Lower Shell Weld Seam 9-442.

In addition, the vendor and timeframe of fabrication the welds were considered. As shown in Table 2, the vessels were fabricated by same vendor, in the same timeframe (late 1960’s to early 1970’s), and to similar Code requirements. In addition, the qualification welds had identical stress relief heat treatment (1150°F ± 25°F) as required by the ASME code for the pressure vessel.

Table 2

Plant	Fabricator	ASME III Code Edition	Heat Treatment	Inspection Date
St. Lucie 1	C-E	1965 thru Winter ‘67	1150°F±25°F 40 Hours, furnace cooled to 600°F	late 1960's and early 1970's
Diablo Canyon 1	C-E	1965 thru Summer ‘66	1150°F±25°F 40 Hours, furnace cooled to 600°F	late 1960's and early 1970's
Diablo Canyon 2	C-E	1968	1150°F±25°F 40 Hours, furnace cooled to 600°F	late 1960's and early 1970's

Therefore, it was determined that the initial/unirradiated RT_{NDT} ($RT_{NDT(u)}$) and USE values for Heat # 21935 and 21935/12008 from Diablo Canyon Units 1 and 2 are applicable to St. Lucie 1 because the welds are of the same heat number & flux type, were fabricated by same vendor, in the same timeframe, and to similar Code requirements.

This conclusion is in-line with previous industry conclusions, such as those used in response to Generic Letter 92-01, which resulted in the Reactor Vessel Integrity Database (RVID). As seen in the RVID, there are multiple instances of the use of sister plant data, including Heat # 21935 or # 21935/12008, to define the initial material properties. In addition, some vendors have provided databases of weld information such as References 1 and 2, which identifies the weld data by heat number, flux type, and lot number, not plant. Plants have used these databases to perform Reactor Vessel Integrity evaluation and to respond to industry issues such as Generic Letter 92-01.

2. To ensure these values are conservative, representative, and/or applicable to use for St. Lucie Unit 1 RPV materials, the RVID and other resources were searched to identify plants with similar welds and the initial RT_{NDT} and USE values were compared as shown in Table 3. In most cases, the values chosen for St. Lucie 1 were conservative. Most exceptions to this are because a generic value was used or the 10 CFR 50, Appendix G requirements for USE are met with an EMA. For the other exceptions, either the plant’s analysis of record has revised these initial values since the RVID was populated, or the RVID value is based on sister-plant data that has since been revised; therefore, the RVID value are not based on the latest information.

   For Heat # 21935/12008, all initial RT_{NDT} and USE are based on the surveillance program data for Diablo Canyon Unit 2. All the vessels were fabricated by same vendor (Combustion Engineering) in the same timeframe (late 1960’s to early 1970’s) and used similar Code requirements (ASME Winter ‘67 through ASME Summer ‘71) and heat treatments (1150°F±25°F 40 Hours maximum).

   For Heat # 21935, all non-generic / non-EMA USE values are set to 109 ft-lb. This value is based on Charpy V-notch impact testing on the Shoreham Weld Seam 5-306, which was Type B4-Mod, Wire Heat # 21935, Flux Type Linde 1092, and Flux Lot 3869, as documented in Reference 3. This data was also included in Reference 4, which provides a conservative 95/95 lower tolerance limit generic value for welds with Linde 1092 (97 ft-lb). The Charpy data for Heat # 21935, Flux Type Linde 1092, and Flux Lot 3869 in

Reference 2 were also reviewed. These results are all at 10°F and do not present the shear. However, they average to 60 ft-lb. It is expected that the USE would be experienced at a higher temperature, typically greater than 100°F. For example, the USE for Heat # 21935/12008 was reached at 150°F per Reference 5. Given the margin to the estimated USE temperature, 109 ft-lb is a reasonable USE.

Heats # 21935 and # 21935/12008 have been used fairly frequently in the welds of C-E fabricated vessels. These vessels were fabricated in the same timeframe (late 1960’s to early 1970’s) and to similar Code requirements. The material properties of these welds have been defined based on consistent data sets. Since St. Lucie Unit 1 was fabricated by same vendor, in the same timeframe, and to similar Code requirements, these data sets are also representative and applicable to the St. Lucie Unit 1 Heats # 21935 and # 21935/12008 reactor vessel welds.

Table 3

				RVID			Latest Values	
Ht #	**Plant**	**Weld Seam**	**Flux Type (Lot)**	**Unirradiated Method**	**$RT_{NDT(u)}$**	**USE**	**$RT_{NDT(u)}$**	**USE**
21935	St. Lucie 1	Upper to Intermediate Shell Girth Weld Seam 8-203	Linde 1092 (3889)	- - -	- - -	- - -	-56	109
	Diablo Canyon 1	Intermediate to Lower Shell Weld Seam 9-442	Linde 1092 (3869)	Sister	-56	109	-56	109
	Diablo Canyon 2	Upper to Intermediate Shell Girth Weld Seam 8-201	Linde 1092 (3889)	- - -	- - -	- - -	-56	109(1)
	McGuire 1	US to IS Circumferential (Circ.) Weld 8-442	Linde 1092 (3869)	- - -	- - -	- - -	-56	109(2)
	Calvert Cliffs 1	Lower Shell Axial Weld Seams 3-203A/C	Linde 1092 (3869)	Sister	-56	109	-56	109
	Cooper	Lower/Lower Int. Shell Circ Weld Seam 1-240	Linde 1092	EMA	-50	- - -	- - -	- - -
	LaSalle 1	Lower Shell Axial Welds Seams 2-307A/C	Linde 1092	EMA	-50	- - -	- - -	- - -
	Pilgrim	Lower Int./Lower Shell Circ. Weld 1-344	Linde 1092	Generic	-50	75	- - -	- - -
	Point Beach 2	Nozzle Beltline to Int. Shell Circ. Weld	Linde 1092 (3869)	Generic	-56	75	-56	109(3)
21935 / 12008	St. Lucie 1	Upper Shell Axial Weld Seams 1-203 A, B, & C	Linde 1092 (3869)	- - -	- - -	- - -	-50	118
	Diablo Canyon 2	Intermediate Shell Axial Weld Seams 2- 201A/B/C.	Linde 1092 (3869)	Surveillance Weld	-50	124	-50	118(4)
	Diablo Canyon 2	Upper Shell Axial Weld Seams 1-201A/B/C	Linde 1092 (3869)	- - -	- - -	- - -	-50	118(4)
	McGuire 1	Lower Shell Longitudinal Weld Seams 3-442A, B, and C	Linde 1092 (3889)	Sister	-50	103	-50	124(2)
	Salem 2	Lower Shell Longitudinal Weld Seams 3-442 A, B, & C	Linde 1092 (3889)	Sister	-56	114	-56	114(5)

Notes:

1. Updated per Diablo Canyon Unit 2 UFSAR Table 5.2-21B.
2. McGuire 1 value defined is based on the RVID USE for Diablo Canyon Unit 2, which only used highest temperature Charpy data and is included in the McGuire LRA (Ref. 6). The applicability of Diablo Canyon 2 surveillance weld to McGuire 1 was evaluated in Reference 7. Included with the McGuire Units 1 and 2 Measurement Uncertainty Recapture (MUR) Power Uprate, evaluated in Reference 8 and approved in Reference 9.
3. Updated per Point Beach SLR Application (Ref. 10)
4. Diablo Canyon 2 values defined in Reference 11 & UFSAR, Table 5.2-21B.
5. Salem Unit 2 value defined in Reference 12 based on Diablo Canyon Unit 2 data provided in Reference 13. The Diablo Canyon Unit 2 data has since been revised; thus, the larger value could be justified.

References:

1. Certified Material Test Reports (CMTRs) CMTR-RV-RDM, “Weld Material Documentation of the Eleven Reactor Pressure Vessels Fabricated by RDM for Westinghouse” (ADAMS Accession No. ML20125E177)

2. CE Report LD-79-036, “I&E Bulletin 78-12, ‘Atypical Weld Material in Reactor Pressure Vessel Welds,’” June 8, 1979

3. R. E. Denton (BGE) to NRC Document Control Desk, “Generic Letter 92-01 Reactor Vessel Structural Integrity Close-out Letter/Upper-Shelf Energy for Weld Seams 3-203-A, B, C (TAC No. M83446)," August 30, 1994 (ADAMS Accession No. ML20072P571)

4. Combustion Engineering (C-E) Owners Group Report CEN-622-A, “Generic Upper Shelf Values for Linde 1092, 124 and 0091 Reactor Vessel Welds CEOG Task 839,” December 1996 (ADAMS Accession No. ML20135E999}

5. Westinghouse Report WCAP-8783, Revision 0, “Pacific Gas and Electric Diablo Canyon Unit No. 2 Reactor Vessel Radiation Surveillance Program,” December 1976.

6. Duke Energy Corporation “Application to Renew the Operating Licenses of McGuire Nuclear Station, Units 1 & 2 and Catawba Nuclear Station, Units 1 & 2” (ADAMS Accession No. ML011660145)

7. Westinghouse Report WCAP-13949, Revision 0, “Analysis of Capsule V Specimens and Dosimeters and Analysis of Capsule Z Dosimeters from the Duke Power Company McGuire Unit 1 Reactor Vessel Radiation Surveillance Program,” February 1994

8. Westinghouse Report WCAP-17455-NP, Revision 0, “McGuire Units 1 and 2 Measurement Uncertainty Recapture (MUR) Power Uprate: Reactor Vessel Integrity and Neutron Fluence Evaluations,” February 2012

9. NRC Safety Evaluation (SE) “McGuire Nuclear Station. Units 1 and 2. Issuance of Amendments Regarding Measurement Uncertainty Recapture Power Uprate (TAC Nos. ME8213 and ME8214),” May 16, 2013 (ADAMS Accession No. ML13073A041)

10. NextEra Energy “Point Beach Nuclear Plant Units 1 and 2 Subsequent License Renewal Application,” November 2020 (ADAMS Accession No. ML20329A247)

11. Westinghouse Report WCAP-15423, Revision 0, “Analysis of Capsule V from Pacific Gas and Electric Company Diablo Canyon Unit 2 Reactor Vessel Radiation Surveillance Program,” September 2000 (ADAMS Accession No. ML010180432)

12. PSE&G Letter LR-N95198, “Generic Letter 92-01, Rev. 1, Reactor Vessel Structural Integrity, Salem Generating Station Unit Nos. 1 & 2,” November 20, 1995.

13. PG&E Letter from G.M. Rueger to NRC, “Response to Generic Letter 92-01, Revision 1, Reactor Vessel Structural Integrity,” June 30, 1992 (ADAMS Accession No. ML16341G610)

Associated SLRA Revisions:

None.

Associated Enclosures:

None.

Aging Effects Associated with a Concrete Environment

RAI 3.3.2.2.9-1

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 U.S. Nuclear Regulatory Commission (NRC) 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. 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.

Background:

As amended by letter dated April 7, 2022 (ML22097A202), the Subsequent License Renewal Application (SLRA) cites no aging effects requiring management for the following auxiliary system steel components exposed to an external environment of concrete: (a) piping and ducting in the ventilation system; and (b) the Unit 2 diesel oil storage tanks (DOSTs). These components cite Standard Review Plan for Subsequent License Renewal (SRP-SLR) item 3.3.1-112, which is associated with the further evaluation in SRP-SLR Section 3.3.2.2.9.

SRP-SLR Section 3.3.2.2.9 states the following:

> "If the following conditions are met, loss of material is not considered to be an applicable aging effect for steel [exposed to concrete]: (a) attributes of the concrete are consistent with American Concrete Institute (ACI) 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG–1557; (b) plant-specific OE [operating experience] indicates no degradation of the concrete that could lead to penetration of water to the metal surface; and (c) the piping is not potentially exposed to groundwater."

SLRA Section 3.3.2.2.9 states "[a] review of OE for PSL indicates there are occurrences of concrete degradation, in some systems, that could lead to the penetration of water to the metal surface; therefore, a loss of material due to general, pitting, and crevice corrosion of steel piping and tanks exposed to concrete is an aging effect that requires management." In addition, SLRA Section 3.3.2.2.9 does not state whether attributes of the concrete for piping and ducting in the ventilation system are consistent with ACI 318 or ACI 349.

By letter dated April 7, 2022, the applicant stated the following:

> "unlike the Unit 1 DOSTs, the Unit 2 DOSTs 2A and 2B are excluded from the scope of the Outdoor and Large Atmospheric Metallic Storage Tanks AMP for SLR, since the Unit 2 DOSTs are indoors (within the Unit 2 DOST building) with a capacity of less than 100,000 gallons and *no history of moisture at the inaccessible exterior bottom surface* [emphasis added by staff]."

During its audit, the staff reviewed plant-specific operating experience where visual inspections of the external surfaces of the Unit 2 DOSTs revealed minor surface corrosion. In addition, during a walkdown of the 2A DOST, the staff noted that caulking at the interface of the tank bottom and concrete was damaged.

Issue:

For piping and ducting in the ventilation system, the staff seeks clarification with respect to how SRP-SLR Section 3.3.2.2.9 criteria are met, given that there have been occurrences of concrete degradation that could lead to the penetration of water to the metal surface. In addition, SLRA Section 3.3.2.2.9 does not address whether attributes of the concrete are consistent with ACI 318 or ACI 349 (associated with SRP-SLR Section 3.3.2.2.9 criterion (a)).

For the Unit 2 DOSTs, the staff seeks clarification with respect to citing no aging effects for the tank-to-concrete interface. The April 7, 2022, submittal states there is "no history of moisture at the inaccessible exterior bottom surface." However, it is unclear to the staff how moisture can be readily identified at an inaccessible location. In addition, the staff notes there is plant-specific operating experience involving (a) minor corrosion on accessible external surfaces of these tanks; and (b) damaged caulking at the tank-to-concrete interface. Based on these observations, it is unclear to the staff why corrosion could also not occur at the tank-to-concrete interface.

