

**NORTH ANNA POWER STATION, UNITS 1 AND 2 (NAPS)
SUBSEQUENT LICENSE RENEWAL APPLICATION (SLRA)**

Requests that Were Withdrawn after clarification calls

The following request for additional information (RAIs) and request for confirmation of information (RCI) were withdrawn and not issued final. Virginia Electric and Power Company (Dominion Energy) was able to point the staff to information on the portal or on the docket.

1. AMP B2.1.10, Steam Generators

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 (CLB) for the period of extended operation. One of the findings that the U.S. Nuclear Regulatory Commission 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 the 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 CLB. In order to complete its review and enable making a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

RAI B2.1.10-1 (eRAI Letter #152, Question #248)

Background:

Section B2.1.10, "Steam Generators," of the Subsequent License Renewal Application (SLRA) states that the Steam Generators program is consistent with Aging Management Program (AMP) XI.M19, "Steam Generators," in NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report – Final Report," dated July 2017 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. [ML17187A031](#) (Volume 1) and [ML17187A204](#) (Volume 2)), without exceptions and enhancements. Table 3.1.2-4, "Reactor Vessel, Internals, and Reactor Coolant System – Steam Generators – Aging Management Evaluation," in the SLRA does not include items for managing cracking of the feedwater distribution ring and J-nozzles.

Section 3.1, "Aging Management of Reactor Vessel, Internals, and Reactor Coolant System," in NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants – Final Report," dated July 2017 (ADAMS Accession No. [ML17188A158](#)), addresses the aging management review (AMR) items associated with certain steam generator components. This section includes the recommended AMPs to manage aging effects associated with steel steam generator components exposed to feedwater.

Issue:

Table 3.1.2-4 in the SLRA does not cite programs to manage cracking for the feedwater distribution ring and J-nozzles, and only cites AMPs XI.M19 and XI.M2, "Water Chemistry," to manage loss of material and wall thinning for the steel feedwater distribution ring and J-nozzles exposed to feedwater.

The GALL-SLR identifies cracking as an applicable aging effect for steel. For example, GALL-SLR Item RP-384 identifies cracking of steel exposed to secondary feedwater or steam as an applicable aging effect to be managed using AMP XI.19 and AMP XI.M2.

Request:

Explain which program(s) will be used to manage cracking in steel feedwater distribution ring and J nozzles exposed to feedwater or state the basis for why a program is not necessary and revise Section B2.1.10 to state the Steam Generators program is consistent with an exception.

2. SLRA AMP B2.1.15, Fire Protection

RAI B2.1.15-2 (eRAI Letter #167, eRAI Number #261)

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

SLR-ISG-Mechanical-2020-XX proposed to add AMR Items VII.G.A-805, VII.G.A-806, and VII.G.A-807 to Table VII.G in NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," and Table 3.3-1 in NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants." The proposed aging effects for cementitious coatings, silicates, and subliming compounds used as fireproofing/fire barriers exposed to air were loss of material, change in material properties, cracking, delamination, and separation. (NOTE: SLR-ISG-2021-02-Mechanical, "Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance," was issued in February 2021 and is available in the Agencywide Documents Access and Management System under Accession No. ML20181A434).

These aging effects are consistent with Section 6, "Fire Barriers," of EPRI 3002013084, "Long-Term Operations: Subsequent License Renewal Aging Affects for Structures and Structural Components (Structural Tools)," November 2018.

Table 5-3, "Structural Tools Comparison with GALL-SLR-Structural Concrete Members," in Section 5, "Structural Concrete Members," of EPRI 3002013084 provides applicability criteria for aging effects/mechanisms for concrete structures and concrete components. Table 5-3 notes that change in material properties due to elevated temperature is applicable for concrete structures and concrete components when the general area temperature exceeds 150°F (65.6°C) or when the local area temperature exceeds 200°F (93.3°C). Therefore, applicants need to make a plant-specific determination of whether concrete structures and concrete components are exposed to temperatures exceeding these values. This is consistent with further evaluations related to concrete exposed to elevated temperatures recommended in Chapter 3.5, "Aging Management of Containments, Structures, and Component Supports," of NUREG-2192. Table 5-3 of EPRI 3002013084 also notes that temperatures exceeding these values potentially result in loss of material and cracking of concrete structures and concrete components.

