POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2 (PBN)
SUBSEQUENT LICENSE RENEWAL APPLICATION (SLRA)
DRAFT REQUESTS FOR ADDITIONAL INFORMATION (RAIS)
SAFETY - SET 2

Contents

SLRA Section 2.3.3.6, “Fire Protection”

DRAI 2.3.3.6-1

Regulatory Basis

10 CFR 54.4, “Scope,” defines the scope of license renewal as those plant SSCs, as well as the process used to identify the SSCs that are subject to an aging management review, as required by 10 CFR 54.21(a)(1); (a) that are safety-related; (b) whose failure could affect 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 particular, Section 54.4(a)(3) of 10 CFR includes within the scope of license renewal all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with Commission’s regulations for fire protection, 10 CFR 50.48.

Issue

In License Amendment Request 271, Transition to 10 CFR 50.48(c) – National Fire Protection Association (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition (ADAMS Accession No. ML13182A351) Table 4-3, “Summary of NFPA 805 Compliance Basis and Required Fire Protection Systems and Features,” indicates that a dry chemical extinguishing system protects fire area A01-E, Fire Zones 322 and 547. It appears to the NRC staff that the dry chemical extinguishing system is necessary to meet the requirement of 10 CFR 50.48. However, the staff is unable to find information in the subsequent license renewal application indicating that this system is within the scope of the license renewal.

Request

Verify whether the dry chemical extinguishing system is within the scope of license renewal in accordance with 10 CFR 54.4(a) and whether it is subject to an aging management review

(AMR) in accordance with 10 CFR 54.21(a)(1), because it appears to be necessary to meet the requirements of 10 CFR 50.48. If it is not within the scope of license renewal and is not subject to an AMR, provide justification for the exclusion.

SLRA Section 3.5.2.2.2.4, "Cracking Due to Stress Corrosion Cracking and Loss of Material Due to Pitting and Crevice Corrosion" (Further Evaluation)

Regulatory Basis

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

DRAI 3.5.2.2.2.4-1

Background

AMR item 3.5.1-099 is applied to manage aging effects of loss of material due to pitting and crevice corrosion, cracking due to stress corrosion cracking (SCC) for aluminum and stainless steel (SS) support members, welds, bolted connections or anchorage to structure for ASME Class 1, 2, 3 or MC (metal containments) components. SLRA Table 3.5-1, as amended by Attachment 29 of SLRA Supplement 1 dated April 21, 2021 (ADAMS Accession No. ML21111A155), states that AMR item 3.5.1-099 is not used, and the aging effects of loss of material and cracking of aluminum and SS supports and other structural components are addressed in AMR item 3.5.1-100.

Issue

Based on the staff's review of the information provided in the SLRA, it is not clear how components associated with item 3.5.1-099 were addressed under AMR item 3.5.1, 100 or if the AMR item is not applicable for the site. The staff noted that table 2 AMR items associated with item 3.5.1-100 do not include any aluminum and SS support members, welds, bolted connections or anchorage to structure for ASME Class 1, 2, 3 or MC components as suggested in the discussion section of Table 1 item 3.5.1-099.

Request

Clarify whether item 3.5.1-099 is not applicable (i.e. this component/environment/aging effects does not exist at the site) or not used (i.e. another line item is used to manage the same aging effects for these components). If not applicable, provide a technical justification. Provide revised SLRA Tables 3.5-1 and 3.5-2 accordingly, if necessary.

DRAI 3.5.2.2.2.4-2

Background

Table 3.5.2-1 AMR line item, "Liners (refueling cavity) and covers (sand box, Unit 1 sump A strainer)" components "Stainless steel" material associate with Table 1 item 3.5.1-100, describes several intended functions including "pressure boundary." The AMR line item identifies the Structures Monitoring program to manage aging effect.

As discussed in NUREG-2221, the staff finds the use of visual inspection for the AMR line items as acceptable when performing periodic inspections to manage the aging effects for structural supports, and when it can easily be demonstrated that, for these type of structural supports, minor loss of material or cracking that might not be visually detectable during a walkdown inspection will likely not impact the intended function of the support.

Issue

It is not clear whether regular visual inspections through the Structural Monitoring program are sufficient to detect small cracks from SCC (usually too small to be seen) to retain the pressure boundary intended function associated with the components described above.

Request

Clarify if “pressure boundary” is an intended function for each of the components associated with the line item. If so, justify how regular visual inspections are adequate to detect small cracks from SCC so that the pressure boundary intended function will be maintained for the subsequent period of extended operation.

SLRA Section B.2.2.1, “Fatigue Monitoring”

DRAI B.2.2.1-1

Regulatory Basis

10 CFR 54.21(a)(3) requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. 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 “parameters monitored or inspected” program element of GALL-SLR AMP X.M1, “Fatigue Monitoring,” states that the program monitors all applicable plant transients that cause cyclic strains and contribute to fatigue, as specified in the fatigue analyses, and monitors or validates appropriate environmental parameters that contribute to F_{en} values. SLRA Section B.2.2.1 addresses the Fatigue Monitoring program as a consistent program with GALL-SLR AMP X.M1.

SLRA Section B.2.2.1 states that SLRA Table 4.3.1-1 identifies the design cycles utilized in the component fatigue analyses and concludes that the projected cycles through the subsequent period of extended operation (SPEO) will not exceed the design cycles assumed in the

analyses. In a similar manner, the fatigue transients and their allowable cycle numbers are provided in SLRA Appendix A, UFSAR supplement, Table 4.1-8.

Issue

Generally speaking, the UFSAR supplement table in SLRA Appendix A is less comprehensive than SLRA Table 4.3.1-1 in terms of the design transients identified in the tables. For example, SLRA Appendix A, UFSAR supplement, Table 4.1-8 does not identify the accumulator safety injection, loss of charging flow, loss of letdown flow, or pressurizer heatup transient as a design transient, while these transients are included in SLRA Table 4.3.1-1.

In addition, SLRA Appendix A, UFSAR supplement, Table 4.1-8 specifically identifies the more limiting allowable cycle numbers for RVI baffle bolts (also called baffle former bolts) as well as the general limits to the design transient cycle numbers that are applied to the other reactor vessel internal (RVI) and piping components. In contrast, the specific allowable cycle numbers for the baffle former bolts are not described in SLRA Table 4.3.1-1.

Request

1. Reconcile the difference between SLRA Table 4.3-1 and SLRA Appendix A, Table 4.1-8 regarding the allowable transient cycles for the RVI baffle former bolts.

Explain why the design transients listed in SLRA Table 4.1.3-1 and SLRA Appendix A, Table 4.1-8 are different. If the difference cannot be justified, identify a consistent design transient table for both SLRA Section 4.3.1 and SLRA Appendix A.

SLRA Section B.2.3.2, “Water Chemistry”

DRAI B.2.3.2-1

Regulatory Basis

10 CFR 54.21(a)(3) requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions

have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. 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 last row of SLRA Table 3.3.2-1, "Chemical Volume and Control – Summary of Aging Management Evaluation," is for loss of material for a stainless steel valve body in treated water. The NUREG-2191 Item listed is VIII.D1.SP-87, and the SLRA Table 1 Item listed is 3.3-1, 085. The use of Item 3.3-1, 085 appears to be an error because it corresponds to hardening or loss of strength for elastomer materials.

Issue

The reference to Table 1 Item 3.3-1, 085 in the last row of SLRA Table 3.3.2-1 appears to be an error because it applies to elastomer materials and would not effectively manage loss of material for stainless steel valve bodies.

Request

Please provide the correct information for the entries in the last row of Table 3.3.2-1, Page 3.3-103 of the SLRA.

SLRA Section B.2.3.8, "Flow Accelerated Corrosion"

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.

DRAI B.2.3.8-1 (Revision Level of NSAC-202L)

Background

During the audit of the Flow-Accelerated Corrosion (FAC) program, the NRC staff sought clarification on which revision of EPRI 3002000563, "Recommendations for an Effective Flow-Accelerated Corrosion Program" (NSAC-202L), the Point Beach Nuclear Plant (PBN) FAC program incorporates.

Commitments a) and d) for No. 12, Flow-Accelerated Corrosion (16.2.2.8), in Subsequent License Renewal Application (SLRA) Table 16-3, "List of SLR Commitments and Implementation Schedule;" and the Enhancements to Element 1, "Scope of Program," and Element 4, "Detection of Aging Effects," as described in SLRA Section B.2.3.8, "Flow-Accelerated Corrosion," were revised in SLRA Supplement 1, dated April 21, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. 21111A155), to reference Revision 4 of NSAC-202L.

Issue

Section 16.2.2.8, "Flow-Accelerated Corrosion," of the Updated Final Safety Analysis Report (UFSAR) Supplement in Appendix A of the SLRA states that the PBN FAC program is based on Revision 4 of NSAC-202L. However, Reference 61 in Section 16.5, "References," of the UFSAR Supplement is for Revision 3 of NSAC-202L.

Request

Please provide a basis to justify the discrepancy between Sections 16.2.2.8 and Reference 61 in Section 16.5 of the UFSAR with regards to the revision of NSAC-202L. Alternatively, revise Section 16.5 of the UFSAR Supplement to be consistent with the changes previously made for the revision level of NSAC-202L.

DRAI B.2.3.8-2 (Software Quality Assurance)

Background

The “scope of program” program element for Aging Management Program (AMP) XI.M17, “Flow-Accelerated Corrosion,” in Volume 2 of NUREG-2191, “Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report – Final Report” (ADAMS Accession No. ML17187A204), states that the program, described by NSAC-202L, includes procedures and administrative controls to assure that structural integrity is maintained for piping components. Section 3.1, “Governing Document,” of Revision 4 of NSAC-202L, recommends the inclusion of quality assurance requirements.