Request:

Provide additional clarification with respect to citing no aging effects for the following auxiliary system steel components exposed to an external environment of concrete: (a) piping and ducting in the ventilation system; and (b) the Unit 2 DOSTs.

PSL Response:

SLRA Table 3.3.2-12 provides the summary of the aging management evaluation for the PSL Units 1 and 2 ventilation systems that are within the scope of SLR and require an aging management review. The table concludes that the component and material types of "galvanized steel duct" and "carbon steel piping" exposed to an external environment of concrete have no aging effects that require management for SLR. The basis for this conclusion is that for these components and environments PSL meets the following conditions specified in SRP-SLR Section 3.3.2.2.9 where loss of material is not considered to be an applicable aging effect for steel: (a) attributes of the concrete are consistent with American Concrete Institute (ACI) 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG–1557; (b) plant-specific OE indicates no degradation of the concrete that could lead to penetration of water to the metal surface; and (c) the piping is not potentially exposed to groundwater. Compliance of the PSL ventilation system “galvanized steel duct” and “carbon steel piping” components with each condition is provided below.

(a) In accordance with SLRA Sections 3.5.2.2.1.7, 3.5.2.2.2.1, and 3.5.2.2.2.3, the reinforced concrete for Groups 1, 3, 4, 5, 6, 7, and 8 Class 1 structures at PSL is designed and constructed in accordance with the applicable portions of ACI 318-63 for Unit 1 and ACI 318-71 for Unit 2, therefore, the reinforced concrete for these PSL structures meets criterion (a) of SRP-SLR Section 3.3.2.2.9. Note that Group 2 and Group 9 structures are associated with BWR plants and are therefore not applicable to PSL.

(b) In addition to an external environment of concrete, the SLRA Table 3.3.2-12 entries for “galvanized steel duct” and “carbon steel piping” components also include an external environment of “air – indoor uncontrolled” indicating that these components are located indoors in Class 1 structures and not subjected to periodic wetting due to outdoor weather conditions. PSL Units 1 and 2 plant-specific OE indicates no degradation of indoor concrete that could lead to the penetration of water to the metal duct or piping surfaces.

(c) The subject PSL ventilation system “galvanized steel duct” and “carbon steel piping” components are located indoors in Class 1 structures and are therefore not exposed to groundwater.

The Unit 2 DOSTs are located in the diesel oil storage tank Class 1 structure which is described in Unit 2 UFSAR Section 3.8.4.1.8. This missile protection structure is a rectangular reinforced concrete structure supported on a three feet thick mat, with two foot thick walls and a two foot thick roof slab. An interior wall separates the two tanks. The floor inside the building is at elevation 19’-0”. The top of the 1’-6” wide concrete ring wall supporting each DOST is at elevation 22’-3 1/2”, elevating each tank more than three feet above the floor level. The tank bottom is supported by compacted Class I sand fill within the ring wall and sloped one inch per ten feet away from the tank center towards the perimeter. The tank perimeter is anchored with non-shrink grout to maximize contact and load transfer between the tank bottom and the ring wall. This design precludes the potential for any water to penetrate the tank-to-concrete interface.

As indicated in SLRA Table 3.3.2-4, the Unit 2 DOSTs are exposed to an external environment of both concrete (the tank bottoms) and air – indoor uncontrolled (tank shells and roofs). Therefore, the DOSTs are not exposed to weather events, including precipitation and wind. Visual inspections of the accessible external surfaces of the Unit 2 DOSTs revealed minor surface corrosion. However, as indicated in the Operating Experience section of SLRA Section B.2.3.17, PSL has experienced some coating/paint delamination and some rusting/corrosion on tanks within the scope of SLR, but none that threatened the function of the tanks. As stated in SLRA Table 3.3.2-4, the aging effect of loss of material of the accessible carbon steel DOST shells and roof will continue to be adequately managed by the External Surfaces Monitoring of Mechanical Components during the SPEO.

The Unit 2 DOSTs have no history of tank leakage or other events that would expose the inaccessible exterior bottom surface to water. In addition, no other PSL Units 1 and 2 indoor metallic tanks that sit on concrete have a history of tank leakage or other events that would expose the inaccessible exterior tank bottom surface to water. Although a recent a walkdown of the 2A DOST noted damaged caulking at the tank-to-concrete interface, the caulking is not required to prevent water from penetrating the tank-to-concrete interface. There is reasonable assurance that penetration of water under the bottom of the DOSTs is unlikely based on the tank design and location as described above. Therefore, loss of material is not considered to be an applicable aging effect for the Unit 2 DOST steel bottoms.

Revision to SLRA Section 3.3.2.2.9 along with Tables 3.3-1 and 3.3.2-4 are provided below.

References:

None.

Associated SLRA Revisions:

SLRA Section 3.3.2.2.9, pages 3.3-24 and 3.3-25 are revised as follows:

3.3.2.2.9 <u>Loss *of Material Due to General, Crevice or Pitting Corrosion and Cracking Due to Stress Corrosion Cracking*</u>

Loss of material due to general (steel only), crevice, or pitting corrosion, and cracking due to SCC (SS only) can occur in steel and SS piping and piping components exposed to concrete. Concrete provides a high alkalinity environment that can mitigate the effects of loss of material for steel piping, thereby significantly reducing the corrosion rate. However, if water intrudes through the concrete, the pH can be reduced and ions that promote loss of material such as chlorides, which can penetrate the protective oxide layer created in the high alkalinity environment, can reach the surface of the metal. Carbonation can reduce the pH within concrete. The rate of carbonation is reduced by using concrete with a low water-to-cement ratio and low permeability. Concrete with low permeability also reduces the potential for the penetration of water. Adequate air entrainment improves the ability of the concrete to resist freezing and thawing cycles and therefore reduces the potential for cracking and intrusion of water. Cracking due to SCC, as well as pitting and crevice corrosion can occur due to halides present in the water that penetrates to the surface of the metal.

If the following conditions are met, loss of material is not considered to be an applicable aging effect for steel: (a) attributes of the concrete are consistent with American Concrete Institute (ACI) 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG–1557; (b) plant-specific OE indicates no degradation of the concrete that could lead to penetration of water to the metal surface; and (c) the piping is not potentially exposed to groundwater. For SS components, loss of material and cracking due to SCC are not considered to be applicable aging effects as long as the piping is not potentially exposed to groundwater. Where these conditions are not met, loss of material due to general (steel only), crevice, or pitting corrosion, and cracking due to SCC (SS only) are identified as applicable aging effects.

GALL-SLR Report AMP XI.M41, “Buried and Underground Piping and Tanks,” describes an acceptable program to manage these aging effects.

The Auxiliary Systems include~~s~~ both steel and SS piping **and piping components** and tanks exposed to concrete. A review of OE for PSL indicates there are occurrences of concrete degradation~~,~~ in some **outdoor** systems~~,~~ that could lead to the penetration of water to the metal surface; therefore, ~~a~~ loss of material due to general **(steel only)**, pitting, ~~and~~ **or** crevice corrosion**, and cracking due to SCC (SS only)** ~~of~~ **can occur in outdoor** steel **and SS** piping and **piping components** ~~tanks~~ exposed to concrete ~~is an aging effect that requires management~~.

~~It should be noted that s~~**Some** ~~systems within the~~ Auxiliary Systems have SS and steel components exposed to concrete but are located indoors and shielded from an outdoor environment. **For indoor SS piping and piping components with an external environment of concrete, loss of material and cracking due to SCC are not considered to be applicable aging effects since these components are located inside Class 1 structures and are not exposed to groundwater. For indoor steel piping and piping components and Unit 2 DOSTs with an external environment of concrete, loss of material is not considered to be an applicable aging effect because the three conditions cited above are met as follows:**

(a) **In accordance with SLRA Sections 3.5.2.2.1.7, 3.5.2.2.2.1, and 3.5.2.2.2.3, the reinforced concrete for Groups 1, 3, 4, 5, 6, 7, and 8 Class 1 structures at PSL is designed and constructed in accordance with the applicable portions of ACI 318-63 for Unit 1 and ACI 318-71 for Unit 2. Note that Group 2 and Group 9 structures are associated with BWR plants and are therefore not applicable to PSL.**

(b) **The subject steel piping and piping components and Unit 2 DOSTs with an external environment of concrete are located inside Class 1 structures and not subjected to weather events, including precipitation and wind. PSL Units 1 and 2 plant-specific OE indicates no degradation of indoor concrete that could lead to the penetration of water to the steel piping and piping component and Unit 2 DOST surfaces.**

(c) **The subject PSL steel piping and piping components and Unit 2 DOSTs are located inside Class 1 structure and therefore, not exposed to groundwater.**

Consistent with the recommendation of GALL-SLR, the Buried and Underground Piping and Tanks (B.2.3.27) AMP is used to manage loss of material ~~in~~ **(**steel **and SS) and cracking (SS only) in outdoor** piping and **piping components** ~~tanks~~ exposed to concrete. ~~This AMP provides for the management of aging effects.~~ Any evidence of loss of material **or cracking** will be evaluated for acceptability. Conditions will be documented in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The Buried and Underground Piping and Tanks AMP is described in Section B.2.3.27.

SLRA Table 3.3-1, page 3.3-46 is revised 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, 112	Steel piping, piping components exposed to concrete	None	None	Yes (SRP-SLR Section 3.3.2.2.9)	Consistent with NUREG-2191. There are no aging effects to be managed for steel piping and piping components **and the Unit 2 DOSTs** exposed to concrete that are not subject to wetting. Further evaluation is documented in Section 3.2.2.2.9.

SLRA Table 3.3.2-4, page 3.3-130 is revised as follows:

Table 3.3.2-4: Diesel Generators and Support Systems – 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**
Tank (Unit 2 diesel oil storage)	Pressure boundary	Carbon steel	Concrete (ext)	**None**	**None**	~~VII.I.AP-198~~ **VII.J.AP-282**	3.3-1, **112**	~~A~~**C**

Associated Enclosures:

None.

Aging Effects for the Unit 2 Condensate Storage Tank

RAI 3.4.2.2.8-1

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 U.S. Nuclear Regulatory Commission (NRC) 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. 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.

Background:

The subsequent License Renewal Application (SLRA) cites no aging effects requiring management for the Unit 2 steel condensate storage tank (CST) exposed to an external environment of concrete. This component cites Standard SRP-SLR item 3.4.1-51, which is associated with the further evaluation in SRP-SLR Section 3.4.2.2.8.

SRP-SLR Section 3.4.2.2.8 states the following:

> "If the following conditions are met, loss of material is not considered to be an applicable aging effect for steel [exposed to concrete]: (a) attributes of the concrete are consistent with American Concrete Institute (ACI) 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG–1557; (b) plant-specific OE indicates no degradation of the concrete that could lead to penetration of water to the metal surface; and (c) the piping is not potentially exposed to groundwater."

SLRA Section 3.4.2.2.8 states the following in part:

- "[t]he carbon steel condensate storage tank bottoms sit on a concrete pad. There is no OE indicating degradation of the concrete that could lead to penetration of water to the metal surface, and the tanks are not exposed to groundwater."
- "[t]he Unit 2 CST and associated piping and components are located in a separate CST building, a structural missile barrier, which provides protection from weather. Therefore, loss of material of steel exposed to concrete for the Unit 2 CST is not an applicable aging effect but is an applicable aging effect for the Unit 1 CST."

.

Issue:

The staff seeks clarification with respect to citing no aging effects for the Unit 2 CST surfaces exposed to an external environment of concrete. Although the structural missile barrier can protect the Unit 2 CST from weather, it is unclear how this can prevent moisture accumulation at the tank-to-concrete interface.

Request:

Provide additional clarification with respect to citing no aging effects for the Unit 2 CST surfaces exposed to an external environment of concrete.

PSL Response:

The Unit 2 CST is located in the condensate storage tank building which is a Class 1 structure described in Unit 2 UFSAR Section 3.8.4.1.7. The building is a cylindrical reinforced concrete structure with a shallow dome roof. The thickness of the wall and of the roof is two feet. The structure is supported on a three foot thick reinforced concrete mat. The structure is designed to seismic Category I requirements. The floor inside the building is at elevation 19'-6". The top of the 2'-0" concrete ring wall supporting the Unit 2 CST is at elevation 20'-0", elevating each tank 6 inches above the floor level. The tank bottom is supported by compacted Class I sand fill within the ring wall and sloped one inch per ten feet away from the tank center towards the perimeter. The tank perimeter is anchored with non-shrink grout to maximize contact and load transfer between the tank bottom and the ring wall. This design precludes the potential for any water to penetrate the tank-to-concrete interface.

SRP-SLR Section 3.4.2.2.8 states that if the following conditions are met, loss of material is not considered to be an applicable aging effect for steel: (a) attributes of the concrete are consistent with American Concrete Institute (ACI) 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG–1557; (b) plant-specific OE indicates no degradation of the concrete that could lead to penetration of water to the metal surface; and (c) the piping is not potentially exposed to groundwater. Compliance of the PSL Unit 2 steel CST-to-concrete interface with each condition is provided below.

(a) In accordance with SLRA Sections 3.5.2.2.1.7, 3.5.2.2.2.1, and 3.5.2.2.2.3, the reinforced concrete for Groups 1, 3, 4, 5, 6, 7, and 8 Class 1 structures at PSL is designed and constructed in accordance with the applicable portions of ACI 318-63 for Unit 1 and ACI 318-71 for Unit 2, therefore, the reinforced concrete for these PSL structures meets criterion (a) of SRP-SLR Section 3.4.2.2.8. Note that Group 2 and Group 9 structures are associated with BWR plants and are therefore not applicable to PSL.