Table 6-3, "Structural Tools Comparison with GALL-SLR-Fire Barriers," in Section 6 of EPRI 3002013084 provides applicability criteria for aging effects/mechanisms for fire barrier materials. Table 6-3 notes that change in material properties due to gamma irradiation exposure is applicable for cementitious coatings, rigid fire boards (subliming compounds), and fibrous fire wraps (silicates) when exposures exceed 106 rads. A plant-specific determination would need to be made on whether cementitious coatings, subliming compounds, and silicates used as fireproofing/fire barriers would be exposed to greater than 106 rads.

Delamination and separation as applicable aging affects are discussed in Section 6 of EPRI 3002013084.

Issue

Section 3.5.2.1.39 does not include change in material properties, delamination, and separation as aging effects associated with the miscellaneous structural commodities subcomponents.

Table 3.5.2-39 includes cracking and loss of material for cementitious coatings, silicates, and subliming compounds used as fireproofing/fire barriers exposed to air. Note 2 to Table 3.5.2-39 that is associated with each of these materials states, "Change in material properties is an aging effect not being managed."

Request

1. Please discuss whether any cementitious coatings, silicates, or subliming compounds used as fireproofing/fire barriers exposed to air will be in general areas where the temperature exceeds 150°F (65.6°C) or in local areas where the temperature exceeds 200°F (93.3°C). If any of these fireproofing/fire barrier materials will be in areas exceeding the general and local area temperatures, then explain why change in material properties due to elevated temperature is not an applicable aging effect/mechanism that requires management.
2. Please discuss whether the gamma irradiation exposure for any cementitious coatings, silicates, or subliming compounds used as fireproofing/fire barriers exposed to air will exceed 106 rads. If the gamma irradiation exposure for any of these fireproofing/fire barrier

materials will exceed 106 rads, then explain why change in material properties due to gamma irradiation exposure is not an applicable aging effect/mechanism that requires management.

3. Please discuss why delamination and separation were not identified as applicable aging effects for cementitious coatings, silicates, and subliming compounds used as fireproofing/fire barriers exposed to air.

3. SLRA Section 2.3.1, Reactor Vessel, Internals, and Reactor Coolant System

Regulatory Basis

The plant-specific CLB must be maintained during the subsequent renewal term in the same manner and to the same extent as during the extended and original licensing term. In implementing these two principles, the rule in 10 CFR 54.4, defines the scope of license renewal as those plant SSCs (a) that are safety-related; (b) whose failure could prevent the accomplishment of safety-related functions; and (c) that are relied on to demonstrate compliance with the NRC's regulations for fire protection, environmental qualification, pressurized thermal shock, anticipated transients without scram, and station blackout.

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

Regulation

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

- (a) Plant systems, structures, and components within the scope of this part are—
 - (1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions—
 - (i) The integrity of the reactor coolant pressure boundary;
 - (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
 - (iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in § 50.34(a)(1), § 50.67(b)(2), or § 100.11 of this chapter, as applicable. ...
 - (2) All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) of this section.

(3) All systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63).

(b) The intended functions that these systems, structures, and components must be shown to fulfill in § 54.21 are those functions that are the bases for including them within the scope of license renewal as specified in paragraphs (a)(1) - (3) of this section.

RAI 2.3.1-1

Please provide justification that the intended function for the Seal Table in Reactor Vessel (SLRA Table 2.3.1-1) is for "Structural Support" instead of "Pressure Boundary."

RAI 2.3.1-2

Regarding SLRA Table 2.3.1-2- Reactor Vessel Internals, please confirm that the following components: Control Rod Guide Tube Split Pins, Head Cooling Spray Nozzles, Lower Support Plate and Columns, Secondary Support Assembly and Upper Support Plate and Columns have been evaluated against the scoping criteria. Provide justification for not including these components in SLRA Table 2.3.1-2 or being categorized as "No additional measures" components in Table 2.3.1-2.

RAI 2.3.1-3

Regarding SLRA Table 2.3.1-3- Reactor Coolant - Reactor Cavity Seals, confirm that the reactor cavity seals have been evaluated against the scoping criteria. Provide justification for not including these components in SLRA Table 2.3.1-3.