During the audit of the PBN FAC program, the NRC staff noted that Revision 13 of IM-AA-101, “Software Quality Assurance Program,” provides the essential elements to meet the quality assurance standards established in the Quality Assurance Topical Report. Revision 13 of IM-AA-101 also defines four levels (A through D) of software classification based on the task for which the output is to be used. In addition, during the audit, the staff noted that Revision 4 of ER-AA-111-1000, “Flow-Accelerated Corrosion (FAC) Activities,” mentions other software that may be used for analysis, such as FAC Manager and IDDEAL. For post-inspection activities, this procedure also states that ultrasonic test analyses may be performed using trending software analysis functions other than those built into CHECWORKS™.

The NRC staff notes ER-AA-111, “Flow-Accelerated Corrosion (FAC) Program,” Revision 3, states that ultrasonic inspection data should be evaluated using an approved (i.e., validated and verified) software program. The applicant stated during the audit of the PBN FAC program that the software quality assurance classification for CHECWORKS™ was Level C (which corresponds to Business Critical in procedure IM-AA-101). The staff also notes that Level C software does not require “Software Verification and Validation” in all instances and does not require “Error Reporting and Corrective Action” as provided in ER-AA-101, Sections 5.12 and 5.14, respectively. The staff further notes that during a recent, previous license renewal review, a number of inspection deferrals were required because the FAC Manager software inaccurately designated components as requiring inspections in the next outage.

Issue

The SLRA, Revision 3 of ER-AA-111, and Revision 4 of ER-AA-111-1000 do not state whether software other than CHECWORKS™ is used in the PBN FAC program. In addition, none of these documents identify the software quality assurance classification for CHECWORKS™ or any other software used in the PBN FAC program. Also, although ER-AA-111 states that the software evaluating the ultrasonic inspection data should be validated and verified, it does not include IM-AA-101 as a developmental reference for accomplishing this, and because CHECWORKS™ is classified as Level C software, it does not require validation and verification. Further, error notification for other software used in the PBN FAC program (e.g., FAC Manager) would not be required if comparably classified as Level C software.

Request

1. Please identify all software products used in the PBN FAC program.

2. Please provide the software quality assurance classification and the bases for the classification for each software product used in the PBN FAC program. If verification and validation or error notification activities are currently being performed but are not required by the software classification level, provide information regarding assurances that these activities will be continued during the subsequent period of extended operation.

DRAI B.2.3.8-3 (AMR Items)

Background

NUREG-2191, Volume 1 identifies wall thinning due to FAC for steel piping, piping components exposed to treated water (e.g., GALL-SLR item VIII.F.S-16, SRP item 3.4.1-005). In addition, NUREG-2191, Volume 1 identifies wall thinning due to erosion for metallic piping, piping components exposed to treated water (e.g., GALL-SLR item VIII.B1.S-408, SRP item 3.4.1-060).

Issue

SLRA Table 3.4.2-1, “Main and Auxiliary Steam – Summary of Aging Management Evaluation,” does not cite wall thinning – FAC or wall thinning – erosion for the following carbon steel components exposed to a treated water (int [internal]) environment:

- Drain trap
- Flow element
- Piping
- Piping and piping components
- Valve body

In addition, SLRA Table 3.4.2-1 does not cite wall thinning – erosion for the following components exposed to a treated water (int) environment:

- Stainless steel drain trap
- Stainless steel piping
- Stainless steel piping and piping components
- Copper alloy valve body

SLRA Table 3.4.2-2, "Feedwater and Condensate – Summary of Aging Management Evaluation," does not cite wall thinning – FAC and/or wall thinning – erosion for the following carbon steel components (intended function in parenthetical) exposed to a treated water (int) environment:

- Piping (Leakage boundary (spatial))
- Piping and piping components (Pressure boundary)
- Piping and piping components (leakage boundary (spatial))

In addition, SLRA Table 3.4.2-2 does not cite wall thinning – erosion for stainless steel piping and piping components (all intended functions) exposed to a treated water (int) environment.

During the audit of the PBN FAC program, The applicant stated that many of these components were aligned with a April 29, 2005, response to a request for additional information related to PBN's original license renewal application (ADAMS Accession No. ML051300355). However, the NRC staff did not find these specific components, materials, and environments addressed as part of the Main and Auxiliary Steam System or the Feedwater and Condensate System in the April 29, 2005, response.

Request

Please discuss, with justification as appropriate, whether wall thinning due to FAC and/or erosion is an applicable aging effect requiring management for the components identified above in the Main and Auxiliary Steam System and Feedwater and Condensate System exposed to a treated water (internal) environment.

SLRA Section B.2.3.10, "Steam Generators"

DRAI B.2.3.10-1

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) Table 3.1.2-5, "Steam Generators – Summary of Aging Management Evaluation," November 2020 (Agencywide Documents Access Management System (ADAMS) Accession No. ML20329A247), includes Generic Aging Lessons Learned (GALL) – Subsequent License Renewal (SLR) Item IV.D1.RP-368, 3.1-1, 012 for managing loss of material for the carbon steel blowdown piping nozzles and secondary side shell penetrations exposed to treated water by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD and Water Chemistry aging management programs (AMPs).

SLRA Supplement 1, dated April 21, 2021 (ADAMS Accession No. 21111A155), revised SLRA Table 3.1.2-5 by adding GALL-SLR Item IV.D1.RP-161, 3.1-1, 072 for managing loss of material

for the carbon steel blowdown piping nozzles and secondary side shell penetrations exposed to water by the Steam Generators and Water Chemistry AMPs.

Issue

Attachment 10 of SLRA Supplement 1 states, in part, "…SLRA Table 3.1.2-5, Table 3.1-1 Item 072…are revised to clarify that the Steam Generators and Water Chemistry AMPs will manage…loss of material for blowdown piping nozzles and secondary side shell penetrations." No GALL-SLR items related to the carbon steel blowdown piping nozzles and secondary side shell penetrations were deleted in SLRA Supplement 1. Therefore, it is unclear to the NRC staff whether GALL-SLR Item IV.D1.RP-161, 3.1-1, 072 was in addition to or replaced GALL-SLR Item IV.D1.RP-368, 3.1-1, 012.

Request

Please clarify if loss of material for the carbon steel blowdown piping nozzles and secondary side shell penetrations exposed to treated water will be managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD; Steam Generators; and Water Chemistry AMPs.

DRAI B.2.3.10-2

Background

SLRA Table 3.1.2-5 includes GALL-SLR Items IV.D1.R-40, 3.1-1, 070 and IV.C2.RP-23, 3.1-1, 088 for managing cracking and loss of material, respectively, for the nickel alloy tube plugs exposed to reactor coolant by the Steam Generators and Water Chemistry AMPs.

During the audit of the Point Beach Nuclear Plant (PBN) Steam Generators program, the NRC staff noted that Revision 15 of Site Engineering Manual 7.11.20, "Eddy Current Testing of the Unit 1 Steam Generators," states that there are three welded alloy 600 plugs in Steam Generator A of PBN Unit 1 that were installed during manufacture. The staff also noted that Revision 21 of plant procedure NP 7.7.17, "Requirements for Steam Generator Primary Side Activities," states that all Alloy 600 plugs were replaced with Alloy 690 plugs during refueling outage 26 (U1R26) for PBN Unit 1.

The applicant clarified during the audit of the PBN Steam Generators program that only the Alloy 600 plugs in Steam Generator B of PBN Unit 1 were replaced with Alloy 690 plugs during U1R26, and that there remains three Alloy 600 welded plugs in Steam Generator A of PBN Unit 1.

Issue

SLRA Section B.2.3.10 states, "Tube plugs installed are fabricated from heat treated Inconel Alloy 690 material." In addition, B.2.3.10 does not state whether there are any Alloy 600 tube plugs installed in the PBN steam generators. Therefore, it is unclear to the NRC staff whether this statement in SLRA Section B.2.3.10 is referring to current and/or future installed tube plugs.

Request

1. Please confirm that the only Alloy 600 plugs in the PBN steam generators that will be managed by the Steam Generators and Water Chemistry AMPs are the three Alloy 600 welded plugs in Steam Generator A in PBN Unit 1.

2. Please make any necessary changes to SLRA Section B.2.3.10 to clearly describe the tube plugging materials in the PBN steam generators.

DRAI B.2.3.10-3

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:

In the SLRA (Agencywide Documents Access Management System (ADAMS) Accession No. ML20329A247), Table 3.1.2-5, “Steam Generators - Summary of Aging Management Evaluation,” Items IV.D1.R-437 and 3.1-1, 125 are listed for cracking management of nickel alloy U-tubes exposed to treated water >140 degrees Fahrenheit and steam, by the Steam Generators aging management program (AMP).

In Table 3.1-1 of the Standard Review Plan (SRP) – SLR, Item 125 is a new item that addresses cracking due to flow-induced vibration and high-cycle fatigue of nickel alloy steam generator tubes at support plate locations exposed to secondary feedwater or steam. During initial license renewal applications, high-cycle fatigue of steam generator tubes at tube support plate locations was addressed by a time-limited aging analysis and was covered by item 2 in Table 3.1-1 of the SRP-LR.