(b) As indicated in SLRA Table 3.4.2-3, the Unit 2 CST is exposed to an external environment of both concrete (the tank bottom) and air – indoor uncontrolled (tank shell and roof). Therefore, the CST is not exposed to weather events, including precipitation and wind. The Unit 2 CST has no history of tank leakage or other events that would expose the inaccessible exterior bottom surface to water. In addition, no other PSL Units 1 and 2 indoor metallic tanks that sit on concrete have a history of tank leakage or other events that would expose the inaccessible exterior tank bottom surface to water. Plant-specific OE also indicates no degradation of indoor concrete that could lead to the penetration of water to the steel surfaces has occurred. Therefore, there is reasonable assurance that penetration of water under the bottom of the Unit 2 CST is unlikely based on the tank design and location as described above.

(c) The Unit 2 CST is located indoors in a Class 1 structure elevated above grade and therefore is not exposed to groundwater.

Therefore, loss of material is not considered to be an applicable aging effect for Unit 2 CST steel-to-concrete interface.

Revision to SLRA Section 3.4.2.2.8 is provided below.

References:

None.

Associated SLRA Revisions:

SLRA Section 3.4.2.2.8, pages 3.4-12 and 3.4-13 are revised as follows:

3.4.2.2.8 Loss of Material Due to General, Crevice or Pitting Corrosion and Cracking Due to Stress Corrosion Cracking

Loss of material due to general (steel only), crevice, or pitting corrosion and cracking due to SCC (SS only) can occur in steel and SS piping and piping components exposed to concrete. Concrete provides a high alkalinity environment that can mitigate the effects of loss of material for steel piping, thereby significantly reducing the corrosion rate. However, if water intrudes through the concrete, the pH can be reduced and ions that promote loss of material such as chlorides, which can penetrate the protective oxide layer created in the high alkalinity environment, can reach the surface of the metal. Carbonation can reduce the pH within concrete. The rate of carbonation is reduced by using concrete with a low water-to-cement ratio and low permeability. Concrete with low permeability also reduces the potential for the penetration of water. Adequate air entrainment improves the ability of the concrete to resist freezing and thawing cycles and therefore reduces the potential for cracking and intrusion of water. Cracking due to SCC, as well as pitting and crevice corrosion can occur due to halides present in the water that penetrates to the surface of the metal.

If the following conditions are met, loss of material is not considered to be an applicable aging effect for steel: (a) attributes of the concrete are consistent with American Concrete Institute (ACI) 318 or ACI 349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG–1557; (b) plant-specific OE indicates no degradation of the concrete that could lead to penetration of water to the metal surface; and (c) the piping is not potentially exposed to groundwater. For SS components loss of material and cracking due to SCC are not considered to be applicable aging effects as long as the piping is *not potentially exposed to groundwater. Where these conditions are not met, loss of material due to general (steel only), crevice, or pitting corrosion, and cracking due to SCC (SS only) are identified as applicable aging effects. GALL-SLR Report AMP XI.M41, "Buried and Underground Piping and Tanks," describes an acceptable program to manage these aging effects.*

The **Unit 1 and 2** carbon steel condensate storage tank bottoms **each** sit on a concrete pad. ~~There is no OE indicating degradation of the concrete that could lead to penetration of water to the metal surface, and the tanks are not exposed to groundwater.~~ The Unit 1 CST and associated piping and components are protected on all sides by a concrete structural barrier. Since the top of the barrier provides minimal protection from weather, the Unit 1 CST and associated pipe and components are exposed to an outside environment. Site specific OE indicates there has been no degradation of the concrete that could lead to penetration of water to the metal surface, however it is conservatively assumed that water can penetrate under the **external** surface of the **Unit 1 CST**~~tank~~. **Therefore, loss of material of steel exposed to concrete is an applicable aging effect for the Unit 1 CST.**

The Unit 2 CST **is located in the condensate storage tank building which is a Class 1 structure described in Unit 2 UFSAR Section 3.8.4.1.7. The building is a cylindrical reinforced concrete structure with a shallow dome roof. The thickness of the wall and of the roof is two feet. The structure is supported on a three foot thick reinforced concrete mat. The structure is designed to seismic Category I requirements**~~and associated piping and components are located in a separate CST building, a structural missile barrier, which provides protection from weather~~.

However, for the indoor Unit 2 steel CST steel tank bottom exposed to an external environment of concrete, loss of material is not considered to be an applicable aging effect because the three conditions cited above are met as follows:

(a) **In accordance with SLRA Sections 3.5.2.2.1.7, 3.5.2.2.2.1, and 3.5.2.2.2.3, the reinforced concrete for Groups 1, 3, 4, 5, 6, 7, and 8 Class 1 structures at PSL is designed and constructed in accordance with the applicable portions of ACI 318-63 for Unit 1 and ACI 318-71 for Unit 2, therefore, the reinforced concrete for these PSL structures meets criterion (a) of SRP-SLR Section 3.4.2.2.8. Note that Group 2 and Group 9 structures are associated with BWR plants and are therefore not applicable to PSL.**

(b) **As indicated in SLRA Table 3.4.2-3, the Unit 2 CST is exposed to an external environment of both concrete (the tank bottom) and air – indoor uncontrolled (tank shell and roof). Therefore, the CST is not exposed to weather events, including precipitation and wind. Plant-specific OE indicates the Unit 2 CST has no history of moisture at the inaccessible exterior bottom surface. In addition, no other PSL Units 1 and 2 indoor metallic tank that sits on concrete has a history of moisture at the inaccessible exterior tank bottom surface. Plant-specific**

OE also indicates no degradation of indoor concrete that could lead to the penetration of water to the steel surfaces has occurred.

(c) **The Unit 2 CST is located indoors in a Class 1 structure elevated above grade and therefore is not exposed to groundwater.**

Therefore, loss of material of steel exposed to concrete for the Unit 2 CST is not an applicable aging effect ~~but is an applicable aging effect for the Unit 1 CST~~.

The Outdoor and Large Atmospheric Metallic Storage Tanks (B.2.3.17) AMP is used to manage loss of material of the steel Unit 1 CST. Stainless steel piping exposed to soil or concrete are assumed to be subject to wetting and the Buried and Underground Piping and Tanks (B.2.3.27) AMP is used to manage loss of material and cracking. The Outdoor and Large Atmospheric Metallic Storage Tanks and Buried and Underground Piping and Tanks AMPs are described in Sections B.2.3.17 and B.2.3.27, respectively.

Associated Enclosures:

None.

Aging Management Review for Fuse Holders

RAI 3.6.1.1-1

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 U.S. Nuclear Regulatory Commission (NRC) 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. 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.

Background:

Subsequent License Renewal Application (SLRA), Supplement 1, Section 2.5.1.3, “Elimination of Electrical and I&C Commodity Groups Not Applicable to St. Lucie,” and Section 3.6.1.1, “Electrical Commodity Groups Not Requiring Aging Management,” addressed the aging management review (AMR) of new fuse holders (not part of active equipment) for aging effects consistent with the screening guidance in NUREG-2191 (GALL- SLR Report), Section XI.E5. The applicant states:

> This fuse box is located in a controlled (benign) environment, the fuses are not manipulated, and the fuses are not subject to electrical stress (high cycling or high heating). There are no relevant aging mechanisms or aging effects for these fuse holders, relative to the insulating material, the metallic clamps, or the fuse box itself (i.e., there are no stressors to cause corrosion or age-related degradation). These fuse holders are within the scope of SLR, but because they do not have relevant aging mechanisms and are not manipulated and are not subject to aging effects, they do not require aging management, consistent with the guidance of NUREG-2191, Section XI.E5.
>
> The subject fuse holders are located in a junction box in a benign environment, are not exposed to environmental stressors (thermal or radiation or moisture), and do not experience electrical stress (high voltage or high cycling). The fuse holders therefore do not warrant aging management, and do not require an aging management program at PSL.

SLRA, Revision 1, Supplement 1, Table 3.6.2-1, “Electrical and Instrumentation & Control Commodities – Summary of Aging Management Evaluation,” and SLRA, Revision 1, Table 3.6 1, “Summary of Aging Management Evaluation for Electrical and Instrumentation & Control Commodities,” provided the aging management evaluations for the in-scope fuse holders in accordance with the aging effects/mechanisms listed in NUREG-2191, Chapter VI, Table A, "Equipment Not Subject to 10 CFR 50.49, Environmental Qualification Requirements," for AMP XI.E5.

Issue:

NUREG-2191, Chapter VI, "Electrical Components," Table A, "Equipment Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," AMP XI.E5, identifies the following aging effects/mechanisms that can affect fuse holders (not part of active equipment):

- The metallic clamps of fuse holders can be subject to increased electrical resistance of connection due to chemical contamination, corrosion, and oxidation or fatigue caused by ohmic heating, thermal cycling, electrical transients, frequent removal /manipulation or vibration.
- The electrical insulation materials of fuse holders can be subject to reduced insulation resistance due to thermal/thermoxidative degradation of organics, radiolysis and photolysis (UV sensitive materials only) of organics, radiation-induced oxidation, and moisture intrusion.

NUREG-2192 Table 3.6-1, "Summary of Aging Management Programs for the Electrical Components Evaluated in Chapter VI of the GALL-SLR Report," stated that no AMP is required for the fuse holders if the applicant can demonstrate that these fuse holders are not subject to the aging effects/mechanisms identified in the Table 3.6-1 and in NUREG-2191, Table A, AMP XI.E5.

The staff notes that the applicant did not demonstrate how they came to the conclusion that the fuse holders are not subject to the stressors that cause the aging effects/mechanisms provided in the NUREG-2191, Table A, AMP XI.E5, as recommended in NUREG-2192.

Request:

Provide a summary of the evaluation used to demonstrate how the applicant determined that the fuse holders' electrical metallic clamps and insulation materials are not subject to the above-mentioned stressors (i.e., thermal, radiation, moisture, ohmic heating, thermal cycling, electrical transients, vibration, frequent removal/manipulation, chemical contaminants, thermal/ thermoxidative degradation of organics, radiolysis and photolysis of organics, etc.) as they relate to the above-mentioned aging effects/mechanisms listed in NUREG-2191, Table A, AMP XI.E5, found to be acceptable for adequately managing the effects of aging during the period of extended operation.

PSL Response:

The original screening of fuse holders in SLRA Section 2.5.1.3 was revised under FPL Letter L-2022-043 dated April 7, 2022 (ADAMS Accession No. ML22097A202) (Reference 1). This revision was provided to clearly identify those fuse holders at PSL that are within the scope of SLR and require an aging management review. A more detailed summary of the evaluation performed on the fuse holders in SLRA Section 2.5.1.3 revised under ML22097A202 is provided to demonstrate that these fuse holders are not subject to the aging effects/mechanisms identified in the Table 3.6-1 and in NUREG-2191, Table A, AMP XI.E5.

The fuse holders within the scope of SLR and subject to an aging management review are used in 125 VDC control power applications in Unit 2 6.9 kV Switchgear Room 2A1 in the Turbine Building. Fuse holders in the 2A1 Unit 2 6.9 kV Switchgear Room are exposed to an air indoor-uncontrolled environment. Field cable termination panel B2536 is a large junction box that houses only fuses and wiring. Photographs of the panel and details regarding its location have been provided on the ePortal. Field cable termination panel B2536 is constructed of corrosion resistant type 316 stainless steel and is a NEMA 4X rated gasketed enclosure suitable for indoor or outdoor use. The gasketed design protects against liquid and solid ingress. There are four 60A fuses inside field cable termination panel B2536 that are within the scope of SLR. Field cable termination panel B2536 along with the fuse holders inside the panel were installed in the 2020 timeframe.

A summary evaluation of fuse holder potential aging effects/mechanisms in an air indoor-uncontrolled environment is provided below:

SLRA Table 3.6-1 Item #	Potential Aging Effect/Mechanism	Summary Evaluation
016	Increased electrical resistance of connection due to chemical contamination, corrosion, and oxidation	Fuse holders are installed in a corrosion resistant type 316 stainless steel gasketed enclosure. Chemicals are not stored in the 2A1 Unit 2 6.9 kV Switchgear Room. The switchgear room in the Turbine Building is totally enclosed and equipped with a filtered air supply system. Supply fans in combination with high efficiency filters provide a saline and dust free environment for the switchgear (Reference 2). Operation of the supply fans keep the room temperature below 104ºF during the design outside ambient air temperature of 93ºF (Reference 2). The actual switchgear room temperature is maintained below 100ºF. Only one supply fan is required to provide filtered supply air to the switchgear room and maintain a positive pressure (Reference 2). The moisture required to produce corrosion and oxidation is not present in this atmosphere since condensation does not form on the warm equipment surfaces in the switchgear room. The gasketed design of the enclosure also protects against the ingress of liquids and foreign contamination. Condensation would not form on surfaces internal to field cable termination panel B2536 because the panel internal temperature is slightly higher than the panel outside temperature. Therefore, moisture as a result of humidity is not considered a significant stressor. Plant walkdown has verified that there are no potential sources of chemical contamination in the area, and the fuse holders are totally enclosed in a protective junction box, even if chemical contamination were possible. Therefore,