RAI 2.3.1-4

Regarding SLRA Table 2.3.1-3- Reactor Coolant - Flame Arrestor, provide justification that the intended function for the flame arrestor is "Pressure Boundary" instead of "Fire barrier" that will provide rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant.

RAI 2.3.1-5

Regarding SLRA Table 2.3.1-3- Reactor Coolant - Pressurizer (Thermal Sleeve), confirm that the intended function for both Pressurizer (spray nozzle thermal sleeve) and Pressurizer (surge nozzle thermal sleeve) is to "Limit Thermal Cycling" and not "Pressure Boundary."

RAI 2.3.1-6

Regarding SLRA Table 2.3.1-3- Reactor Coolant - Pressurizer (Pressurizer Spray Head),, provide justification and confirm that the pressurizer spray head is excluded from the scope by specifically addressing the following concerns due to the guidance presented in the Standard Review Plan (NUREG-2192) Table 2.3-1. If the spray head meets any one of the situations as described below, it may require the inclusion of pressurizer spray head in the scope:

- a. During fire events as required by 10 CFR 50 Appendix R evaluation, the pressurizer spray head is used to achieve the reactor cooldown to meet the Technical Specifications LCO 3.4.3.
- b. If the spray head is failed, it will damage the surrounding safety-related components.

4. SLRA AMP B2.1.7, PWR Reactor Vessel Internals

Background and Regulatory Basis

Paragraph 54.21(a)(3) of 10 CFR states “[f]or each structure and component identified in paragraph (a)(1) of this section, demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation.”

The applicant developed its AMR results for the PWR vessel internal (PWRVI) components based on the guidance in the GALL-SLR and SRP-SLR reports. The NRC staff is reviewing the applicant’s AMR results, as documented in SLRA Table 3.1.1 (Table 1), SLRA Table 3.1.2-2 (Table 2), and associated AMR further evaluations (FEs) in SLRA Sections 3.1.2.2.9 and 3.1.2.2.10, Subitem 2 (control rod drive penetration nozzle thermal sleeves).

In order to have reasonable assurance that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, the staff is reviewing the applicant’s use of the SRP-SLR and GALL-SLR report recommendations (including deviations from these documents) for the plant-specific AMR results. The staff’s review of the AMR results for PWRVI components addresses their consistency with the inspection and evaluation (I&E) guidelines in the PWRVI AMP described in SLRA Section B2.1.7; the SLRA AMP is based on the generic I&E guidelines in MRP-227, Revision 1-A (ADAMS Accession No. ML20175A112), as supplemented by the results of the applicant’s MRP-227, Rev. 1-A Gap Analysis.

RAI B2.1.7-2 - Clevis Insert Bolts and Dowels (eRAI Letter #182, Question #278)

Issue

The applicant’s PWRVI AMP categorizes the clevis insert bolts and dowels as Primary components. This categorization is based on the results of the applicant’s MRP-227, Rev. 1-A Gap Analysis and follows industry recommendations in the SLR interim guidance document, MRP 2018-022 (ADAMS Accession No. ML19081A061).

SLRA Table 1 and Table 2 show that the clevis insert bolts and dowels are categorized as “Existing Programs” components rather than Primary components. Specifically, SLRA Table 2 shows that cracking for these items is being managed consistent with GALL-SLR Item IV.B2.RP-399 (Generic Note A) and SLRA Table 1, Item 3.1.1-053c. Loss of material due to wear is listed as being managed per GALL-SLR Item IV.B2.RP-356 (Generic Note C) and SLRA Table 1, Item 3.1.1-028. The “Discussion” column in SLRA Table 1 Item 3.1.1-028 further indicates that this item is applied for managing loss of material due to wear for the clevis insert bolts and dowels, rather than the CRGT support pins, and it is under Existing Programs components.

The staff is verifying that the SLRA Table 2 AMR results for the PWRVI components use SLRA Table 1 items that are reasonably consistent with the AMP I&E guidelines for managing the applicable aging effects. This includes consistency in the PWRVI component categorizations – i.e., Primary, Expansion, Existing Programs, and No Additional Measures. For example, SLRA Table 1 Items 3.1.1-053a and 3.1.1-059a may be applied in SLRA Table 2 for managing applicable aging effects for Westinghouse Primary components, as designated in the PWRVI AMP.