As a result of both U.S. and international operating experience with high-cycle fatigue failure of steam generator tubes at tube support plates, the NRC issued Bulletin No. 1988-002, Rapidly Propagating Fatigue Cracks in Steam Generator Tubes,” ADAMS Accession No. ML031220043, Information Notice 2005-29, “Steam Generator Tube and Support Configuration,” ADAMS Accession No. ML052280011, and Information Notice 2007-37, “Buildup of Deposits in Steam Generators,” ADAMS Accession No. ML072910750. Westinghouse Electric Company issued a Nuclear Safety Advisory Letter (NSAL 12-7) on September 24, 2012, in response to NRC staff communications for licensees to identify the as-built anti-vibration bar insertion depths in applicable steam generators, so as to identify the potential for additional tube fatigue failures.

A generic analysis of Westinghouse Model 44F steam generators was produced by Westinghouse Electric Company for the Electric Power Research Institute in April 2016[1]. The purpose of this report was to define, on a SG model-specific basis, the information required to complete a plant-specific U-bend fatigue analysis consistent with the requirements of NRC Bulletin 88-02.”

Issue

[1] *Steam Generator Management Program: Generic Elements of U-Bend Tube Vibration Induced Fatigue Analysis for Westinghouse Model 44F Steam Generators.* EPRI, Palo Alto, CA: 2016. 3002007562.

While the generic analysis of the Westinghouse Model 44F steam generators was performed based on the Point Beach Unit 1 steam generators, the report was intended as a reference for utilities to use in completing a plant-specific fatigue analysis of potentially susceptible tubes. The results of the plant-specific analysis were not discussed in the SLRA or provided as a reference on the portal for NRC staff review.

Request

Provide the results of the plant-specific fatigue analysis for NRC staff review.

SLRA Section B.2.3.16, "Fire Water System"

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.

DRAI B.2.3.16-1 (Fire Protection System Components Subject to Wet-Dry Cycle)

Background

NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," Volume 2 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17187A204), states portions of water-based fire protection system components that have been wetted but are normally dry are subject to augmented testing and inspections beyond those in Table XI.M27-1, "Fire Water System Inspection and Testing

Recommendations." The augmented tests and inspections are conducted on piping segments that cannot be drained or piping segments that allow water to collect. The augmented tests and inspections are:

- Every 5 years, beginning 5 years prior to the subsequent period of extended operation (SPEO), conduct either a flow test or flush sufficient to detect potential flow blockage, or a 100 percent visual inspection of the internal surface of piping segments that cannot be drained or piping segments that allow water to collect. If the results of the 100 percent internal visual inspection are acceptable and the segment is not subsequently wetted, then further augmented tests or inspections are not necessary.

- Every 5 years during the SPEO, perform volumetric wall thickness examinations on 20 percent of the length of piping segments that cannot be drained or piping segments that allow water to collect.

Subsequent License Renewal Application (SLRA) Supplement 1, dated April 21, 2021 (ADAMS Accession No. ML21111A155), revised SLRA Section B.2.3.16, "Fire Water System," by clarifying the operating experience related to the fire water piping systems subject to the wet-dry cycle. The fire water piping systems susceptible to the wet-dry cycle are the gas turbine building and low voltage auxiliary transformers suppression system and the warehouse #2 suppression system.

SLRA Supplement 1 stated that the internal piping of the warehouse #2 suppression system was inspected in April 2014 and there was little to no wear in the piping and no head blockage. It also stated, "An additional action request was issued to perform future inspections of warehouse #2 dry system branches as applicable [emphasis attached]."

SLRA Supplement 1 stated that a low point in the gas turbine building and low voltage auxiliary transformers suppression system was drained and internally inspected and there was a normal amount of internal wear/corrosion. It also stated, "A recent walkdown determined there were several additional low points, therefore, a new action request was issued to perform future inspections of the gas turbine building and low voltage auxiliary transformers' dry system branches as applicable [emphasis attached]."

Issue

SLRA Supplement 1 did not state whether the inspection of the warehouse #2 suppression system was 100 percent of the internal surface of piping segments that cannot be drained or piping segments that allow water to collect. Due to the use of the phrase "as applicable," it is unclear whether the future inspections will be consistent with augmented tests and inspections in NUREG-2191, Volume 2. In addition, SLRA Supplement 1 did not discuss when the future inspections will be performed.

Request

1. Please clarify whether 100 percent of the internal surface of piping segments that cannot be drained or piping segments that allow water to collect in the warehouse #2 suppression system were inspected.

2. If the inspections of the gas turbine building and low voltage auxiliary transformers suppression system and the warehouse #2 suppression system have been completed, please describe the results of the inspections.

3. Discuss what is meant by the phrase "as applicable" as it relates to the future inspections of the gas turbine building and low voltage auxiliary transformers suppression system and the warehouse #2 suppression system. Alternatively, confirm that future inspections of the suppression systems subject to the wet-dry cycle will be consistent with the augmented tests and inspections in NUREG-2191, Volume 2.

SLRA Section B.2.3.27, "Buried and Underground Piping and Tanks"

Regulatory Basis

10 CFR 54.21(a)(3) requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review

under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. 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.

DRAI B.2.3.27-1 (Breakout Topic No. 4: Cathodic Protection)

Background

SLRA Section B.2.3.27, "Buried and Underground Piping and Tanks," states "[t]he PBN Buried and Underground Piping and Tanks AMP, with enhancements, will be consistent with exception [not related to the subject RAIs] with the 10 elements of NUREG-2191, Section XI.M41, "Buried and Underground Piping and Tanks.""

GALL-SLR Report AMP XI.M41, "Buried and Underground Piping and Tanks," Table XI.M41-1, "Preventive Actions for Buried and Underground Piping and Tanks," recommends that cathodic protection is provided for buried steel piping and tanks at least 5 years prior to the subsequent period of extended operation (SPEO). In addition, the "preventive actions" program element of GALL-SLR Report AMP XI.M41 states the following:

> Failure to provide cathodic protection in accordance with Table XI.M41-1 may be acceptable if justified in the SLRA. The justification addresses soil sample locations, soil sample results, the methodology and results of how the overall soil corrosivity was determined, pipe to soil potential measurements and other relevant parameters.
> If cathodic protection is not provided for any reason, the applicant reviews the most recent 10 years of plant-specific operating experience (OE) to determine if degraded conditions that would not have met the acceptance criteria of this AMP have occurred. This search includes components that are not in-scope for license renewal if, when compared to in-scope piping, they are similar materials and coating systems and are buried in a similar soil environment. The results of this expanded plant-specific OE search are included in the SLRA.

During its review of the SLRA, the staff noted the following steel components will be managed for loss of material using the Buried and Underground Piping and Tanks program: (a) steel

piping exposed to soil in the service water, emergency power, and fire protection systems; and (b) the half buried emergency fuel oil storage tank.

During its audit, the staff noted the following: (a) Point Beach does not have any buried tanks that are cathodically protected; (b) the cathodic protection systems at Point Beach were originally installed to provide corrosion control for the containment structures and buried circulating water piping.

Issue

Based on its audit and review of the SLRA, the staff could not determine if cathodic protection will be provided for steel piping and tanks exposed to soil (within the scope of subsequent license renewal (SLR)). The SLRA does not specify which systems and/or components will receive cathodic protection.

Request

Provide clarification regarding if cathodic protection will be provided for steel piping and tanks exposed to soil (within the scope of SLR) at least 5 years prior to the SPEO. If all or portions of the subject piping and tanks will not be cathodically protected, state the basis, according to the "preventive actions" element of GALL-SLR Report AMP XI.M41, for why cathodic protection will not be provided.

DRAI B.2.3.27-2 (Breakout Topic Nos. 5 and 6: Uncoated Buried Fire Protection Piping)

Background

GALL-SLR Report Table XI.M41-1 recommends that external coatings are provided for buried metallic piping. In addition, GALL-SLR Report AMP XI.M41 states additional inspections, beyond those in GALL-SLR Report Table XI.M41-2, "Inspection of Buried and Underground Piping and Tanks," may be appropriate if exceptions are taken to the "preventive actions" program element or in response to plant-specific OE. Based on its audit and review of the SLRA, the staff noted there is uncoated buried piping in the fire protection system. The staff could not determine the extent of uncoated buried piping in the fire protection system or which material types (i.e., steel, gray cast iron, ductile iron) are uncoated. Therefore, additional inspections may be appropriate, according to GALL-SLR Report AMP XI.M41.

Issue

The recommended inspections in GALL-SLR Report AMP XI.M41 are based on external coatings being provided for buried metallic piping. Based on plant-specific OE indicating that there is uncoated buried piping in the fire protection system, the staff seeks additional clarification regarding why additional inspections of buried fire protection system piping are not appropriate.

Request

Provide additional OE (or other technical justification) to demonstrate that additional inspections, beyond those recommended in GALL-SLR Report AMP XI.M41, are not appropriate for buried fire protection system piping.

DRAI B.2.3.27-3 (Breakout Topic Nos. 3 and 7: Interface Corrosion for Tanks)

Background

SLRA Table 3.3.2-8, "Emergency Power – Summary of Aging Management Evaluation," states the emergency diesel generator (EDG) fuel oil storage tanks are exposed to an external environment of concrete. As amended by letter dated April 21, 2021 (ADAMS Accession No. ML21111A155), SLRA Table 3.3.2-8 was revised to state that the subject tanks are also exposed to an underground external environment.

SLRA Table 3.3.2-8 states the emergency fuel oil storage tank is exposed to an external environment of soil. As amended by letter dated April 21, 2021, SLRA Table 3.3.2-8 was revised to state that the subject tank is also exposed to a concrete and underground external environment.