SLRA Table 3.6-1 Item #	Potential Aging Effect/Mechanism	Summary Evaluation
		chemical contamination is not considered an applicable aging mechanism. Plant walkdown verified that there are no sources of potential mechanical system leakage in proximity to the fuse holders in field cable termination panel B2536. Therefore, corrosion and oxidation are not considered applicable aging mechanisms. Plant walkdown also confirmed that these fuse holders appeared to be in like-new condition. Therefore, increased electrical resistance of connection due to chemical contamination, corrosion, and oxidation is not an aging effect requiring aging management.
017	Increased electrical resistance of connection due to fatigue from ohmic heating, thermal cycling, electrical transients	The only fuse holders that could potentially be exposed to thermal cycling and ohmic heating are those that carry significant current in power supply applications. Engineering design shows the fuses are rated at 60A while the associated control wiring consists of #6 AWG conductors with an ampacity of 55A. However, these circuits (and fuse holders) are purposely sized with margin to accommodate the inrush current of the 125 VDC breaker charging motor. These fuse holders are used in Main Feedwater Pump (MFWP) motor applications. The MFWP motors and associated switchgear breakers are cycled very infrequently, typically only once per fuel cycle. Under normal operation, these fuse holders experience a very low current draw. The steady state full load amperage (FLA) is on the order of only 4A (after charging). Therefore, thermal cycling and ohmic heating are not considered significant aging mechanisms based on this design configuration. Regarding electrical transients, PSL electrical design ensures that stresses due to forces associated with electrical faults and transients are mitigated by the proper coordination and fast action of circuit protective devices at high currents. Mechanical stress due to electrical faults is not considered a credible aging mechanism since such faults are infrequent and random in nature. Therefore, increased electrical resistance of connection due to fatigue from ohmic heating, thermal cycling, electrical transients is not an aging effect requiring aging management.
018	Increased electrical resistance of connection due to	Based on research by plant personnel, the fuses within the scope of this evaluation are not routinely pulled or otherwise manipulated. Therefore, frequent

SLRA Table 3.6-1 Item #	Potential Aging Effect/Mechanism	Summary Evaluation
	fatigue caused by frequent fuse removal/manipulation or vibration	manipulation is not considered an applicable aging mechanism. Vibration is induced in fuse holders by the operation of external equipment, such as compressors, fans, and pumps. Plant walkdown has verified the exact location and mounting of the fuse holders within the scope of this evaluation. This walkdown has verified that field cable termination panel B2536 is a stand-alone enclosure with no direct sources of vibration acting on it. The panel is mounted separately to its own Unistrut support structure which is anchored to the concrete floor. Vibration is not considered an applicable aging mechanism. Therefore, increased electrical resistance of connection due to fatigue caused by frequent fuse removal/manipulation or vibration is not an aging effect requiring aging management.
022	Reduced electrical insulation resistance due to thermal / thermoxidative degradation of organics, radiolysis, and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion	The metallic clamp (or clip) portion of these fuse holders are constructed of high conductivity tin-plated copper. Tin-plated copper material is commonly used in various electrical applications because of its low cost and protection against oxidation and corrosion. As shown in SLRA Table 3.6.2-1 under Table 1 item 3.6-1, 022 electrical insulation materials for fuse holders (not part of active equipment) include: bakelite; phenolic; melamine or ceramic; molded polycarbonate; other (Reference 1). Experience has shown these materials are used in this application because these materials are high strength, non-conductive, non-tracking, non-hygroscopic, and will not degrade at high temperatures or in the presence of pollution or UV light. The following addresses the environmental stressors of heat, radiation and moisture for the 2A1 Unit 2 6.9 kV Switchgear Room. Plant walkdown verified that there are no sources of potential mechanical system leakage in proximity to the fuse holders in field cable termination panel B2536. The switchgear room temperature is maintained below 100ºF and supply fans provide a positive pressure (Reference 2). Therefore, moisture intrusion is not an applicable aging mechanism in this atmosphere because condensation does not form on the warm equipment surfaces in the switchgear room and the metallic clamp (or clip) portion of the fuse holder is constructed of corrosion resistance material. The 80-yr service-limiting dose in the Turbine Building is <2E+03 rads. This value is considered

SLRA Table 3.6-1 Item #	Potential Aging Effect/Mechanism	Summary Evaluation
		benign and is far below the service-limiting radiation thresholds for these insulation materials. For example, phenolic has an 80-yr radiation threshold of 2E+07 rads, while melamine has an 80-yr radiation threshold 5E+07 rads. Temperature in the Unit 2 6.9 kV Switchgear Room is kept below 100ºF. This value is far below the service-limiting temperature thresholds for these insulation materials. For example, phenolic has an 80-yr temperature threshold of 219.3ºF (104.1ºC), while melamine has an 80-yr temperature threshold of 202ºF (94.4ºC). Other materials such as ceramic are not age sensitive. Therefore, radiation and temperature are not considered significant aging mechanisms for these fuse holders (not part of active equipment). Consistent with SLRA Table 3.6-1 Item Number 022, no XI.E5 AMP for “Fuse Holders” is required because the fuse holders in field cable termination panel B2536 are located in an environment that does not subject them to environmental aging mechanisms.

An additional review was performed to ensure there were no inconsistencies between SLRA, Revision 1, Table 3.6-1, “Summary of Aging Management Evaluations for Electrical and Instrumentation & Control Commodities” and SLRA, Revision 1, Supplement 1, Attachment 3, Table 3.6.2-1, “Electrical and Instrumentation & Control Commodities – Summary of Aging Management Evaluation.”

After review of SLRA, Revision 1, Table 3.6-1 (ADAMS Accession No. ML21285A110) some inconsistencies were identified. SLRA, Revision 1, Table 3.6-1 aligns with NUREG-2192 (SRP-SLR) Table 3.6-1, “Summary of Aging Management Programs for the Electrical Components Evaluated in Chapter VI of the GALL-SLR Report”, however some revisions are required in the discussion column for table item numbers 016, 017, 018, and 022. After review of SLRA, Revision 1, Supplement 1, Attachment 3, Table 3.6.2-1 (ADAMS Accession No. ML22097A202) (Reference 1) some inconsistences were identified for the Table 1 column line item numbers 3.6-1, 022 and 3.6-1, 018. These line items have been revised to show an “Air – indoor uncontrolled” environment consistent with the environment for the PSL fuse holders (not part of active equipment) within the scope of this evaluation.

References:

1. FPL Letter L-2022-043 dated April 7, 2022 – Subsequent License Renewal Application Revision 1 – Supplement 1 (ADAMS Accession No. ML22097A202)

2. St. Lucie Unit 2 UFSAR Section 9.4.4, Turbine Building Ventilation System

Associated SLRA Revisions:

SLRA revisions are presented on the following pages.

SLRA Table 3.6-1, page 3.6-17 is revised as follows:

Table 3.6-1: Summary of Aging Management Evaluations for Electrical and Instrumentation & Control Commodities

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs (AMP)/TLAA	Further Evaluation Recommended	Discussion
3.6-1, 016	Fuse holders (not part of active equipment): metallic clamps composed of various metals used for electrical connections exposed to air – indoor, uncontrolled	Increased electrical resistance of connection due to chemical contamination, corrosion, and oxidation (in an air, indoor controlled environment, increased resistance of connection due to chemical contamination, corrosion and oxidation do not apply)	AMP XI.E5, "Fuse Holders" No AMP is required for those applicants who can demonstrate these fuse holders are located in an environment that does not subject them to environmental aging mechanisms and effects due to chemical contamination, corrosion, and oxidation.	No	Pursuant to the discussion in SLRA Section ~~2.5.1.3~~**3.6.1.1**, the fuse holders within the scope of SLR are in an air-indoor **un**controlled environment and do not experience the detailed environmental aging effects.
3.6-1, 017	Fuse holders (not part of active equipment): metallic clamps composed of various metals used for electrical connections exposed to air – indoor, controlled, or uncontrolled	Increased electrical resistance of connection due to fatigue from ohmic heating, thermal cycling, electrical transients	AMP XI.E5, "Fuse Holders" No AMP is required for those applicants who can demonstrate these fuse holders are not subject to fatigue due to ohmic heating, thermal cycling, electrical transients.	No	Pursuant to the discussion in SLRA Section ~~2.5.1.3~~**3.6.1.1**, the fuse holders within the scope of SLR are not subject to ohmic heating, thermal cycling, or electrical transients.
3.6-1, 018	Fuse holders (not part of active equipment): metallic clamps composed of various metals used for electrical connections exposed to air – indoor, controlled, or uncontrolled	Increased electrical resistance of connection due to fatigue caused by frequent fuse removal/manipulation or vibration	AMP XI.E5, "Fuse Holders" No AMP is required for those applicants who can demonstrate these fuse holders are not subject to fatigue caused by frequent fuse removal/manipulation or vibration.	No	Pursuant to the discussion in SLRA Section ~~2.5.1.3~~**3.6.1.1**, the fuse holders within the scope of SLR are not subject to frequent manipulation and will not experience fatigue degradation (at the metallic clamp).

SLRA Table 3.6-1, page 3.6-18 is revised as follows:

Table 3.6-1: Summary of Aging Management Evaluations for Electrical and Instrumentation & Control Commodities

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs (AMP)/TLAA	Further Evaluation Recommended	Discussion
3.6-1, 019	Cable connections (metallic parts) composed of various metals used for electrical contacts exposed to air – indoor controlled or uncontrolled, air – outdoor	Increased electrical resistance of connection due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation	AMP XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No	Consistent with NUREG-2191. The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP will manage the effects of aging.
3.6-1, 020	Electrical connector contacts for electrical connectors composed of various metals used for electrical contacts exposed to air with borated water leakage	Increased electrical resistance of connection due to corrosion of connector contact surfaces caused by intrusion of borated water	AMP XI.M10, "Boric Acid Corrosion"	No	Consistent with NUREG-2191. The Boric Acid Corrosion (B.2.3.4) AMP will manage the effects of aging.
3.6-1, 021	Transmission conductors composed of aluminum exposed to air – outdoor	Loss of conductor strength due to corrosion	None – for AAAC	No	NUREG-2191 aging effects are not applicable to PSL. See Section 3.6.2.2.3 for further evaluation.
3.6-1, 022	Fuse holders (not part of active equipment): insulation material composed of electrical insulation material: bakelite; phenolic melamine or ceramic; molded polycarbonate, and other, exposed to air – indoor controlled or uncontrolled	Reduced electrical insulation resistance due to thermal / thermoxidative degradation of organics, radiolysis, and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion	AMP XI.E5, "Fuse Holders" No AMP is required for those applicants who can demonstrate these fuse holders are located in an environment that does not subject them to environmental aging mechanisms	No	Pursuant to the discussion in SLRA Section ~~2.5.1.3~~**3.6.1.1**, the fuse holders within the scope of SLR are located in an air-indoor **un**controlled environment and are not subject to the detailed environmental aging effects.

Table 3.6.2-1, page 3.6-28 is revised as follows:

Table 3.6.2-1: Electrical and Instrumentation & Control Commodities – Summary of Aging Management Evaluation								
Structure and/or Component	**Component Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program (AMP) / TLAA**	**NUREG-2191 Item**	**Table 1 Item**	**Notes**
Fuse Holders (not part of active equipment) Electrical Insulation	Insulate (electrical)	Electrical insulation: Bakelite, Phenolic, Melamine, or Ceramic; Molded Polycarbonate, or other Organic Polymers	Air – indoor ~~controlled or~~ uncontrolled	None	None	VI.A.LP-24	3.6-1, 022	I
Fuse Holders (not part of active equipment) Metallic Clamp	Electrical Continuity	Various Metals used for Electrical Connection	Air – indoor uncontrolled	None	None	VI.A.LP-23	3.6.1, 016	I
Fuse Holders (not part of active equipment) Metallic Clamp	Electrical Continuity	Various Metals used for Electrical Connection	Air – indoor uncontrolled	None	None	VI.A.LP-31	3.6.1, 018	I
Fuse Holders (not part of active equipment) Metallic Clamp	Electrical Continuity	Various Metals used for Electrical Connection	Air-indoor uncontrolled	None	None	VI.A.LP-7	3.6.1, 017	I

General Notes

A. Consistent with component, material, environment, aging effect, and AMP listed for NUREG-2191 line item. AMP is consistent with 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.
I. Aging effect in NUREG-2191 for this component, material and environment combination is not applicable.

Plant Specific Notes

None.

Associated Enclosures:

None

UFSAR Update for the Unit 1 Refueling Water Storage Tank AMP

RAI 19.2.2.17-2

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 U.S. Nuclear Regulatory Commission (NRC) 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. 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.

Background:

10 CFR 54.21(d) requires each license renewal application to include a final safety analysis report (FSAR) supplement, containing a summary description of the programs and activities for managing the effects of aging. In its discussions about FSAR supplements, the Standard Review Plan for Subsequent License Renewal (NUREG-2192) notes that the description should be sufficiently comprehensive such that later changes to the program can be controlled by 10 CFR 50.59. NUREG-2192 also notes that the Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report (NUREG-2191), Table XI-01 provides examples of the type of information to be included. GALL-SLR Report Table XI-01, “FSAR Supplement Summaries for GALL-SLR Report Chapter XI Aging Management Programs [AMP],” provides a description of the “Outdoor and Large Atmospheric Metallic Storage Tanks” program (AMP XI.M29), stating that loss of material is managed by conducting periodic internal and external visual examinations.

Issue:

The Updated Final Safety Analysis Report (UFSAR) supplement for the Outdoor and Large Atmospheric Metallic Storage Tanks program appears to lack sufficient details for inspecting the Unit 1 Refueling Water Tank (U1 RWT). The staff questions whether the inspection frequency and technique will be based on the NRC approved ASME Section XI Inservice Inspection relief request.

Request:

Regarding SLRA Section 19.2.2.17, either: a) provide additional information that explains how the current description of the program and aging management activities in the UFSAR supplement meets the intent of 10 CFR 54.21(d) and NUREG-2192, which states that the description should be sufficiently comprehensive such that later changes to the program can be controlled by 10 CFR 50.59 or b) modify the UFSAR supplement to include information related to the U1 RWT and ASME Section XI Inservice Inspection relief request.

PSL Response:

The Unit 1 SLR UFSAR supplement and SLR commitment associated with the Outdoor and Large Atmospheric Metallic Storage Tanks aging management program (AMP) are revised to include the surveillance frequency and techniques associated with the U1 RWT internal inspections, including the surveillances associated with ASME Section XI Inservice Inspection relief requests. The exception and enhancements table in SLRA Appendix B are also updated accordingly.