Request

Address whether revisions to the SLRA Table 2 AMR results are needed to address categorization of clevis insert and dowels as Westinghouse Primary components, based on application of SLRA Table 1 Items 3.1.1-053a and 3.1.1-059a.

RAI B2.1.7-3 - CRGT Support Pins (eRAI Letter #182, Question #279)

Issue

SRP-SLR Table 3.1-1, Item ID 028 is reserved for CRGT support pins. However, SLRA Table 1 and Table 2 do not show any AMR result for the CRGT support pins. Specifically, SLRA Table 1 designates Item 3.1.1-028 for clevis insert bolts and dowels rather than CRGT support pins. Since the CRGT support pins are included in the scope of PWRVI components addressed in the AMP, an AMR result may be needed for the CRGT support pins to comply 10 CFR 54.21. The staff notes that the NRC recently published SLR interim staff guidance (ISG) in SLR-ISG-2021-01-PWRVI (ADAMS Accession No. ML20217L203), providing updated aging management criteria for PWRVI components. The ISG updates to Item ID 028 in SRP-SLR Table 3.1-1 include a set of optional recommendations for documenting the AMR results for the CRGT support pins.

Request

For the CRGT support pins, address whether a revision to the “Discussion” column in SLRA Table 1, Item 3.1.1-028 and an addition to SLRA Table 2 are needed to address the AMR results for the North Anna CRGT support pins.

RAI B2.1.7-4 - Baffle Plates and BMI Column Bodies (eRAI Letter #182, Question #280)

Issue

SLRA Table 2 shows that GALL-SLR Item IV.B2.RP-388 is applied with Generic Note A for managing loss of fracture toughness for the baffle plates. However, this GALL-SLR item addresses loss of fracture toughness for core barrel girth welds rather than the baffle plates. Since the GALL-SLR report does not have any Table IV.B2 item for loss of fracture toughness for baffle plates, Item IV.B2.RP-388 may be applied to this SLRA Table 2 result, but a different generic note (e.g., “C”) may need to be selected.

SLRA Table 2 shows that GALL-SLR Item IV.B2.RP-295 is applied with Generic Note A for managing loss of fracture toughness for the BMI column bodies. However, GALL-SLR Item IV.B2.RP-295 addresses loss of fracture toughness for non-CASS lower support column bodies rather than BMI column bodies. GALL-SLR Item IV.B2.RP-292 addresses loss of fracture

toughness for BMI column bodies and therefore may be suitable to apply to this SLRA Table 2 item with Generic Note A.

Request

Address whether revisions to these two SLRA Table 2 items are needed to address the issue with application of the GALL-SLR Table IV.B2 items.

RAI B2.1.7-5 - CRGT Lower Flange Welds (eRAI Letter #182, Question #281)

Issue

For the CRGT lower flange welds, the applicant's PWRVI AMP follows the I&E guidelines in MRP-227, Rev. 1-A. Accordingly, the AMP includes CRGT lower flange welds in both the Primary components for peripheral CRGT assemblies, and in the Expansion components for the remaining non-peripheral CRGT assemblies.

The SLRA Table 2 AMR results identify the CRGT "lower flange" (as opposed to CRGT "lower flange weld"). These results only show that this is a Westinghouse Primary component, based on application of SLRA Table 1 Items 3.1.1-053a and 3.1.1-059a to manage cracking and loss of fracture toughness, respectively. These AMR results do not address the remaining non-peripheral CRGT assemblies under Westinghouse Expansion components. These SLRA Table 2 results also cite the GALL-SLR items, IV.B2.RP-298 for managing cracking and IV.B2.RP-297 for managing loss of fracture toughness, invoking Generic Note C instead of Generic Note A.