As amended by letter dated April 21, 2021, the last enhancement associated with the "detection of aging effects" program element of SLRA Section B.2.3.27, "Buried and Underground Piping and Tanks," states the following:

> "[c]larify that examinations of the buried portion of tank T-072 are conducted from the external surface of the tank using visual techniques or from the internal surface of the tank using volumetric techniques. A minimum of 25% of the buried surface is examined.

The inspected area includes at least some of both the top and bottom of the tank [emphasis added by staff]. If the tank is inspected internally by volumetric methods, the method must be capable of determining tank wall thickness and general and pitting corrosion and qualified at PBN to identify loss of material that does not meet acceptance criteria. The double wall tanks, T-175A and T-175B shall be examined by monitoring the annular space for leakage."

Issue

The inspection recommendations for buried and underground tanks provided in the enhancement above are consistent with GALL-SLR Report AMP XI.M41 recommendations (e.g., as italicized above, the inspected area includes at least some of both the top and bottom of the tank). However, these recommendations are based on tanks being exposed to a buried or underground environment (i.e., not tanks with an air-to-soil, air-to-concrete, or soil-to-concrete external interface, where there is an increased potential for degradation at interface locations). The staff seeks additional clarification regarding how inspections of the EDG fuel oil storage tanks (exposed externally to a concrete and underground (i.e., air) environment) and the emergency fuel oil storage tank (exposed externally to soil, concrete, and underground environments) will account for the potential for corrosion at air-to-soil, air-to-concrete, or soil-to-concrete interfaces.

Request

Provide additional information regarding how inspections of the EDG fuel oil storage tanks and emergency fuel oil storage tank will account for the potential for corrosion at air-to-soil, air-to-concrete, or soil-to-concrete interfaces. Alternatively, revise the subject enhancement to clarify that inspected areas will also include interface regions (where there is a transition from one external environment to another).

DRAI B.2.3.27-4 (Breakout Topic No. 8: Preventive Action Category C)

Background

As amended by letter dated April 21, 2021, the SLRA states the following with respect to meeting the criteria for and transitioning from Preventive Action Category C:

- SLRA Appendix A, "Updated Final Safety Analysis Report Supplement," Section 16.2.2.27, "Buried and Underground Piping and Tanks," states:

  > [b]ased on excellent plant OE and the combination of good soil conditions, preventive design features in place, and inspections, the buried steel piping at PBN would meet the criteria for Preventive Action Category C. However, if these conditions were to change, the Preventive Action Category would require reevaluation and could potentially change. Thus, the number of inspections for each 10-year inspection period, commencing 10 years prior to the SPEO, based on the inspection quantities identified in GALL-SLR Table XI.M41-2 (adjusted for a 2-unit plant site) is two, so long as the Preventive Action Category C remains applicable.

- SLRA Appendix A, Table 16-3, "List of SLR Commitments and Implementation Schedule," commitment No. 31, subpart (g) states in part:

  > [p]erform inspections of buried and underground piping and tanks in accordance with NUREG-2191 Table XI.M41-2 Category C steel, unless a reevaluation of future OE and soil conditions determines that another Preventive Action Category is more applicable.

- The first enhancement associated with the "detecting of aging effects" program element in SLRA Section B.2.3.27, "Buried and Underground Piping and Tanks," states the in part:

  > [c]larify that inspections of buried and underground piping and tanks will be conducted in accordance with NUREG-2191 Table XI.M41-2 Category C steel, unless a reevaluation of future OE and soil conditions determines that another Preventive Action Category is more applicable.

GALL-SLR Report Table XI.M41-2, "Inspection of Buried and Underground Piping and Tanks," states:

- Preventive Action Category C applies when (a) cathodic protection was installed or refurbished 5 years prior to the end of the inspection period of interest; (b) cathodic protection has operated at least 85 percent of the time either since 10 years prior to the subsequent period of extended operation or since installation/refurbishment, whichever is shorter; and (c) cathodic protection has provided effective protection for buried piping as evidenced by meeting the acceptance criteria of Table XI.M41-3, "Cathodic Protection Acceptance Criteria," of this AMP at least 80 percent of the time either since 10 years prior to the subsequent period of extended operation or since installation/refurbishment, whichever is shorter.

- Preventive Action Category E applies when a cathodic protection system has been installed but all or portions of the piping covered by that system fail to meet any of the criteria of Preventive Action Category C piping, provided (a) coatings and backfill are provided in accordance with the "preventive actions" program element of this AMP; (b) plant-specific OE is acceptable (i.e., no leaks in buried piping due to external corrosion, no significant coating degradation or metal loss in more than 10 percent of inspections conducted); and (c) soil has been determined to not be corrosive.

Issue

The conditions to meet Preventive Action Category C, as delineated in GALL-SLR Report Table XI.M41-2, are based solely on cathodic protection efficacy. Factors such as soil corrosivity, plant-specific OE, results of inspections, and preventive actions other than cathodic protection (i.e., coatings and backfill quality) more closely align with the criteria for meeting Preventive Action Category E. The staff seeks clarification regarding why factors other than cathodic protection efficacy are used in relation to meeting the criteria for and transitioning from Preventive Action Category C.

Request

State the basis for why factors other than cathodic protection efficacy are used in relation to meeting the criteria for and transitioning from Preventive Action Category C. Alternatively, revise the SLRA, as appropriate, to reflect that cathodic protection efficacy will be used in relation to meeting the criteria for and transitioning from Preventive Action Category C.

SLRA Section B.2.3.29, “ASME Section XI, Subsection IWE”

Regulatory Basis

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

DRAI B.2.3.29-1

Background

SLRA Section B.2.3.38 under the heading “NUREG-2191 Consistency” states: “The PBN ASME Section XI, Subsection IWE AMP, with enhancements, will be consistent with the 10 elements of NUREG-2191, Section XI.S1, “ASME Section XI, Subsection IWE” **as modified by SLR-ISG-Structures-2020-XX, Updated Aging Management Criteria for Structures Portions of the Subsequent RAI B.2.3.29-1 License Renewal.**” **(emphasis added)**

Issue

The GALL-SLR AMP XI.S1, “ASME Section XI, Subsection IWE,” was not modified by the cited Draft Interim Staff Guidance (ISG) SLR-ISG-Structures-2020-XX (issued for comment in June 2020), as claimed in the consistency statement SLRA Section B.2.3.29. The staff further noted that the option to perform a fatigue waiver analysis, for containment pressure-retaining boundary components subject to cyclic loading that do not have a CLB fatigue analysis, provided in Appendix A of the ISG related to the SRP-SLR further evaluation 3.5.2.2.1.5 was not used in the PBN SLRA. The staff is unable to make a finding of the NUREG-2191 consistency for SLRA B.2.3.29 AMP, as it is stated in the SLRA.

Request

Provide an appropriately revised NUREG-2191 consistency statement for SLRA B.2.3.29, “ASME Section XI, Subsection IWE,” AMP against which staff can make its finding.

DRAI B.2.3.29-2

Background

SRP-SLR Section 1.2.1 states, in part: "If a GALL-SLR Report AMP is selected to manage aging, the applicant may take one or more exceptions to specific GALL-SLR Report AMP program elements. Exceptions are portions of the GALL-SLR Report AMP that the applicant does not intend to implement, which the staff will review on a case-by-case basis. Any deviation or exception to the GALL-SLR Report AMP should be described and justified."

SLRA Section B.2.3.29, "ASME Section XI, Subsection IWE," program, as amended by Supplement 1 dated April 21, 2021, with enhancements (and no exceptions) claims consistency with GALL-SLR AMP XI.S1. To make the program element consistent with that in GALL-SLR AMP XI.S1, the SLRA included an enhancement to the "detection of aging effects" program element of the AMP, related to supplemental one-time supplemental volumetric examination of the containment liner (SLRA Table 16-3, License Renewal (LR) Commitment 33(f)), that states:

> Augment existing procedures to implement a one-time supplemental volumetric inspection of metal liner surfaces that samples randomly selected as well as focused locations susceptible to loss of thickness due to corrosion from the concrete side if triggered by plant-specific OE identified **through code inspections** after the date of issuance of the first renewed license for each unit. This sampling is conducted to demonstrate with 95% confidence, that 95% of accessible portion of the liner is not experiencing greater than 10% wall loss. **(emphasis added)**

Issue

The staff is unable to determine that the "detection of aging effects" program element, with the above stated enhancement, will be consistent with that in GALL-SLR AMP XI.S1 because of the following issues identified with regard to the enhancement (LR Commitment 33(f)):

1) The trigger specified in the GALL-SLR is the site-specific occurrence or recurrence of the stated plant-specific OE without regard to the method, program, or process by which (how) it is identified. Contrary to this, the SLRA enhancement states that the triggering OE would be specific to that identified **through code inspections (emphasis added),** which would be an unjustified exception to the GALL-SLR AMP XI.S1. Past nuclear power industry operating

experience has identified corrosion of the containment liner that originated from the inaccessible (concrete) side during repair/replacement activities, maintenance walkdowns, Appendix J activities, and can be identified by several other means in an operating plant. Contrary to the intent of the GALL-SLR AMP XI.S1, tying the OE identification specifically to "code inspections" introduces technicalities for potentially not performing one-time supplemental volumetric examination if identified by other plant processes or programs.

2) There is no implementation schedule provided for LR Commitment 33(f) for the case where the triggering OE occurs during the subsequent period of extended operation.