References:

None.

Associated SLRA Revisions:

SLRA Appendix A1, Section 19.2.2.17, pages A1-23 and A1-24, as updated by SLRA Supplement 1 (Attachment 21) and the Set 1 (Set 1A) RAI 19.2.2.17-1 Response (Attachment 13), is revised as follows:

19.2.2.17 Outdoor and Large Atmospheric Metallic Storage Tanks

The PSL Outdoor and Large Atmospheric Metallic Storage Tanks AMP is an existing AMP, previously part of the PSPM Program and Structures Monitoring Program. This condition monitoring AMP manages aging effects associated with outdoor tanks sited on concrete and indoor large-volume tanks containing water designed with internal pressures approximating atmospheric pressure that are sited on concrete. The Unit 1 and Common Unit tanks included within the scope of this AMP are as follows:

- Unit 1 Refueling Water Tank (U1 RWT)
- Treated Water Storage Tank (TWST)
- Unit 1 Condensate Storage Tank (U1 CST)
- Diesel Oil Storage Tank 1A (DOST 1A)
- Diesel Oil Storage Tank 1B (DOST 1B)

This AMP includes preventive measures to mitigate corrosion by protecting the external surfaces of steel components per standard industry practice. Sealant or caulking is used for outdoor tanks at the tank bottom interface. This AMP manages loss of material and cracking by conducting one-time and periodic internal and external visual and surface examinations. **The periodic inspections of the respective tank caulking or sealant are performed on an 18-month frequency.** Inspections of caulking or sealant are supplemented with physical manipulation. Surface exams are conducted to detect cracking for the aluminum U1 RWT. Thickness measurements of tank bottoms are conducted to detect degradation (e.g., loss of material on the inaccessible external surface). Inspections are conducted in accordance with ASME Code Section XI requirements as applicable or are conducted in accordance with plant-specific procedures that include inspection parameters such as lighting, distance, offset, and surface conditions.

Instead of volumetric examinations, visual inspections are used to inspect the U1 RWT floor, for cracking and loss of material as prescribed in an NRC-approved ASME Section XI Inservice Inspection relief request documented in FPL engineering evaluations and preventive maintenance activities. The preventive maintenance activities include a full hands-on drained tank interior inspection performed using the methods directed by the relief request at the frequency prescribed by the NRC approved relief request for each respective ASME Section XI ISI interval. The drained tank inspection will also inspect for galvanic corrosion cells between the stainless steel piping, and manway flanges and the aluminum tank. For a refueling outage where a hands-on inspection is not scheduled, a remote visual inspection of the RWT liner will be performed. As an option, the remote visual inspections may be performed with the unit on-line.

SLRA Appendix A1, Section 19.4, Table 19-3 commitment No. 20 (page A1-86), as updated by SLRA Supplement 1 (Attachment 7), is revised as follows:

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
			Sample expansion inspections that happen in the next inspection interval are part of the preceding interval. b) Perform baseline one-time interior visual inspections of the U1 RWT. Perform 10-year surface examination inspections of the aluminum U1 RWT's interior nonwetted surface and exterior surface for evidence of loss of material and cracking. The surface examinations will inspect 25 1-square-foot sections or 25 1-linear-foot sections of welds. If evidence of cracking is identified, then a surface examination is also performed to determine the extent of the cracking. c) Perform 10-year LFET tank bottom thickness examinations of the TWST, DOST 1A, DOST 1B, and the U1 CST, with follow-on UT at discrete locations. **d) Perform visual inspections of the U1 RWT floor, in lieu of volumetric examinations, to inspect for cracking and loss of material as prescribed in an NRC-approved ASME Section XI Inservice Inspection relief request documented in FPL engineering evaluations and preventive maintenance activities. The preventive maintenance activities include a full hands-on drained tank interior inspection performed using the methods directed by the relief request at the frequency prescribed by the NRC approved relief request for each respective ASME Section XI ISI interval. The drained tank inspection will also inspect for galvanic corrosion cells between the stainless steel piping, and manway flanges and the aluminum tank. For a refueling outage where a hands-on inspection is not scheduled, a remote visual inspection of the RWT liner will be performed. As an option, the remote visual inspections may be performed with the unit on-line.**	

SLRA Appendix B, Section B.2.3.17, pages B-154 and B-155, as updated by SLRA Supplement 1 (Attachment 22), is revised as follows:

Exceptions to NUREG-2191

The PSL Outdoor and Large Atmospheric Metallic Storage Tanks AMP will take the following exception to the NUREG-2191 guidance:

The PSL Outdoor and Large Atmospheric Metallic Storage Tanks AMP will take an exception to performing volumetric examinations of the U1 RWT floor, since it is not feasible. The aluminum floor for the U1 RWT has through-wall holes and this metal floor was not credited for the original License Renewal. Instead the floor is lined with a fiberglass-reinforced vinyl ester epoxy material (Dudick Protecto-Line 800), which is credited for performing the pressure boundary function for SLR. Instead of volumetric examinations, visual inspections will be used to inspect for cracking and loss of material as prescribed in an approved NRC relief request documented in FPL engineering evaluations and preventive maintenance activities. The preventive maintenance activities include ~~diver inspections performed at a refueling outage interval and~~ a **full hands-on** drained tank **interior** inspection performed using **the methods directed by the relief request** at **the frequency prescribed by the NRC approved relief request for each respective ASME Section XI ISI interval**. The drained tank inspection will continue to inspect for galvanic corrosion cells between the SS piping, and manway flanges and the aluminum tank. **For a refueling outage where a hands-on inspection is not scheduled, a remote visual inspection of the RWT liner will be performed. As an option, the remote visual inspections may be performed with the unit on-line.**

SLRA Appendix B, Section B.2.3.17 (enhancements table), page B-157, is revised as follows:

Element Affected	Enhancement
	○ Expand the inspection to include all tanks of with the same material-environment combination (for DOST degradation). ○ For other sampling-based inspections (e.g., 20%, 25 locations) the smaller of five additional inspections or 20% of the inspection population is conducted. If subsequent inspections do not meet acceptance criteria, an extent of condition and extent of cause is conducted to determine the further extent of inspection. The additional inspections include inspections at all of the Units with the same material, environment, and aging effect combination. Sample expansion inspections that happen in the next inspection interval are part of the preceding interval.
4. Detection of Aging Effects	Perform baseline one-time interior visual inspections of the RWTs. Perform 10-year surface examination inspections of the aluminum and SS RWTs' interior nonwetted surface and exterior surface for evidence of loss of material and cracking. The surface examinations will inspect 25 1-square-foot sections or 25 1-linear-foot sections of welds. If evidence of cracking is identified, then a surface examination is also performed to determine the extent of the cracking.
4. Detection of Aging Effects	Perform 10-year LFET tank bottom thickness examinations of the U2 RWT, U2 PWST, TWST, DOST 1A, DOST 1B, and the CSTs, with follow-on UT at discrete locations.
4. Detection of Aging Effects	**Perform visual inspections of the U1 RWT floor, in lieu of volumetric examinations, to inspect for cracking and loss of material as prescribed in an NRC-approved ASME Section XI Inservice Inspection relief request documented in FPL engineering evaluations and preventive maintenance activities. The preventive maintenance activities include a full hands-on drained tank interior inspection performed using the methods directed by the relief request at the frequency prescribed by the NRC approved relief request for each respective ASME Section XI ISI interval. The drained tank inspection will also inspect for galvanic corrosion cells between the stainless steel piping, and manway flanges and the aluminum tank. For a refueling outage where a hands-on inspection is not scheduled, a remote visual inspection of the RWT liner will be performed. As an option, the remote visual inspections may be performed with the unit on-line.**

Associated Enclosures:

None.

Inspection of Water-Control Structures Associated with Nuclear Power Plants AMP – Hurricane Protection Sheet Piles

RAI B.2.3.34-2

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 U.S. Nuclear Regulatory Commission (NRC) 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. 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.

Background:

Subsequent License Renewal Application (SLRA) Section B.2.3.34, “Inspection of Water-Control Structures Associated with Nuclear Power Plants,” states that the St. Lucie Nuclear Plant (PSL) Inspection of Water-Control Structures Associated with Nuclear Power Plants Aging Management Program (AMP), with enhancements, will be consistent without exception to the ten program elements of Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report AMP XI.S7, “Inspection of Water-Control Structures Associated with Nuclear Power Plants.”

SLRA Section 2.4.14 states that “the ultimate heat sink dam evaluation boundary is at the exterior surface of the structure” and “adjacent hurricane protection sheet piles are also considered within the evaluation boundary.” SLRA Table 2.4.14 and UFSAR 3.8.1.1.5 show that steel sheet piling (beneath dam) is subject to Aging Management Review (AMR).

For the “scope of program” program element, the GALL-SLR Report AMP states that the scope of the program includes structural steel, and structural bolting associated with water-control structures, steel or wood piles and sheeting required for the stability of embankments and channel slopes, and miscellaneous steel, such as sluice gates and trash racks.

Issue:

The staff is unclear where the hurricane protection sheet piles are located, or if they are the same item as the sheet piling beneath the dam, since there is no discussion of hurricane protection sheet piles provided in SLRA Section B.2.3.34. In addition, the staff was unable to identify AMR line items in the SLRA that addressed this commodity.

It is unclear whether the hurricane protection sheet piles discussed in SLRA Section 2.4.14 are within the scope of subsequent license renewal and subject to AMR.

<u>Request:</u>

1. Provide the description of the hurricane protection sheet piles and their intended functions.

2. Clarify whether the hurricane protection sheet piles are within the scope of subsequent license renewal and subject to AMR.

3. If the hurricane protection sheet piles are within the scope of subsequent license renewal and subject to AMR, explain how aging management will be accomplished, provide associated AMR Table 2 items and update SLRA as necessary.

PSL Response:

This revised RAI response supersedes in its entirety the RAI response provided in Attachment 14 of FPL Letter L-2022-108 (Reference ML22192A078).

The numbered responses below correspond to the numbered requests above.

1. The hurricane protection sheet piles are steel sheet piles that are installed along the banks of Big Mud Creek on either side of the ultimate heat sink dam to protect against erosion of the banks during hurricanes. The sheet piles run mostly parallel to the road for a combined total of 598’-6”. The sheet piles are driven below ground to elevation –26.5 ft. The top elevation of the sheet piles varies between +11.00 ft and +16.00 ft. The top of the sheet piles is visible at ground level.

2. As stated in SLRA Section 2.4.14 (Reference ML21285A110), the hurricane protection sheet piles are considered within the evaluation boundary. During initial license renewal, the hurricane protection sheet piles were evaluated and determined not to be within the scope of license renewal as they did not support an intended function. For subsequent license renewal, the hurricane sheet piles are conservatively considered to be within the scope of SLR and subject to AMR.

3. Aging of the hurricane protection sheet piles will be managed by the PSL Structures Monitoring AMP, consistent with SRP Table 1 Item 3.5-1, 079 and NUREG-2191 Item III.A3.TP-219 for “steel components: piles” exposed to “soil, groundwater” and with SRP Table 1 Item 3.5-1, 077 and NUREG-2191 Item III.A3.TP-302 for “steel components: all structural steel” exposed to “air-outdoor.” The implementing procedures for the PSL Structures Monitoring AMP currently includes the hurricane protection sheet piles; therefore, no additional enhancements are necessary.

References:

None.

Associated SLRA Revisions:

SLRA Table 2.4-14, page 2.4-30, is revised as follows:

Table 2.4-14
Ultimate Heat Sink Dam (Barrier Wall)
Components Subject to Aging Management Review

Component Type	Component Intended Function(s)
Checkered plate Grating Handrails Ladders Platforms Stairs	Structural support
Concrete: foundation	Structural support
Concrete: foundations, roof, slabs, walls	Missile barrier Shelter, protection Structural support
Miscellaneous steel (i.e., missile barriers, hatch covers, etc.)	Shelter, protection Missile barrier
Steel sheet piling (beneath dam)	Shelter, protection
Steel sheet piling (hurricane protection)	**Shelter, protection**
Structural bolting	Structural support

SLRA Table 3.5-1 Item Number 3.5-1, 079, page 3.5-65, is revised as follows:

Table 3.5-1: Summary of Aging Management Evaluations for the Containments, Structures and Component Supports					
Item Number	Component	Aging Effect/Mechanism	Aging Management Program / TLAA	Further Evaluation Recommended	Discussion
3.5-1, 079	Steel components: piles	Loss of material due to corrosion	AMP XI.S6, "Structures Monitoring"	No	Consistent with NUREG-2191. The Structures Monitoring (B.2.3.33) AMP is credited with managing loss of material of steel piles for the Ultimate Heat Sink Dam (Barrier Wall)**, hurricane protection,** and discharge nose wave protection (Yard Structures).