The staff is verifying that the SLRA Table 2 AMR results for the PWRVI components are reasonably consistent with the AMP I&E guidelines for managing the applicable aging effects. This includes consistency in the PWRVI component categorizations – i.e., Primary, Expansion, Existing Programs, and No Additional Measures. The staff also verifies that SLRA Table 2 identifies the component consistent with the AMP that is credited in the AMR result. For example, CRGT "lower flange weld" may need to be identified in the Table 2 AMR result consistent with the AMP using generic notation (e.g., A, B, C, D, or E, etc.) that addresses its degree of consistency with the applicable GALL-SLR item.

Request

For the CRGT lower flange welds, please address whether revisions and/or additions to the SLRA Table 2 items are needed to address the issues discussed above.

RAI B2.1.7-6 - Core Barrel Lower Flange Weld and Upper Girth Weld (eRAI Letter #182, Question #282)

Issue

The applicant's PWRVI AMP categorizes the core barrel lower flange weld and core barrel upper girth weld as Expansion components. This categorization is based on the AMP's implementation of MRP-227, Rev. 1-A. However, the SLRA Table 2 AMR results for the core barrel lower flange weld and core barrel upper girth weld show that these are Westinghouse Primary components, based on application of SLRA Table 1 Item 3.1.1-053a to manage

cracking, and consistent with the cited GALL-SLR items – IV.B2.RP-280 for the lower flange weld and IV.B2.RP-387 for the upper girth weld (Generic Note A for both).

The staff is verifying that the SLRA Table 2 AMR results for the PWRVI components are reasonably consistent with the AMP I&E guidelines for managing the applicable aging effects. This includes consistency in the PWRVI component categorizations – i.e., Primary, Expansion, Existing Programs, and No Additional Measures.

Request

For the core barrel lower flange weld and core barrel upper girth weld, please address whether revisions to the SLRA Table 2 items are needed to address the issues discussed above.

RAI B2.1.7-7 - No Additional Measures Components (eRAI Letter #182, Question #283)

Issue

The SLRA Table 2 AMR results include four line items for No Additional Measures components. These AMR results include the material type, environment, aging effect requiring management (“None”), the AMP (the PWRVI AMP), and cite applicable GALL-SLR and SLRA Table 1 items. However, these four SLRA Table 2 AMR items do not identify the actual No Additional Measures components – instead, they cite Plant-Specific Note 1, which states, “No additional measures components are itemized in the MRP-227-A Gap Analysis.”

As part of its review of the PWRVI AMP, staff conducted an audit of the applicant’s AMP documentation. This audit included review of the PWRVI AMP Evaluation Report (which included the gap analysis) and a listing of North Anna PWRVI components that were evaluated for the AMP. The specific PWRVI No Additional Measures components are not identified in any of these documents.

Request

Identify the specific No Additional Measures components.

RAI B2.1.7-8 - AMR Further Evaluation for PWRVI Components (eRAI Letter #182, Question #284)

Issue

SLRA Section 3.1.2.2.9 cites EPRI Topical Report (TR) 1022863, “Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-A)” December 2011 (ADAMS Accession No. ML120170453) as the 60-year basis for the SLRA AMP. This section also states that the December 2011 MRP-227-A report “provides the industry’s current aging management recommendations for the reactor vessel internal (RVI) components that are included in the design of a PWR facility.”

The PWRVI AMP described in SLRA Section B2.1.7, SLRA Section A1.7 (UFSAR Supplement section for PWRVI AMP), and SLRA Table A4.0-1 Commitment No. 7, as amended by letter dated February 4, 2021 (ADAMS Accession No. ML21035A303), are all based on the implementation of MRP-227, Revision 1-A as the 60-year basis for the SLRA AMP rather than the December 2011 MRP-227-A report.

Request

Address whether SLRA revisions are needed to resolve the discrepancy between the MRP-227 version cited in SLRA Section 3.1.2.2.9 and that cited in SLRA Sections B2.1.7, A1.7, and Table A4.0-1 Commitment No. 7, as amended by letter dated February 4, 2021.

5. RCI Withdrawn

RCI No.	Description
B2.1.34-B	Based on the review of SLRA Section B2.1.34, "Structures Monitoring," the staff verified that the spring hanger component listed in SLRA Table 3.5.2-38 is being added to the scope of the program under the "components support members" specified in Enhancement 2. Confirm that the spring hanger component listed in SLRA Table 3.5.2-38 is being added to the scope of the program under the "components support members" specified in Enhancement 2.