Request

1) Provide a revised enhancement to the "detection of aging effects" program element in SLRA Section B.2.3.29, related to one-time supplemental volumetric examination, and the associated LR Commitment 33(f) that would make the PBN AMP program element consistent with that in GALL-SLR AMP XI.S1, that addresses Issue 1 above with regard to how (method, program or process) the triggering operating experience is identified.

2) Additionally, provide the implementation schedule for LR Commitment 33(f) for the case where the triggering OE occurs during the subsequent period of extended operation.

DRAI B.2.3.29-3

Background

SLRA Section B.2.3.29, "ASME Section XI, Subsection IWE," program, as amended by Supplement 1 dated April 21, 2021, includes enhancements to the "detection of aging effects" program element and corresponds to LR Commitments 33(d) and 33(e) that identify "surface examinations **or enhanced visual examinations**" methods to detect cracking due to cyclic loading or due to stress corrosion cracking (SCC). **(emphasis added)**

With regard to the enhanced visual examination method, GALL-SLR AMP XI.M32, "One-Time Inspection," identifies EVT-1 as an acceptable inspection method to detect cracking due to SCC or cyclic loading for pressure-retaining components.

Issue

With regard to the enhanced visual alternative, the staff is not clear what specific enhanced visual inspection method is intended to be used with regard to LR Commitments 33(d) and 33(e) and corresponding program enhancements to make its determination of the capability of the technique to detect cracking due to cyclic loading or SCC.

Request

1) Explicitly state the specific enhanced visual inspection method (e.g. EVT-1) in LR Commitments 33(d) and 33(e) and the corresponding B.2.3.29 program enhancements (and FSAR Supplement 16.2.29) that will be used to detect cracking due to cyclic loading or SCC.

2) If it is other than the EVT-1 method, describe the specific enhanced visual method and justify its adequacy to detect cracking due to cyclic loading or SCC.

DRAI B.2.3.29-4

Background

SLRA Section B.2.3.29, under the "Operating Experience" subsection, addresses PBN's evaluation of NRC Information Notice (IN) 2014-07 "Degradation of Leak Chase Channel Systems for Floor Welds of Metal Containment Shell and Concrete Containment Metallic Liner," and Regulatory Issue Summary (RIS) 2016-07 "Containment Shell or Liner Moisture Barrier Inspection" regarding leak-chase interface components that serve a moisture barrier function, and it states in part:

> …, the plant does have accessible capped lines for the leak chase. The locations of the leak chase channel vents were documented on applicable PBN drawings and included in IWE visual examinations.

It further states, with regard to RIS 2016-07,

> PBN has been proactively performing exams on moisture barriers once each Period during the 2nd Interval, and this RIS has been incorporated into the 3rd IWE Interval program plan.

Issue

The AMR results in SLRA Table 3.5.2-1 do not include line item(s) that correspond to the above components that serve a moisture barrier function for inaccessible areas of containment floor liner and that correspond to the above statements made in the SLRA related to OE described in IN 2014-07 and RIS 2016-07. The staff is unable to verify the above referenced statements in the SLRA nor that the AMR results in SLRA Table 3.5.2-1 reflect aging management for containment components that serve a moisture barrier function per recommendations for industry OE described in IN 2014-07 and RIS 2016-07.

Request

1) Clarify and state if accessible leak-chase channel interface components at or near the containment floor that serve a moisture barrier function (i.e., prevent intrusion of moisture into inaccessible portions of liner) are monitored by the ASME Section XI, Subsection IWE program, consistent with the recommendations in NRC IN 2014-07 and RIS 2016-07 and as alluded to in the SLRA.

2) Provide appropriate AMR line items in the SLRA Table 3.5.2-1 for above containment components that serve a moisture barrier function per NRC IN 2014-07 and RIS 2016-07. If not, justify the SLRA statements referenced in the Background section above and justify the adequacy of the PBN ASME Section XI, Subsection IWE program to manage liner degradation in inaccessible areas related to operating experience described in NRC IN 2014-07 and RIS 2016-07.

SLRA Section B.2.3.31, “ASME Section XI, Subsection IWF”

Regulatory Basis

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

DRAI B.2.3.31-1

Background

SLRA Section B.2.3.31 states that the PBN ASME Section XI, Subsection IWF aging management program (AMP), with enhancements, will be consistent with one exception [to scope of program] to NUREG-2191 [GALL-SLR] Section XI.S3, "ASME Section XI, Subsection IWF." The SLRA AMP does not take any exception to the "preventive actions" program element.

SLRA Section B.2.3.31, as amended by Supplement 1 dated April 21, 2021, includes an amended enhancement (SLR Commitment 35(d)) to the "preventive actions" program element of the SLRA "...Additionally, Molybdenum disulfide [MoS_2] thread lubricants are not used."

The corresponding program element in GALL-SLR AMP XI.S3 states, in part, that "molybdenum disulfide **and other lubricants containing sulfur should not be used**." **(emphasis added)**

During the audit, the staff reviewed Maintenance Instruction (MI) 29.1, Rev. 14, "Use of Thread Lubricants and Sealants," and noted that it does not prohibit other lubricants containing sulfur.

SRP-SLR Section 1.2.1 states, in part: "If a GALL-SLR Report AMP is selected to manage aging, the applicant may take one or more exceptions to specific GALL-SLR Report AMP program elements. Exceptions are portions of the GALL-SLR Report AMP that the applicant does not intend to implement, which the staff will review on a case-by-case basis. Any deviation or exception to the GALL-SLR Report AMP should be described and justified."

Issue

Contrary to the applicant's claim of consistency with the GALL-SLR AMP, the above referenced enhancement to the applicant's B.2.3.31 AMP does not appear to be consistent with the corresponding program element in the GALL-SLR XI.S3 AMP with regard to the GALL-SLR recommendation that other lubricants containing sulfur should also not be used, in addition to molybdenum disulfide. It is not clear whether the applicant plans to continue using (other than MoS_2) lubricants containing Sulphur on high-strength bolting. The SLRA does not take an exception to the preventive actions program element for other than MoS_2 lubricants containing Sulphur. Also, the language of the SLRA B.2.3.31 AMP enhancement is not structured the same as corresponding SLR Commitment 35(d).

Request

1) Provide a revised enhancement and a revised SLR Commitment 35(d) that would make the "preventive actions" program element consistent, as claimed in the SLRA, with the GALL-SLR AMP XI.S3 regarding the recommendation that other lubricants containing sulfur should also not be used in addition to molybdenum disulfide.

2) Alternatively, provide the technical justification for the exception to the "preventive actions" program element GALL-SLR AMP XI.S3 specifically with regard to the recommendation that, in addition to MoS_2, other lubricants containing Sulphur should also be not used on high-strength bolting.

DRAI B.2.3.31-2

Background

The "preventive actions" program element of GALL-SLR AMP XI.S3 states: "Operating experience and laboratory examinations show that the use of molybdenum disulfide (MoS2) as a lubricant is a potential contributor to stress corrosion cracking (SCC), especially when applied to high-strength bolting. The "parameters monitored or inspected" program element of GALL-SLR AMP XI.S3 recommends that high strength bolting (actual measured yield strength greater than or equal to 150 ksi) in sizes greater than 1 inch nominal diameter should be monitored for SCC.

SLRA Section B.2.3.31, as amended by Supplement 1, includes an amended enhancement (SLR Commitment 35(d)), which states, in part, that Molybdenum disulfide thread lubricants will not be used during the subsequent period of extended operation (SPEO).

During the audit, the staff reviewed Maintenance Instruction (MI) 29.1, Rev. 14, "Use of Thread Lubricants and Sealants." Section 3.1.3 of this MI states the solid components [of Thread Lubricants] may include, among others, Molybdenum disulfide. Attachment A of the MI includes Molykote® as a proprietary brand of thread lubricants used at Point Beach, which is of

molybdenum disulfide material. Also, the MI does not prohibit other lubricants containing sulfur. It appears that Molybdenum disulfide lubricant may have been used at Point Beach in the past.

Since high-strength bolting is used and will continue to be used, and molybdenum disulfide or other lubricants containing Sulphur may have been used at PBN, SLRA Section B.2.3.31, as amended by Supplement 1 dated April 21, 2021, includes an enhancement (SLR Commitment 35(i) in Table 16-3 as amended by Supplement 1) to the "detection of aging effects" program element to include volumetric examinations of a representative sample of high-strength bolting greater than 1 inch diameter, to detect cracking due to SCC, in each 10-year interval during the SPEO.

Issue

1) The staff noted that visual inspections of the currently implemented ASME Section XI, Subsection IWF program cannot detect SCC aging effect in high-strength bolting from the use of lubricants containing sulfur in high-strength bolting. The staff also noted that preventive measures are not currently in place to inhibit such an aging effect. Hence, it is possible that this aging effect may be present now or become present due to continued use of high-strength bolts as replacements coated with lubricants containing Sulphur, including MoS_2, prior to SPEO. Hence, it is possible that such an aging effect may remain undetected until SLRA AMP B.2.3.31 volumetric examinations of a sample containing high-strength bolts coated with lubricants containing Sulphur are performed, which may be as much as ten years into the SPEO. The SRP-SLR Branch Technical Position RLSB-1 Section A.1.2.3.4, however, states that "detection of aging effects should occur before there is a loss of the SC-intended function(s). Therefore, for the period of time between the start of the SPEO and when the volumetric examinations are performed, it is not clear how the aging effect of cracking due to SCC will be detected prior to a loss of intended function.