SLRA Table 3.5.2-14, page 3.5-128, is revised as follows:

Table 3.5.2-14: Ultimate Heat Sink Dam (Barrier Wall) – 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**
Concrete: foundations, roof, slabs, walls (accessible)	Missile barrier Shelter, protection Structural support	Concrete (reinforced)	Raw water	Cracking	Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.3.34)	III.A6.T-34	3.5-1, 096	A
Concrete: foundations, roof, slabs, walls (accessible)	Missile barrier Shelter, protection Structural support	Concrete (reinforced)	Raw water	Increase in porosity and permeability Loss of strength	Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.3.34)	III.A6.TP-37	3.5-1, 061	A
Concrete: foundations, roof, slabs, walls (accessible)	Missile barrier Shelter, protection Structural support	Concrete (reinforced)	Raw water	Cracking Loss of bond Loss of material	Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.3.34)	III.A6.TP-38	3.5-1, 059	A
Concrete: foundations, roof, slabs, walls	Missile barrier Shelter, protection Structural support	Concrete (reinforced)	Water – flowing	Loss of material	Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.3.34)	III.A6.T-20	3.5-1, 056	A
Miscellaneous steel (i.e., hatch covers, missile barriers, etc.)	Missile barrier Shelter, protection	Steel	Air – indoor uncontrolled Air – outdoor	Loss of material	Structures Monitoring (B.2.3.33)	III.A8.TP-302	3.5-1, 077	B
Steel sheet piling (beneath dam)	Shelter, protection	Steel	Groundwater/soil	Loss of material	Structures Monitoring (B.2.3.33)	III.A3.TP-219	3.5-1, 079	B
Steel sheet piling (hurricane protection)	**Shelter, protection**	**Steel**	**Groundwater/soil**	**Loss of material**	**Structures Monitoring (B.2.3.33)**	**III.A3.TP-219**	**3.5-1, 079**	**B**
Steel sheet piling (hurricane protection)	**Shelter, protection**	**Steel**	**Air – outdoor**	**Loss of material**	**Structures Monitoring (B.2.3.33)**	**III.A3.TP-302**	**3.5-1, 077**	**B**

Associated Enclosures:

None.

Steam Generators: Clarified AMR Results and AMP Scope

Affected SLRA Sections: Table 2.3.1-5, Table 3.1-1, Table 3.1.2-5, Table 19-3, (Appendix A1 and A2) Section 19.2.2.10, B.2.3.10, B.2.3.20

SLRA Page Numbers: 2.3-13, 3.1-23, 3.1-27, 3.1-38, 3.1-39, 3.1-89, 3.1-90, 3.1-97 through 3.1-99, 3.1-101, A1-18, A1-19, A1-71, A2-18, A2-19, A2-72, B-88 through B-91, B-92, B-93, B-174

Description of Change:

This revised SLRA supplemental response supersedes in its entirety the supplemental response provided in Attachment 18 of FPL Letter L-2022-043 (Reference ML22097A202). The revised SLRA supplemental response eliminates the reference to the PSL license amendment request to implement Revision 5 of NUREG-1432, “Standard Technical Specifications-Combustion Engineering Plants” (ML21265A285) in accordance with TSTF 577 Revision 1 (ML21098A188) and the associated exception to the Steam Generator AMP. The markup provided to SLRA Table 2.3.1-5 on page 2.3-13, SLRA Appendix A1 on page A1-71, SLRA Appendix A2 on page A2-72, SLRA Section B.2.3.10 on pages B-88 through B-91, B-92, and B-93 incorporates the markup from the PSL RAI Set 2 Responses (Reference ML22192A078).

The PSL SLRA Table 2.3.1-5 lists the intended functions of the tube bundle wrapper and wrapper supports as “Structural support” and “Direct flow”. In Table 3.1.2-5, the intended function of the tube bundle wrapper and wrapper supports only lists “Structural support”. Table 2.3.1-5 is accurate and as such SLRA Table 3.1.2-5 is modified to include the intended function of “Direct flow” in the line entry for the tube bundle wrapper and wrapper support.

PSL SLRA Appendices A1 and A2 Section 19.2.2.10 cite that the PSL Steam Generators AMP is modeled after NEI 97-06, “Steam Generator Program Guidelines” and the referenced EPRI Guidelines of NEI 97-06. These sections are edited to specify that the Steam Generators AMP is modeled after Revision 3 of NEI 97-06 consistent with SLRA general reference 1.6.32 on SLRA page 1-15.

Further evaluation item 3.1.2.2.11.1 evaluates the PSL steam generator divider plates with respect to PWSCC susceptibility and whether or not a plant-specific AMP is necessary. The Unit 1 RSG design includes a floating divider plate that has no crack initiation point. The Unit 2 RSG divider plate design utilizes highly resistant materials. Both Unit 1 and Unit 2 RSG divider plates are dispositioned as not requiring additional aging management from a plant-specific AMP. PSL SLRA Section B.2.3.20 summarizes this disposition and correctly cites that no plant-specific AMP is necessary but does not cite the associated justifications. Accordingly, SLRA Section B.2.3.20 is revised to cite the associated justifications provided in further evaluation item 3.1.2.2.11.1. In addition, plant specific note 1 to Table 3.1.2-5 is clarified to recognize that the nickel alloy divider plate is highly resistant but remains susceptible to PWSCC.

The Unit 1 stainless steel divider plate exposed to reactor coolant is susceptible to loss of material and cracking. The line items in Table 3.1.2-5 do not address the aging effect of loss of material in the Unit 1 divider plate. To recognize the aging effect and appropriate aging management program, an additional line item is added to Table 3.1.2-5 citing NUREG-2191 item IV.C2.RP-23 which credits the Water Chemistry program to manage loss of material.

Further evaluation item 3.1.2.2.11.2 evaluates the PSL steam generator tube-to-tubesheet welds with respect to PWSCC and whether or not a plant-specific AMP is necessary. Both Unit 1 and Unit 2 steam generators are dispositioned to not require additional management from a plant-specific AMP but remain susceptible to PWSCC and require management by the Steam Generators and Water Chemistry AMPs. Accordingly, SLRA Table 2.3.1-5, Table 3.1-1, and Table 3.1.2-5 are modified to identify that the tube-to-tubesheet welds are in scope, susceptible to PWSCC and loss of material, and managed by the Steam Generators and Water Chemistry AMPs. In addition, discussions of the Steam Generators AMP in PSL SLRA Appendices A1 and A2 Section 19.2.2.10, and Appendix B Section B.2.3.10 are modified to identify that the tube-to-tubesheet welds are within the scope of the AMP.

The PSL steam generator component type “feedwater feedring” included in SLRA Table 2.3.1-5 does not fully address the feedwater feedring and its supports. The feedwater feedring includes intended functions of “Structural integrity (attached)” as well as “Direct flow”. The associated feedwater feedring supports have an intended function of “Structural integrity (attached)”. In addition, the Unit 2 feedwater feedring is composed of stainless steel and the supports are carbon steel. To clarify this, the component type “feedwater feedring supports” is added in SLRA Tables 2.3.1-5, 3.1-1, and 3.1.2-5 and the appropriate intended functions and material types are identified for the feedwater feedring supports. The discussion in SLRA Table 3.1-1 for item 072 is revised to distinguish the group of components that are common to both units and those components that are only applicable to Unit 1. In addition, Appendix B Section B.2.3.10 is revised to discuss Unit 1 operating experience regarding feedwater feedring support inspections.

The PSL Steam Generators AMP remedies steam generator tubes which do not satisfy the performance criteria through tube plugging. The scope of the Steam Generators AMP is clarified in SLRA Sections Appendices A1 and A2 Section 19.2.2.10, and Appendix B Section B.2.3.10.

The PSL Steam Generators AMP inspections are performed in accordance with the Degradation Assessment for both the primary-side and secondary-side components. This is clarified in SLRA Section B.2.3.10.

The implementation schedule for the Steam Generators AMP includes a condition that it will be implemented no later than the last refueling outage prior to the SPEO. However, there are no enhancements or SLR-specific inspections required to be implemented prior to entry into the SPEO. To clarify the state of the AMP, this condition is removed from the implementation schedule in SLRA Table 19-3.

SLRA Tables 2.3.1-5, 3.1-1, and 3.1.2-5 include the component type “Tube support plates and anti-vibration bars (Unit 2)”. While the tube support plates are unique to Unit 2, anti-vibration bars are an applicable component type for both Unit 1 and Unit 2. The component type of “anti-vibration bars” is inclusive of the design specific names of anti-vibration support components such as the flat fan bars used by the Unit 1 design and v-shaped support pads and bars used for the Unit 2 design. This is clarified in SLRA Tables 2.3.1-5, 3.1-1, and 3.1.2-5.

The PSL steam generators are susceptible to cumulative fatigue damage and cracking due to fatigue or cyclic loading. Table 3.1.2-5 includes NUREG-2191 line item IV.D1.R-221 to recognize the primary side steam generator components exposed to reactor coolant being managed for cumulative fatigue damage and cracking through the Section 4.3.1 TLAA, “Metal Fatigue of Class 1 Components”. In addition to the primary side components, the Section 4.3.1

TLAA addresses the secondary side carbon steel components exposed to treated water and steam and bolting exposed to air. To recognize this, NUREG-2191 line items IV.D1.R-33 and IV.C2.R-18 are added to SLRA Table 3.1.2-5 to manage the carbon steel steam generator components exposed to treated water and steam and bolting exposed to air respectively. These changes are also captured in Table 3.1-1, Item number 3.1-1, 005.

PSL performs condition monitoring assessments to determine if tube integrity was met during the prior operating interval. PSL performs tube plugging and operational assessments to provide assurance that tube integrity will be maintained through the next inspection. SLRA Appendices A1 and A2 Section 19.2.2.10 are revised to discuss the performance of condition monitoring assessments consistent with the discussion in SLRA B.2.3.10.

SLRA Table 2.3.1-5 on page 2.3-13 is revised as follows including revisions incorporated in the previous PSL response to RAI B.2.3.10-4 (Reference ML22192A078):

Table 2.3.1-5
Steam Generator Components Subject to Aging Management Review

Component Type	Component Intended Function(s)
Anti-vibration bars[1]	Structural support
Blowdown nozzles	Pressure boundary
Bolting	Mechanical closure
Conical skirt	Structural support
Divider plates	Flow distribution
Feedwater feedring	Structural integrity (attached) Direct flow
Feedwater feedring supports	Structural integrity (attached)
Feedwater j-nozzle	Structural integrity (attached) Direct flow
Feedwater nozzle	Pressure boundary
Moisture separators	Structural integrity (attached)
Primary heads	Pressure boundary
Primary inlet and outlet nozzles	Pressure boundary
Primary instrument nozzles	Pressure boundary
Primary manway covers	Pressure boundary
Recirculation nozzles and end caps (Unit 2)	Pressure boundary
Secondary instrument nozzles	Pressure boundary
Secondary manway and handhole closure covers	Pressure boundary
Stay cylinders (Unit 1)	Pressure boundary
Steam generator components with fatigue analysis	Pressure boundary
Steam generator components: external surfaces	Pressure boundary Mechanical closure
Steam outlet nozzle (Unit 2)	Pressure boundary
Steam outlet nozzle venturis (Unit 2)	Throttle
Steam outlet nozzle with integral flow orifices (Unit 1)	Pressure boundary Throttle

Table 2.3.1-5
Steam Generator Components Subject to Aging Management Review

Component Type	Component Intended Function(s)
Tube bundle wrapper and wrapper supports	Structural support Direct flow
Tube-to-tubesheet welds	**Pressure boundary**
Tube plugs	Pressure boundary
Tube stabilizers (stakes) (Unit 2)	Structural support
Tube support lattice bars (Unit 1)	Structural support
Tube support plates ~~and anti-vibration bars~~ (Unit 2)	Structural support
Tubesheets	Pressure boundary
Upper and lower shells, secondary head, transition cone	Pressure boundary
Upper vessel clevises and shear keys	Structural support
U-tubes	Pressure boundary Heat transfer

Note:

1. This component type includes the Unit 1 flat fan bars and the Unit 2 v-shaped support pads.

SLRA Table 3.1-1 on page 3.1-23 is revised 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 / TLAA**	**Further Evaluation Recommended**	**Discussion**
3.1-1, 005	Steel, stainless steel, steel (with stainless steel or nickel alloy cladding) steam generator components, pressurizer relief tank components, piping components, bolting	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes (SRP-SLR Section 3.1.2.2.1)	Consistent with NUREG-2191. Cumulative fatigue damage of **steel,** stainless steel**,** and steel (with stainless steel cladding), piping components and bolting is addressed as a TLAA in Section 4.3.1. Cumulative fatigue damage in the pressurizer surge line is addressed with a plant specific AMP. Further evaluation is documented in Section 3.1.2.2.1.

SLRA Table 3.1-1 on pages 3.1-27 is revised 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 / TLAA**	**Further Evaluation Recommended**	**Discussion**
3.1-1, 025	Steel (with nickel alloy cladding) or nickel alloy steam generator primary side components: divider plate and tube-to-tube sheet welds exposed to reactor coolant	Cracking due to primary water SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M19, "Steam Generators." In addition, a plant- specific program is to be evaluated.	Yes (SRP-SLR Sections 3.1.2.2.11.1 and 3.1.2.2.11.2)	Consistent with NUREG-2191. The Steam Generators and Water Chemistry AMPs are used to manage cracking due to primary water SCC in the **tube-to-tubesheet welds and the** Unit 2 divider plates. Further evaluation is documented in Section 3.1.2.2.11.

SLRA Table 3.1-1 Item Number 3.1-1, 072 on page 3.1-38 and Item Number 3.1-1, 076 on page 3.1-39 are revised 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 / TLAA	Further Evaluation Recommended	Discussion
3.1-1, 072	Steel steam generator tube support plate, tube bundle wrapper, supports and mounting hardware exposed to secondary feedwater or steam	Loss of material due to general, pitting, crevice corrosion, erosion, ligament cracking due to corrosion	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry" (corrosion based aging effects and mechanisms only)	No	Consistent with NUREG-2191. The Steam Generators and Water Chemistry AMPs are used to manage loss of material due to general, pitting, and crevice corrosion, erosion, and ligament cracking due to corrosion in the steel steam generator tube bundle wrapper and supports, **feedwater feedring supports, tubesheets,** Unit 1 moisture separators, ~~tubesheets,~~ and Unit 1 feedwater feedring exposed to treated water or steam.
3.1-1, 076	Steel, chrome plated steel, stainless steel, nickel alloy steam generator U-bend supports including anti-vibration bars exposed to secondary feedwater or steam	Loss of material due to wear, fretting	AMP XI.M19, "Steam Generators"	No	Consistent with NUREG-2191. The Steam Generators AMP is used to manage loss of material due to wear and fretting of the stainless steel **anti-vibration bars, the stainless steel** Unit 1 tube support lattice bars, and the stainless steel Unit 2 tube support plates ~~and anti-vibration bars~~ exposed to treated water or steam.

SLRA Table 3.1.2-5 on pages 3.1-89 and 3.1-90 is revised as follows

Table 3.1.2-5: Steam 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**
Anti-vibration bars	**Structural support**	**Stainless steel**	**Treated water (ext) Steam (ext)**	**Loss of material**	**Steam Generators (B.2.3.10)**	**IV.D1.RP-225**	**3.1-1, 076**	**A**
Anti-vibration bars	**Structural support**	**Stainless steel**	**Treated water (ext) Steam (ext)**	**Loss of material**	**Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)**	**IV.D1.RP-226**	**3.1-1, 071**	**A**
Anti-vibration bars	**Structural support**	**Stainless steel**	**Treated water >140°F (ext) Steam (ext)**	**Cracking**	**Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)**	**IV.D1.RP-384**	**3.1-1, 071**	**A**
Blowdown nozzles	Pressure boundary	Carbon steel	Air – indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components (B.2.3.23)	IV.C2.R-431	3.1-1, 124	A
Blowdown nozzles	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.3.1) Water Chemistry (B.2.3.2)	IV.D1.RP-368	3.1-1, 012	C
Blowdown nozzles	Pressure boundary	Carbon steel	Treated water (int)	Wall thinning – FAC	Flow-Accelerated Corrosion (B.2.3.8)	IV.D1.R-37	3.1-1, 061	C
Bolting	Mechanical closure	Carbon steel	Air – indoor uncontrolled (ext)	Loss of material	Bolting Integrity (B.2.3.9)	IV.D1.RP-166	3.1-1, 064	A
Bolting	Mechanical closure	Carbon steel	Air – indoor uncontrolled (ext)	Loss of preload	Bolting Integrity (B.2.3.9)	IV.D1.RP-46	3.1-1, 067	A
Bolting	**Mechanical closure**	**Carbon steel**	**Air – indoor uncontrolled (ext)**	**Cumulative fatigue damage Cracking**	**TLAA – Section 4.3.1, Metal Fatigue of Class 1 Components**	**IV.C2.R-18**	**3.1-1, 005**	**A**

Table 3.1.2-5: Steam 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
Conical skirt	Structural support	Carbon steel	Air – indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components (B.2.3.23)	IV.C2.R-431	3.1-1, 124	C
Divider plates (Unit 1)	Flow distribution	Stainless steel	Reactor coolant (ext)	Cracking	Water Chemistry (B.2.3.2)	IV.D1.RP-17	3.1-1, 086	A
Divider plates (Unit 1)	**Flow distribution**	**Stainless steel**	**Reactor coolant (ext)**	**Loss of material**	**Water Chemistry (B.2.3.2)**	**IV.C2.RP-23**	**3.1-1, 088**	**C**
Divider plates (Unit 2)	Flow distribution	Nickel alloy	Reactor coolant (ext)	Cracking	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-367	3.1-1, 025	A, 1
Divider plates (Unit 2)	Flow distribution	Nickel alloy	Reactor coolant (ext)	Loss of material	Water Chemistry (B.2.3.2)	IV.C2.RP-23	3.1-1, 088	C
Feedwater feedring (Unit 1)	Structural integrity (attached) Direct flow	Carbon steel	Treated water (ext) Steam (ext)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-161	3.1-1, 072	C
Feedwater feedring (Unit 1)	Structural integrity (attached) Direct flow	Carbon steel	Treated water (int)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-161	3.1-1, 072	C
Feedwater feedring (Unit 1)	Structural integrity (attached) Direct flow	Carbon steel	Treated water (int)	Wall thinning – FAC	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-49	3.1-1, 074	A
Feedwater feedring supports	**Structural integrity (attached)**	**Carbon steel**	**Treated water (ext) Steam (ext)**	**Loss of material**	**Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)**	**IV.D1.RP-161**	**3.1-1, 072**	**C**

Table 3.1.2-5: Steam 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**
Feedwater feedring (Unit 2)	Structural integrity (attached) Direct flow	Stainless steel	Treated water (ext) Steam (ext)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-226	3.1-1, 071	C
Feedwater feedring (Unit 2)	Structural integrity (attached) Direct flow	Stainless steel	Treated water (int)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-226	3.1-1, 071	C
Feedwater feedring (Unit 2)	Structural integrity (attached) Direct flow	Stainless steel	Treated water >140°F (ext) Steam (ext)	Cracking	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-384	3.1-1, 071	C
Feedwater feedring (Unit 2)	Structural integrity (attached) Direct flow	Stainless steel	Treated water >140°F (int)	Cracking	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-384	3.1-1, 071	C
Feedwater j- nozzle (Unit 1)	Structural integrity (attached) Direct flow	Nickel alloy	Treated water (ext) Steam (ext)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-226	3.1-1, 071	
Feedwater j- nozzle (Unit 1)	Structural integrity (attached) Direct flow	Nickel alloy	Treated water (int)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-226	3.1-1, 071	C
Feedwater j- nozzle (Unit 1)	Structural integrity (attached) Direct flow	Nickel alloy	Treated water >140°F (ext) Steam (ext)	Cracking	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-384	3.1-1, 071	C

SLRA Table 3.1.2-5 on pages 3.1-97 through 3.1-99 is revised as follows

Table 3.1.2-5: Steam 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**
Stay cylinders (Unit 1)	Pressure boundary	Carbon steel with stainless steel cladding	Reactor coolant (int)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.R-436	3.1-1, 127	C
Stay cylinders (Unit 1)	Pressure boundary	Carbon steel with stainless steel cladding	Reactor coolant (int)	Loss of material	Water Chemistry (B.2.3.2)	IV.C2.RP-23	3.1-1, 088	A
Steam generator components with fatigue analysis	Pressure boundary	Carbon steel with stainless steel cladding Carbon steel with nickel alloy cladding Nickel alloy Stainless steel	Reactor coolant (int)	Cumulative fatigue damage Cracking	TLAA – Section 4.3.1, Metal Fatigue of Class 1 Components	IV.D1.R-221	3.1-1, 008	A
Steam generator components with fatigue analysis	**Pressure boundary**	**Carbon steel**	**Treated water (ext) Steam (ext)**	**Cumulative fatigue damage Cracking**	**TLAA – Section 4.3.1, Metal Fatigue of Class 1 Components**	**IV.D1.R-33**	**3.1-1, 005**	**A**
Steam generator components: external surfaces	Pressure boundary Mechanical closure	Steel	Air with borated water leakage (ext)	Loss of material	Boric Acid Corrosion (B.2.3.4)	IV.D1.R-17	3.1-1, 049	A
Steam outlet nozzle (Unit 2)	Pressure boundary	Carbon steel	Air – indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components (B.2.3.23)	IV.C2.R-431	3.1-1, 124	A

Table 3.1.2-5: Steam 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
Steam outlet nozzle (Unit 2)	Pressure boundary	Carbon steel	Steam (int)	Loss of material	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.3.1) Water Chemistry (B.2.3.2)	IV.D1.RP-368	3.1-1, 012	C
Steam outlet nozzle (Unit 2)	Pressure boundary	Carbon steel	Steam (int)	Wall thinning – FAC	Flow-Accelerated Corrosion (B.2.3.8)	IV.D1.R-37	3.1-1, 061	A
Steam outlet nozzle venturis (Unit 2)	Throttle	Nickel alloy	Steam (ext)	Cracking	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-384	3.1-1, 071	C
Steam outlet nozzle venturis (Unit 2)	Throttle	Nickel alloy	Steam (ext)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-226	3.1-1, 071	C
Steam outlet nozzle with integral flow orifices (Unit 1)	Pressure boundary Throttle	Carbon steel	Air – indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components (B.2.3.23)	IV.C2.R-431	3.1-1, 124	A
Steam outlet nozzle with integral flow orifices (Unit 1)	Pressure boundary Throttle	Carbon steel	Steam (int)	Loss of material	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.3.1) Water Chemistry (B.2.3.2)	IV.D1.RP-368	3.1-1, 012	C
Steam outlet nozzle with integral flow orifices (Unit 1)	Pressure boundary Throttle	Carbon steel	Steam (int)	Wall thinning – FAC	Flow-Accelerated Corrosion (B.2.3.8)	IV.D1.R-37	3.1-1, 061	A

Table 3.1.2-5: Steam 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
Tube bundle wrapper and wrapper supports	Structural support **Direct flow**	Carbon steel	Treated water (ext) Steam (ext)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-161	3.1-1, 072	A
Tube-to-tubesheet welds	**Pressure boundary**	**Nickel alloy**	**Reactor coolant (ext)**	**Cracking**	**Steam Generators (B.2.3.10)** **Water Chemistry (B.2.3.2)**	**IV.D1.RP-385**	**3.1-1, 025**	**A**
Tube-to-tubesheet welds	**Pressure boundary**	**Nickel alloy**	**Reactor coolant (ext)**	**Loss of material**	**Water Chemistry (B.2.3.2)**	**IV.C2.RP-23**	**3.1-1, 088**	**C**
Tube plugs	Pressure boundary	Nickel alloy	Reactor coolant (ext)	Cracking	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.R-40	3.1-1, 070	A
Tube plugs	Pressure boundary	Nickel alloy	Reactor coolant (ext)	Loss of material	Water Chemistry (B.2.3.2)	IV.C2.RP-23	3.1-1, 088	C
Tube stabilizers (stakes) (Unit 2)	Structural support	Nickel alloy	Reactor coolant (ext)	Cracking	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.R-40	3.1-1, 070	C
Tube stabilizers (stakes) (Unit 2)	Structural support	Nickel alloy	Reactor coolant (ext)	Loss of material	Water Chemistry (B.2.3.2)	IV.C2.RP-23	3.1-1, 088	C
Tube stabilizers (stakes) (Unit 2)	Structural support	Stainless steel	Reactor coolant (ext)	Cracking	Water Chemistry (B.2.3.2)	IV.D1.RP-17	3.1-1, 086	C
Tube support lattice bars (Unit 1)	Structural support	Stainless steel	Treated water (ext) Steam (ext)	Loss of material	Steam Generators (B.2.3.10)	IV.D1.RP-225	3.1-1, 076	A
Tube support lattice bars (Unit 1)	Structural support	Stainless steel	Treated water (ext) Steam (ext)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-226	3.1-1, 071	C

Table 3.1.2-5: Steam 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**
Tube support lattice bars (Unit 1)	Structural support	Stainless steel	Treated water >140°F (ext) Steam (ext)	Cracking	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-384	3.1-1, 071	A
Tube support plates and anti-vibration bars (Unit 2)	Structural support	Stainless steel	Treated water (ext) Steam (ext)	Loss of material	Steam Generators (B.2.3.10)	IV.D1.RP-225	3.1-1, 076	A
Tube support plates and anti-vibration bars (Unit 2)	Structural support	Stainless steel	Treated water (ext) Steam (ext)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-226	3.1-1, 071	A
Tube support plates and anti-vibration bars (Unit 2)	Structural support	Stainless steel	Treated water >140°F (ext) Steam (ext)	Cracking	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-384	3.1-1, 071	A
Tubesheets	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.RP-161	3.1-1, 072	C
Tubesheets	Pressure boundary	Carbon steel with nickel alloy cladding	Reactor coolant (int)	Loss of material	Steam Generators (B.2.3.10) Water Chemistry (B.2.3.2)	IV.D1.R-436	3.1-1, 127	A
Upper and lower shells, secondary head, transition cone	Pressure boundary	Carbon steel	Air – indoor uncontrolled (ext)	Loss of material	External Surfaces Monitoring of Mechanical Components (B.2.3.23)	IV.C2.R-431	3.1-1, 124	C

SLRA Table 3.1.2-5 Notes on page 3.1-101 is revised as follows

Plant Specific Notes

1. Per further evaluation 3.1.2.2.11.1 the Unit 2 divider plates are fabricated from **materials that are** ~~non-susceptible~~ **highly resistant to PWSCC** and do not require further aging management.

SLRA Appendix A1, Section 19.2.2.10 on pages A1-18 and A1-19, is revised as follows:

> The PSL Steam Generators AMP, previously the PSL Steam Generator Integrity Program (SGIP), is an existing AMP that manages the aging of steam generator tubes, plugs, divider plate assemblies, **tube-to-tubesheet welds,** heads (interior surfaces of channel or lower heads), tubesheet(s) (primary side), and secondary side components that are contained within the steam generator (i.e., secondary side internals). The AMP is modeled after NEI 97-06 **Revision 3**, "Steam Generator Program Guidelines" and the referenced EPRI Guidelines of NEI 97-06 **Revision 3**.
>
> The establishment of a steam generator program for ensuring steam generator tube integrity is required by the PSL Technical Specifications. Additionally, administrative controls require tube integrity to be maintained to specific performance criteria, condition monitoring requirements, inspection scope and frequency, acceptance criteria for ~~the~~ **tube** plugging ~~or repair of flawed tubes~~, acceptable tube ~~repair~~ **plugging** methods, and leakage monitoring requirements. **Condition monitoring assessments are performed to determine whether tube integrity was met during the prior operating interval. Operational assessments are performed to ensure that tube integrity will be maintained until the next inspection.** The nondestructive examination (NDE) techniques used to inspect steam generator components covered by this AMP are intended to identify components (e.g., tubes, plugs) with degradation that may need to be removed from service (e.g., tubes)~~, repaired,~~ or replaced **(e.g., plugs)**, as appropriate.
>
> Volumetric inspections are performed on steam generator tubes to identify degradation such as PWSCC, outer diameter stress corrosion cracking (ODSCC), and loss of material (mechanical wear) due to foreign objects and tube support structures. General visual inspections are also performed to identify any evidence of cracking, loss of material or corrosion where accessible.
>
> This AMP also performs general visual inspections of the steam generator heads (internal surfaces) looking for evidence of cracking or loss of material (e.g., rust stains). Additionally, the AMP includes foreign material exclusion as a means to inhibit wear degradation, and secondary side maintenance activities, such as sludge lancing, for removing deposits that may contribute to component degradation.