2) If PBN continues the use of MoS2 (or other lubricants containing Sulphur)-coated high-strength bolts susceptible to SCC, there is the potential to increase the population of installed high-strength bolts (i.e., install additional high-strength bolts as replacement bolting) susceptible to SCC. It is not clear how a sample for volumetric examination representing the entire population of high-strength bolts will be established. It is also not clear how the program will assess the sample size and scope to ensure that it continues to

monitor suspect high-strength bolts coated with Sulphur based lubricants, especially those that have used/are using MoS_2.

Request

1) Since volumetric examinations per SLRA Commitment 35(i) are planned for some time into the SPEO (could be as much towards the end of the first 10-year interval in the SPEO), provide information on whether and how the aging effect of cracking due to SCC will be detected for the population of existing high strength bolts such that this aging effect can be managed consistent with SRP-SLR Branch technical Position RLSB-1 Section A.1.2.3.4 prior to entering the SPEO.

2) Discuss how the "parameters monitored or inspected" program element will identify and assess the adequacy of the representative high-strength bolting sample inspected for cracking due to SCC for existing and/or when additional susceptible high-strength bolts are installed.

3) Update applicable portions of the SLRA as necessary.

DRAI 3.5-1, 068-1

Background

SLRA Table 3.5-1, AMR item 3.5-1, 068 (cracking due to stress corrosion cracking (SCC) of high strength steel bolting) in the "Discussion" column states, in part: "…. Cracking of any high-strength [bolting] used in non-ASME component supports is managed by the Structures Monitoring (B.2.3.34) AMP."

SLRA Table 3.5.2-13 "Component Supports Commodity Group – Summary of Aging Management Evaluation," includes on SLRA page 3.5-138 one GALL-SLR Report line item III.B1.1.TP-41 that corresponds to Table 3.5-1, item 3.5-1, 068 with generic Note E. This SLRA AMR item credits the Structures Monitoring Program (B.2.3.34) (in lieu of the XI.S3 "ASME Section XI, Subsection IWF" AMP credited in the corresponding GALL-SLR and SRP-SLR Table 3.5-1 items) to manage the effects of aging for cracking of high-strength steel structural bolting for non-ASME structural supports.

Generic Note E (Refer SLRA page 3.5-138) states: ”Consistent with material, environment, and aging effect but a different aging management program is credited or NUREG-2191 credits a plant-specific aging management program.”

The GALL-SLR Report line item III.B1.1.TP-41 associated with SRP-SLR item 3.5-1, 068 recommends the XI.S3 “ASME Section XI, Subsection IWF” AMP. The SLRA B.2.3.31 “ASME Section XI, Subsection IWF” AMP performs periodic volumetric examinations on a representative sample of high-strength bolting to detect cracking due to SCC, as recommended in XI.S3 AMP.

Issue

The SLRA B.2.3.34 “Structures Monitoring” AMP included an enhancement (SLRA Table 16-3, Commitments 38(a) and 38(d)) to include guidance and acceptance criteria for inspections of stainless steel and aluminum components for pitting and crevice corrosion, and evidence of cracking due to SCC. However, there is no enhancement provided in the SLRA Structures Monitoring AMP that relates to detecting cracking due to SCC for high-strength steel bolts. It is not clear how the general visual examinations of the SLRA Structures Monitoring AMP is adequate to detect cracking due to SCC in high-strength bolting. Further, for high-strength steel bolting, it is also not clear which specific non-ASME components are proposed to be managed by the referenced AMR line item.

The staff does not have sufficient information to make its finding regarding the adequacy of the inspection method of SLRA Section B.2.3.34 “Structures Monitoring” to detect cracking due to SCC in high-strength steel bolting.

Request

1) Clarify what specific bolting/system will be examined under the scope of the general non-ASME “high strength components supports" group, including safety significance of their function, for which the specific GALL-SLR line item with a generic note E in SLRA Table 3.5.2-13 that corresponds to SLRA Table 3.5-1, item 3.5-1, 068 will be used.

2) Discuss the examination method and frequency that is proposed to be used in the SLRA Section B.2.3.34 including its adequacy to detect cracking due to SCC in non-ASME high-

strength steel bolting considering the significance of the function of the specific components examined.

3) Update the applicable SLRA Sections for conforming changes, as necessary.

DRAI 3.5-1, 085-1

Background

SLRA Table 3.5-1, AMR item 3.5.1, 085 (loss of material due to pitting, crevice corrosion for stainless steel bolting exposed to treated water), as amended by Supplement 1 dated April 21, 2021 (ADAMS Accession No. ML21111A155, Attachment 22 page 22 of 48) in the "Discussion" column states:

> Consistent with NUREG-2191 as clarified and with exception for Water Chemistry. The Water Chemistry (B.2.3.2) AMP and One-Time Inspection (B.2.3.3**04** [B.2.3.20]) AMP are credited with managing loss of material for stainless steel bolting exposed to treated borated water in the spent fuel pool.
>
> The ASME Section XI, Subsection IWF (B.2.3.31) AMP addresses bolting specific considerations regarding lubricants and storage.

Further, SLRA Table 3.5-1, item 3.5-1, 090 in "Discussion" column states: "Not Used. Stainless steel bolting exposed to treated borated water in the spent fuel pool is addressed in item 3.5-1, 085."

Generic Note A (Refer SLRA page 3.5-125) states: "Consistent with component, material, environment, aging effect and aging management program listed for NUREG-2191 line item. AMP is consistent with NUREG-2191 AMP description."

The GALL-SLR Report credits AMR items III.B1.1.TP-232, III.B1.2.TP-232, or III.B1.3.TP-232 for loss of material due to pitting and crevice corrosion of stainless steel structural bolts exposed to treated water as summarized in SRP-SLR Table 3.5-1, item 085.

Issue

SLRA Table 3.5.2-9 “Spent Fuel Pool Structure – Summary of Aging Management Evaluation” on page 3.5-124 includes an AMR line item corresponding to item 3.5.1, 085 with generic Note A. The SLRA AMR line item assigns NUREG-2191 item III.A6.TP-221 and Water Chemistry (SLRA Section B.2.3.2) and One-Time Inspection (SLRA Section B.2.3.20) AMPs to manage the effects of aging for loss of material due to general, pitting, and crevice corrosion for structural bolting in the spent fuel pool. This designation is not in agreement with the material, environment and AMPs of GALL-SLR Report for disposition of SLRA item 3.5-1, 085 that credits GALL-SLR AMR items III.B1.1.TP-232, III.B1.2.TP-232, or III.B1.3.TP-232 and Water Chemistry and ASME Section XI, Subsection IWF AMPs for consistency and conformance to the assigned generic Note A. Furthermore, the GALL-SLR XI.S3, “ASME Section XI, Subsection IWF,” AMP addresses ISI of Class 1, 2, 3 for MC piping and components and their supports.

It is not clear whether the designation of generic Note A indicating complete consistency of for this SLRA AMR line item with the GALL-SLR Report guidance is appropriate. It is also not clear how the One-Time Inspection (B.2.3.20) program currently credited (in lieu of the ASME Section XI, Subsection IWF (B.2.3.31) AMP) will be used to manage loss of material due to pitting and crevice corrosion in stainless steel bolting in treated/borated water environment of the spent fuel pool.

The staff needs additional information to make its finding that the aging management of components for which item SLRA 3.5-1, 085 is credited is consistent with the corresponding GALL-SLR Report line item as claimed in SLRA Table 3.5-1 and SLRA Table 3.5.2-9, and its adequacy.

Request

1) Identify the component(s)/component supports for which stainless steel structural bolting are proposed to be managed by the referenced AMR item 3.5-1, 085 in SLRA Table 3.5-1 and Table 3.5.2-9.

2) Provide revised SLRA Table 3.5-1 and Table 3.5.2 AMR line items for item 3.5.1, 085 (or any other applicable SRP-SLR Table 3.5-1 line item) justifying GALL-SLR Report consistency for an assigned generic Note A and a plant-specific note if applicable.

3) Alternatively, explain how the combination of One-Time Inspection (SLRA Section B.2.3.20) and Water Chemistry (SLRA Section B.2.3.2) AMPs will be used to adequately manage stainless steel structural bolting exposed to treated water for pitting and crevice corrosion aging effects (i.e., material, environment and aging effect combination). Accordingly, provide revised Table 3.5-1 and applicable Table 3.5.2s AMR line items with justifiable generic and plant-specific notes.

SLRA Section B.2.3.34, "Structures Monitoring"

DRAI B.2.3.34-1

Regulatory Basis

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

Background

AMR items in SLRA Table 3.5.2-13, "Component Supports Commodity Group," as revised by the supplemental letter dated April 21, 2021, states that building concrete at locations of expansion and grouted anchors, and grout pads for support base plates will be managed for the aging effects of reduction in concrete anchor capacity by the Structures Monitoring program. The AMR item, associated with Table 1 item 3.5-1, 055, cites generic note A to indicate that this AMR item is consistent with the GALL-SLR Report. The AMR item also cites plant-specific Note 2 to indicate this type of component includes epoxy grout/anchors as subject to the same aging effects. (emphasis added)

The GALL-SLR Report does not generically address epoxy grouted anchors as a component subject to an AMR or provide a comprehensive list of all potential aging effects that may be applicable to the epoxy grouted anchors. As described in the SRP-SLR, the applicant may use a plant-specific AMP or plant-specific aging management activities (within an existing AMP) as

the basis for aging management of a specific structure or component. For those components, materials and aging effects combinations that are not generically addressed by the GALL-SLR Report, the NRC staff reviews the proposed AMPs or activities in accordance with the program element criteria that are defined in the SRP-SLR Appendix A.1, Subsection A.1.2.3, to ensure that the effects of aging for those structures or components will be adequately managed during the period of extended operation.

NRC Information Notice No. (IN) 83-40, discusses industry operating experiences regarding the use of epoxy grouts for anchor bolts installations, the potential degradations of epoxy formulations due to heat and radiation, and potential degradations due to the relatively low creep strength of epoxies. Furthermore, the industry and manufacturers have recognized the importance of proper installation (e.g. proper mixing, hole cleaning, application, etc.) of these types of anchors to ensure the desired performance. NRC IN 2010-01 discusses industry operating experiences regarding improper installation of post-installed anchors in pipe supports.

Issue

Based on the staff review of the information provided in the SLRA and the audited documents, additional information is necessary to demonstrate that the aging effects for epoxy grouted anchors/bolts will be adequately managed by the Structures Monitoring Program. Specifically, the following issues requiring additional justification were identified:

- Plant-specific Note 2 states that epoxy grouted anchors are subject to the same aging effects as typical grouted anchors, however no technical justification has been provided to support this claim.
- The proposed aging effects under AMR item 3.5-1, 055 is limited to the aging effects of reduction in concrete anchor capacity due to concrete degradations, however the SLRA did not consider or address other potential aging effects identified in relevant industry operating experience for epoxy grout anchors (see NRC IN 83-40).
- During the audit, the staff reviewed plant procedure NP 7.7.9, “Facilities Monitoring Program,” Revision 21, and noted that epoxy grouted anchors/bolts components are not specifically discussed or addressed within the procedure to ensure that they are adequately managed for the subsequent period of extended operation.
- The scope within the Structures Monitoring program for this type of anchors is not clear. Additional information is needed regarding the type of systems or components (e.g., safety-related systems, ASME Class 1, 2, 3 components, non-safety related components)

that the epoxy grouted anchors are associated with and their specific environments (e.g., areas with potential for high temperatures or radiation), if there are any limitations in place to prevent the use of epoxy grouted anchors for certain applications or locations, and the type of epoxy grout used at PBN and its material qualification based on its intended function(s) and application (e.g., safety-related, non safety-related).

- It is not clear whether installation procedures followed ensure that manufactures recommendations for proper installation and personnel qualification are met to prevent any premature deterioration/aging effects (see e.g., IN 2010-01 for installation related issues).
- It is not clear whether the epoxy grouted anchors have been qualified to sustain design basis loads to the end of the subsequent period of extended operation.

Request

Provide clarification or additional justification to the issues identified above to demonstrate that the aging effects for epoxy grouted anchors/bolts will be adequately managed by the Structures Monitoring Program so that the relevant CLB and their intended function(s) will be maintained to the end of the subsequent period of extended operation.

DRAI 3.5.2.11-1 (earthen berm structures)

Background

An AMR item in SLRA Table 3.5.2-11, states that loss of form and loss of material for earthen berm structures exposed to air – outdoor environment will be managed by the Structures Monitoring program. The AMR item cites generic note J to indicate that neither the component nor the material and environment combination are evaluated in the GALL-SLR Report.

Issue

The GALL-SLR Report includes item III.A6.T-22, for earthen water-control structures, which includes loss of material and loss of form as the applicable aging effects for earthen dams or embankments. During the audit, the staff reviewed the proposed enhancements in SLRA Section B.2.3.34, “Structures Monitoring,” and plant procedure NP 7.7.9, “Facilities Monitoring Program,” Revision 21, and noted that Section 2 of Attachment D of the procedure addresses the aging effects and acceptance criteria of loss of material for similar structural components (i.e., earthen embarkments). However, none of the reviewed documents address monitoring for the loss of form aging effect and the associated acceptance criteria for the earthen berm

structures. Therefore, it is not clear how the Structures Monitoring program will adequately manage the loss of form aging effect for earthen berm structures if the associated program elements are not clearly defined within the Structures Monitoring program.

Request

Clarify how the Structures Monitoring program will adequately manage loss of form and loss of material for earthen berm structures, including those parameters to be monitored or inspected and acceptance criteria, for the subsequent period of extended operation.

DRAI 3.3.1, 263-1 (polystyrene (polymer) inserts used in manhole covers)

Background

An AMR item in SLRA Table 3.5.2-11, "Yard Structures," as revised by the supplemental letter dated April 21, 2021, states that polystyrene (polymer) inserts used in manhole covers will be managed for the aging effects of blistering, cracking, hardening, loss of material, and loss of strength by the Structures Monitoring program. The AMR item, associated with Table 1 item 3.3-1, 263, cites generic note E to indicate that this AMR item is consistent with the GALL-SLR Report for material, environment, and aging effects, but a different aging management program is credited. SLRA Section B.2.3.34, as revised by the supplemental letter dated April 21, 2021, provides an enhancement to the Structures Monitoring program to ensure that the polystyrene (polymer) foam components that are mounted on the underside of the manhole covers are added to the scope of the program as an elastomer material.

As described in the SRP-SLR, the GALL-SLR Report contains the NRC staff's generic evaluation of plant AMPs and establishes the technical bases for their adequacy. The applicant may use a plant-specific AMP or plant-specific aging management activities (within an existing AMP) as the basis for aging management of a specific structure or component. However, the GALL-SLR Report AMP XI.S6, "Structures Monitoring," does not generically address the aging effects for polymeric materials. For those components, materials and aging effects combinations that are not generically addressed by the GALL-SLR Report, the NRC staff reviews the proposed AMPs or activities in accordance with the program element criteria that are defined in the SRP-SLR Appendix A.1, Subsection A.1.2.3, to ensure that the effects of aging for those structures or components will be adequately managed during the period of extended operation.

Issue

During the audit, the staff reviewed PBN's procedure NP 7.7.9, Revision 21, and noted, in Attachment D, that the Structures Monitoring program addresses the acceptance criteria and aging effects of cracking and changes in material properties (i.e. hardening) for elastomers. However, the existing procedure does not clearly define or address the acceptance criteria and aging effects of blistering, loss of material, and loss of strength for elastomer components. Therefore, it is not clear how the Structures Monitoring program will adequately manage the aging effects for polystyrene (polymer) inserts used in manhole covers if the associated program elements are not clearly defined within the Structures Monitoring program. Additionally, due to the difference in the terminology used to described this component material, it is not clear if the insert components behaves more as an elastic material, as described GALL-SLR Report in Table IX.C for elastomers, or as a more solid/inelastic material (e.g. Polystyrene/foam).

Request

- Clarify the type of the polymer material used (e.g., elastic material similar to a flexible seal, inelastic material similar to solid or foam) to better characterize the inserts used for the manhole covers.
- Clarify how the Structures Monitoring program will adequately manage the aging effects of polystyrene (polymer) inserts used with the manhole covers, including what parameters will be monitored or inspected, how frequently the components will be inspected, and the acceptance criteria that will be used, so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

DRAI 3.3.1, 111-1 (inconsistency in applicability of item 3.3-1, 111)

Background

SLRA Table 3.3-1, as revised by the supplemental letter dated April 21, 2021, states that item 3.3-1, 111 is not applicable and that item 3.5.1, 100 is used instead to adequately manage the stainless steel new fuel storage racks at PBN. However, two line items in SLRA Table 3.5.2-1, "Containment Building Structure and Internal Structural Components," associated with Table 1 item 3.3-1, 111, are used by the SLRA to demonstrate that other components (i.e. steel liner in the reactor cavity and miscellaneous steel structural components) exposed to an

air – indoor environment are being managed for loss of material and/or distortion by the Structures Monitoring program.

The GALL-SLR Report item VII.A1.A-94 (page VII A1-2, Table A1), associated with SRP-SLR Table 1 item 3.3-1, 111, recommends the Structures Monitoring program to manage the aging effects of loss of material due to general, pitting, or crevice corrosion for new fuel storage racks made out of steel material that are exposed to an air – indoor uncontrolled environment.

Issue

It is not clear how the SLRA Table 2 line items are consistent with the SLRA disposition of Table 1 item 3.3-1, 111, which states that the Table 1 item is not applicable for PBN.

Request

Clarify the inconsistency identified between the SLRA Table 1 item and SLRA Table 2 line items associated with AMR item 3.3-1, 111.

SLRA Section 4.3.1, "Metal Fatigue Class 1 Components"

Regulatory Basis

Pursuant to 10 CFR 54.21(c), the SLRA shall include an evaluation of time-limited aging analyses (TLAAs). The applicant shall demonstrate that (i) the analyses remain valid for the period of extended operation; (ii) the analyses have been projected to the end of the period of extended operation; or (iii) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

DRAI 4.3.1-1

Background

SLRA Table 4.3.1-1 describes the allowable 80-year transient cycle numbers in comparison with the original 40-year design cycle numbers for the applicant's fatigue analyses.

Issue

For the "control rod drop," "excessive FW [feedwater] flow," and OBE [operating basis earthquake] transients, SLRA Table 4.3.1-1 does not identify existing design allowable cycle

numbers. However, the table lists specific 80-year allowable cycle numbers for these transients (table items 32, 33 and 34). The basis for the 80-year allowable cycles is not clear.

For the "feedwater cycling at hot standby" and "boron concentration equilibrium" transients, the existing design allowable cycle numbers are described as 2000 and 23360 respectively in SLRA Table 4.3-1. However, the table does not provide the 80-year allowable design cycles for these transients (table items 26 and 27). It is not clear why 80-year allowable cycles are not specified.