SLRA Appendix A1, Section 19.4, commitment No. 13 portion of Table 19-3 on page A1-71, is revised as follows including the revision incorporated in the previous PSL response to RAI B.2.3.15-1 (Reference ML22192A078):

Table 19-3
List of Unit 1 SLR Commitments and Implementation Schedule

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
13	Steam Generators (19.2.2.10)	XI.M19	a) Continue the existing PSL Steam Generators AMP.	No later than 6 months prior to the SPEO, ~~or no later than the last refueling outage prior to the SPEO~~ i.e.: PSL1: 09/01/2035

SLRA Appendix A2, Section 19.2.2.10, on pages A2-18 and A2-19, is revised as follows:

The PSL Steam Generators AMP, previously the PSL Steam Generator Integrity Program (SGIP), is an existing AMP that manages the aging of steam generator tubes, plugs, divider plate assemblies, **tube-to-tubesheet welds,** heads (interior surfaces of channel or lower heads), tubesheet(s) (primary side), and secondary side components that are contained within the steam generator (i.e., secondary side internals. The AMP is modeled after NEI 97-06 **Revision 3**, "Steam Generator Program Guidelines" and the referenced EPRI Guidelines of NEI 97-06 **Revision 3**.

The establishment of a steam generator program for ensuring steam generator tube integrity is required by the PSL Technical Specifications. Additionally, administrative controls require tube integrity to be maintained to specific performance criteria, condition monitoring requirements, inspection scope and frequency, acceptance criteria for **tube**~~the~~ plugging~~ or repair of flawed tubes~~, acceptable tube ~~repair~~ **plugging** methods, and leakage monitoring requirements. **Condition monitoring assessments are performed to determine whether tube integrity was met during the prior operating interval. Operational assessments are performed to ensure that tube integrity will be maintained until the next inspection.** The nondestructive examination (NDE) techniques used to inspect steam generator components covered by this AMP are intended to identify components (e.g., tubes, plugs) with degradation that may need to be removed from service (e.g., tubes)~~, repaired,~~ or replaced **(e.g., plugs)**, as appropriate.

Volumetric inspections are performed on steam generator tubes to identify degradation such as PWSCC, outer diameter stress corrosion cracking (ODSCC), and loss of material (mechanical wear) due to foreign objects and tube support structures. General visual inspections are also performed to identify any evidence of cracking, loss of material or corrosion where accessible.

This AMP also performs general visual inspections of the steam generator heads (internal surfaces) looking for evidence of cracking or loss of material (e.g., rust stains). Additionally, the AMP includes foreign material exclusion as a means to inhibit wear degradation, and secondary side maintenance activities, such as sludge lancing, for removing deposits that may contribute to component degradation.

SLRA Appendix A2, Section 19.4, commitment No. 13 portion of Table 19-3 on page A2-72 is revised as follows including the revision incorporated in the previous PSL response to RAI B.2.3.15-1 (Reference ML22192A078):

Table 19-3
List of Unit 1 SLR Commitments and Implementation Schedule

No.	Aging Management Program or Activity (Section)	NUREG-2191 Section	Commitment	Implementation Schedule
13	Steam Generators (19.2.2.10)	XI.M19	a) Continue the existing PSL Steam Generators AMP.	No later than 6 months prior to the SPEO**,** ~~or no later than the last refueling outage prior to the SPEO~~ i.e.: PSL2: 10/06/2042

SLRA Section B.2.3.10 pages B-88 through B-91 are revised as follows consistent with the revisions incorporated in the previous PSL response to RAI B.2.3.10-3 (Reference ML22192A078) which removed several references to repair and as such they are not included in this markup:

Program Description

The PSL Steam Generators AMP, previously the PSL Steam Generator Integrity program, is an existing AMP that manages the aging of steam generator tubes, plugs, divider plate assemblies, **tube-to-tubesheet welds,** heads (interior surfaces of channel or lower heads), tubesheet(s) (primary side), and secondary side components that are contained within the steam generator (i.e., secondary side internals). The aging of steam generator pressure vessel welds is managed by other AMPs such as the PSL ASME Section XI ISI, Subsections IWB, IWC, and IWD AMP (Section B.2.3.1), and the PSL Water Chemistry AMP (Section B.2.3.2).

The establishment of a steam generator program for ensuring steam generator tube integrity is required by the PSL Technical Specifications (TS). Additionally, Administrative Control requires tube integrity to be maintained to specific performance criteria, condition monitoring requirements, inspection scope and frequency, acceptance criteria for the plugging of flawed tubes, and leakage monitoring requirements. **Condition monitoring assessments are performed to determine whether tube integrity was met during the prior operating interval. Operational assessments are performed to ensure that tube integrity will be maintained until the next inspection.** The NDE techniques used to inspect steam generator components covered by this AMP are intended to identify components (e.g., tubes, plugs) with degradation that may need to be removed from service (e.g., tubes), ~~repaired,~~ or replaced **(e.g., plugs)**, as appropriate.

The PSL Steam Generators AMP is based on the guidelines provided in NEI 97-06 (Reference 1.6.32), Revision 3, "Steam Generator Program Guidelines." As such, this AMP incorporates the following industry guidelines:

- EPRI 3002007572, "PWR Steam Generator Examination Guidelines" (Reference 1.6.33);
- EPRI 1022832, "PWR Primary-to-Secondary Leak Guidelines" (Reference 1.6.34);
- EPRI 3002000505, "Pressurized Water Reactor Primary Water Chemistry Guidelines";
- EPRI 3002010645, "Pressurized Water Reactor Secondary Water Chemistry Guidelines";
- EPRI 3002007571, "Steam Generator Integrity Assessment Guidelines" (Reference 1.6.35); and

- EPRI 3002007856, "Steam Generator In-Situ Pressure Test Guidelines" (Reference 1.6.36).

Through these guidelines, a balance of prevention, mitigation, inspection, evaluation, and leakage monitoring measures are incorporated. Specifically, this AMP incorporates the following from NEI 97-06:

a. Performance criteria are intended to provide assurance that tube integrity is being maintained consistent with the CLB.

b. Guidance for monitoring and maintaining the tubes, which provides assurance that the performance criteria are met at all times between scheduled tube inspections.

Since degradation of divider plate assemblies, **tube-to-tubesheet welds,** channel heads (internal surfaces), or tubesheets (primary side) may have safety implications, the PSL Steam Generators AMP addresses degradation associated with steam generator tubes, plugs, divider plates, **tube-to-tubesheet welds,** interior surfaces of channel heads, tubesheets (primary side), and secondary side components that are contained within the steam generator (i.e., secondary side internals). This AMP does not include in its scope the steam generator secondary side shell, any nozzles attached to the secondary side shell or steam generator head, or the welds associated with these components. In addition, the scope of this AMP does not include steam generator primary side chamber welds (other than general corrosion of these welds caused as a result of degradation (defects/flaws) in the primary side cladding).

The PSL Steam Generators AMP includes preventive and mitigative actions for addressing degradation. This includes foreign material exclusion as a means to inhibit wear degradation and secondary side maintenance/cleaning activities, such as sludge lancing, for removing deposits that may contribute to degradation. Sludge lancing occurs when the steam generator is inspected, and inspections for remaining foreign material are performed after sludge lancing is completed. Primary side preventive maintenance activities include tube plug inspection, and replacement of tube plugs which are suspected of leakage. Additionally, this AMP works in conjunction with the PSL Water Chemistry AMP (Section B.2.3.2), which monitors and maintains water chemistry to reduce susceptibility to SCC or IGSCC.

The procedures associated with this AMP provide parameters to be monitored or inspected except for steam generator divider plates, **tube-to-tubesheet welds,** channel heads, and tubesheets. For these latter components, visual inspections are performed at least every 72 effective full power months or every third refueling outage (RFO), whichever results in more frequent inspections. These inspections of the steam generator head interior surfaces, including the divider plate, are intended to identify signs that cracking, or loss of material may be occurring (e.g., through identification of rust stains).

Condition monitoring assessments are performed to determine whether the structural and accident-induced leakage performance criteria were satisfied during the prior operating interval. Operational assessments are performed to verify that structural and leakage integrity will be maintained for the planned operating interval before the next inspection. If tube integrity cannot be maintained for the planned operating interval before the next inspection, corrective actions are taken in accordance with the PSL CAP. Comparisons of the results of the condition monitoring assessment to the predictions of the previous operational assessment are performed to evaluate the adequacy of the previous operational assessment methodology. If the operational assessment was not conservative in terms of the number and/or severity of the condition, corrective actions are taken in accordance with the Steam Generator Integrity Assessment Guidelines. Assessment of tube integrity and plugging criteria of flawed tubes is in accordance with the PSL TS.

Degraded plugs, divider plates, **tube-to-tubesheet welds,** channel heads (interior surfaces), tubesheets (primary side), and secondary side internals are evaluated for continued acceptability on a case-by-case basis. The intent of all evaluations is to provide reasonable assurance that the components will continue to perform their functions consistent with the design and licensing basis of the facility and will not affect the integrity of other components (e.g., by generating loose parts). In addition, when degradation of the steam generator tubes is identified, the TS specified actions are followed. For degradation of other components, the appropriate corrective action is evaluated per NEI 97-06 and the associated EPRI guidelines, the ASME Code Section XI, 10 CFR 50.65, and 10 CFR Part 50, Appendix B, as appropriate.

Procedures implement the performance criteria for tube integrity, condition monitoring requirements, inspection scope and frequency, acceptance criteria for the plugging ~~or repair~~ of flawed tubes, ~~acceptable tube repair methods,~~ leakage monitoring requirements, and operational leakage and accident-induced leakage requirements from the TS.

Steam generator tubes not meeting the TS limits for continued operation are removed from service by installation of tube plugs. This plug installation redefines the reactor coolant pressure boundary and loss of steam generator tube plug integrity can impact the ability of the steam generators to perform its intended function if permitted to continue without corrective action. Tube plugs installed are fabricated from heat treated Inconel Alloy 690 material. Although these plugs have a high resistance to primary water stress corrosion cracking (PWSCC), they are routinely inspected.

Aging is managed through assessment of potential degradation mechanisms, inspections, tube integrity assessments, plugging ~~and repairs~~, Primary-to-Secondary Leak Monitoring, maintenance of secondary-side component integrity, primary-side and secondary-side water chemistry, and foreign material exclusion.

Volumetric inspections are performed to identify degradations of steam generator tubes such as PWSCC, outer diameter stress corrosion cracking (ODSCC), and loss of material due to foreign objects and tube support structures. Visual inspections are performed on other primary-side and secondary-side components. The visual inspections of the primary-side **and secondary side** components listed above are performed in accordance with the Degradation Assessment (DA) that is prepared as each steam generator is scheduled for examination.

The PSL Steam Generators AMP includes a DA in accordance with the requirements defined in the EPRI Steam Generator Integrity Assessment Guidelines; a DA is performed to determine the type and location of flaws to which the tube may be susceptible, and implementation of inspection methods capable of detecting those forms of degradation are addressed. The DA includes a review of applicable industry OE, as well as plant-specific OE which has occurred since the previous DA was performed.

A condition monitoring assessment is performed at the conclusion of each inspection to determine whether inspection criteria is met. A forward-looking evaluation, operational assessment is used to predict that the structural integrity and accident leakage performance will be acceptable during the operating interval until the next in-service inspection.

SLRA Section B.2.3.10 page B-92 and B-93 is revised as follows including revisions incorporated in the previous PSL response to RAI B.2.3.10-2 (Reference ML22192A078):

Plant Specific Operating Experience

A program health report review was performed covering the range of the first quarter of 2015 through the fourth quarter 2020. Health report attributes including owner proficiency, infrastructure, implementation, and equipment were Green for the majority of the review period. However, high tubing plugging rate in Unit 2 steam generator ~~B~~**A** due to mechanical wear at AVBs, and water hammer condition vulnerability on Unit 2 steam generators were gaps to Green. The plugging rate is being monitored during every outage. **As a corrective action measure to address a prior history of condensation induced water hammer events, v**isual inspection of the feedring and its supports in the Unit 2 steam generators is **currently being** performed **every outage in which SG ECT inspection is performed as well as in any outage where the water-hammer monitoring criteria was met during the prior operating cycle**. **Due to design differences the Unit 1 feedring supports are not completely accessible for inspection. However, limited Unit 1 feedwater feedring support inspections are currently performed at least two times during each steam generator eddy current tube inspection interval and have not revealed any support degradation.**

SLRA Section B.2.3.20 page B-174 are revised as follows:

Recent industry OE was reviewed from the SLR Safety Evaluation Reports for the first three submitted SLRAs (Turkey Point, Peach Bottom, and Surry). Two main points of interest include (a) ensuring that the PSL One-Time Inspection AMP is not used for managing aging of systems or components with known age-related degradation issues, and (b) ensuring that one-time inspections are completed on steam generator components, as necessary. The steam generator inspection locations of interest for the One-Time Inspection AMP are the divider plate assemblies (based on evaluation per EPRI 3002002850) and any circumferential transition cone welds (if replacement activities resulted in a circumferential field weld).

- ~~The PSL steam generator divider plates are constructed of materials not susceptible to primary water stress corrosion cracking.~~ **The PSL Unit 1 RSG design includes a floating divider plate that has no crack initiation point. The PSL Unit 2 RSG divider plates are Alloy 690 and Alloy 690 type weld materials.** Therefore, the PSL Unit 1 and Unit 2 steam generator divider plates do not require inspection per the PSL One-Time Inspection AMP.