Request

1. Clarify the basis for the 80-year allowable cycles for the "control rod drop," "excessive FW flow," and OBE transients.

2. Explain why SLRA Table 4.3.1-1 does not identify the 80-year allowable cycle numbers for the "feedwater cycling at hot standby" and "boron concentration equilibrium" transients as part of fatigue monitoring activities.

DRAI 4.3.1-2

Background

SLRA Section 4.3.1 states that the cumulative usage factor (CUF) for the pressurizer spray piping has been projected to the end of the subsequent period of extended operation. The SLRA section also indicates that stratification cycles are conservatively projected based on thermocouple data with a leaking spray control valve that is assumed to leak throughout 80 years of plant operation.

In addition, SLRA Section 4.3.1 explains that the fatigue analysis for the piping results in a CUF value of 0.369 for 80 years of operation. The section states that, due to the conservatism applied to this analysis, cycle monitoring is not required for the piping.

Issue

Additional information is needed to confirm that the previous inspection results support the applicant's approach that cycle monitoring is not used for the pressurizer spray piping.

Request

Clarify whether the previous inspection results support the applicant's approach that cycle monitoring is not used for the pressurizer spray piping. If the inspections identified a relevant indication of fatigue in the piping, provide justification for (1) why cycle monitoring is not needed for the piping and (2) why inspection activities are not proposed to manage fatigue for the piping.

SLRA Section 4.3.3, "Metal Fatigue of Non-Class 1 Components"

DRAI 4.3.3-1

Regulatory Basis

Pursuant to 10 CFR 54.21(c), the SLRA shall include an evaluation of time-limited aging analyses (TLAAs). The applicant shall demonstrate that (i) the analyses remain valid for the period of extended operation; (ii) the analyses have been projected to the end of the period of extended operation; or (iii) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

Background

SLRA Section 4.3.3 addresses the fatigue analysis waiver for non-Class 1 components in accordance with the ANSI B31.1 code. In the SLRA section, Table 4.3.3-2 discusses the projected numbers of equivalent full temperature cycles to demonstrate that the total transient cycle for each evaluated piping system does not exceed the 7000 cycle threshold that allows no reduction to the allowable stress range.

Specifically, Table 4.3.3-2 indicates that, in accordance with the design transient cycles specified in UFSAR supplement (SLRA Appendix A) Table 4.1-8, the 7000 cycle threshold is not exceeded by the following systems: (1) feedwater and condensate system; (2) main and auxiliary steam system; (3) reactor coolant system (Non-Class 1); and (4) safety injection system.

Issue

In comparison, ANSI B31.1 indicates that, if the range of temperature change varies for transient cycles, the equivalent full temperature cycles may be computed by considering the lesser temperature change ratios based on the partial temperature changes of the transient cycles. However, SLRA Section 4.3.3 does not clearly discuss which design transients can contribute to the equivalent full temperature cycles for the evaluated systems in addition to the plant heatup and cooldown transients.

Request

1. Clarify which design transients, other than plant heatup and cooldown transients, in USFAR supplement Table 4.1-8 and SLRA Table 4.3.1-1 can contribute to the equivalent full temperature cycles for each of the following systems: (1) feedwater and condensate system; (2) main and auxiliary steam system; (3) reactor coolant system, non-Class 1; and (4) safety injection system.

2. Considering the design transients identified in item 1 and their cycles, confirm that the equivalent full temperature cycles do not exceed the 7000 cycle threshold in each system.

SLRA Section 4.3.4, "Environmentally Assisted Fatigue"

Regulatory Basis

Pursuant to 10 CFR 54.21(c), the SLRA shall include an evaluation of time-limited aging analyses (TLAAs). The applicant shall demonstrate that (i) the analyses remain valid for the period of extended operation; (ii) the analyses have been projected to the end of the period of extended operation; or (iii) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

DRAI 4.3.4-1

Background

SLRA Section 4.3.4 addresses the environmentally assisted fatigue (EAF) time-limited aging analysis (TLAA). GALL-SLR AMP X.M1, "Fatigue Monitoring," and SRP-SLR Section 4.3.2.1.2

recommend that an EAF TLAA evaluate the component and piping locations identified in NUREG/CR-6260.

SLRA Section 4.3.4 includes EAF evaluations for most of the sample locations addressed in NUREG/CR-6260 for the Westinghouse-designed reactor. However, the SLRA does not clearly address the following locations identified in NUREG/CR-6260: (1) pressurizer surge line piping locations other than the reactor coolant loop surge line nozzle and pressurizer vessel surge line nozzle; and (2) RHR system Class 1 piping locations other than the RHR tee and accumulator safe injection nozzle locations.

Issue

The existing fatigue analysis for the pressurizer surge line described in WCAP-13509 indicates that the maximum CUF value is estimated at a surge line piping location rather than the reactor coolant loop surge nozzle or the pressurizer vessel surge nozzle. However, the SLRA does not clearly address this location identified in WCAP-13509 in the evaluation of the NUREG/CR-6260 locations. In addition, SLRA Section 4.3.4 does not clearly discuss the basis for selecting the RHR tee and accumulator safety injection nozzle locations as the leading EAF locations for the RHR piping system.

Request

1. Reconcile the potential inconsistence of pressurizer surge line leading locations between SRLA Section 4.3.4 (hot leg surge and pressurizer surge nozzles) and WCAP-13509 (surge line piping location).

2. Clarify the basis for selecting the RHR tee and accumulator safety injection nozzle locations as the leading EAF locations for the RHR system Class 1 piping.

DRAI 4.3.4-2

Background

GALL-SLR AMP X.M1, “Fatigue Monitoring,” and SRP-SLR Section 4.3.2.1.2 recommend that an EAF analysis include the evaluation of the sample locations identified in NUREG/CR-6260

and that, if plant-specific locations are more limiting than those sample locations, the plant-specific location should be also evaluated in the EAF TLAA.

SLRA Section 4.3.4 explains that the piping systems of PBN were originally designed and constructed in accordance with the ANSI B31.1 code. After the commence of the operation, some piping systems were evaluated in accordance with the fatigue analysis provisions of ASME Code, Section III.

The SLRA also indicates that the sample locations specified in NUREG/CR-6260 and the additionally identified pressurizer spray piping are evaluated in the EAF TLAA to address the piping systems that were designed per ANSI B31.1 but not analyzed per ASME Code, Section III.

The applicant did not perform a detailed screening analysis for the ANSI B31.1 piping systems. Instead, the applicant used the previous EAF screening results of Westinghouse-designed reactors (i.e., Surry plant) as the basis of selecting the NUREG/CR-6260 locations and pressurizer spray piping for further EAF evaluation.

Issue

It is not clear to the staff why the EAF analysis results of the Surry plant can represent the applicant's reactors in terms of identifying plant-specific locations that may be more limiting than the NUREG/CR-6260 locations. In addition, additional information is needed to clarify why the leading locations identified in the applicant's EAF evaluation are bounding for the piping systems designed per ANSI B31.1 but not analyzed per ASME Code, Section III or the guidance on leading EAF locations of NUREG/CR-6260.

Request

1. Provide justification for why the EAF analysis results of the Surry plant can represent the applicant's reactors in terms of identifying plant-specific locations that may be more limiting than the NUREG/CR-6260 locations.

2. Justify why the leading locations identified in the applicant's EAF evaluation are bounding for the piping systems designed per ANSI B31.1 but not analyzed per ASME Code, Section III or the guidance on leading EAF locations of NUREG/CR-6260.

SLRA Section 4.6, "Containment Liner Plate, Metal Containments, and Penetrations"

Regulatory Basis

10 CFR § 54.21(c)(1) requires the applicant to evaluate time limited aging analyses (TLAA). 10 CFR § 54.21(d) requires that the FSAR supplement for the facility must contain a summary description of the evaluation of the TLAA for the period of extended operation determined by 54.21(c)(1).

DRAI 16.3.6-1

Background:

Section 4.6, as amended by Attachment 29 of SLRA Supplement 1 dated April 21, 2021 (ADAMS Accession No. ML21111A155), dispositioned the TLAA for fatigue of the containment liner plate and carbon steel piping penetrations in accordance with 10 CFR 54.21(c)(1)(i) for the subsequent period of extended operation. SLRA Appendix A, Section 16.3.6 "Containment Liner Plate and Penetrations Fatigue Analysis" which provides the UFSAR supplement description for this TLAA was not amended by Supplement 1 for conforming changes.

Issue

SLRA Appendix A, Section 16.3.6 continues to include (specifically in the last two paragraphs on SLRA pages A-58 and A-59) description and partial disposition in accordance with 10 CFR 54.21(c)(1)(iii) that is inconsistent with the evaluation description and disposition in SLRA Section 4.6, as amended by Attachment 29 of Supplement 1 dated April 21, 2021. The staff is unable to make its determination that the UFSAR supplement provides an adequate summary description for the TLAA.

Request

Provide a revised SLRA Appendix A, Section 16.3.6 with an UFSAR supplement summary description for the containment liner and steel piping penetrations TLAA that is consistent with

the TLAA description and disposition in SLRA Section 4.6, as amended by Supplement 1 dated April 21, 2021.

SLRA Section 4.7.1, “Leak-Before-Break of Reactor Coolant System Loop Piping”

DRAI 4.7.1-1

Regulatory Basis

Pursuant to 10 CFR 54.21(c), the SLRA shall include an evaluation of time-limited aging analyses (TLAAs). The applicant shall demonstrate that (i) the analyses remain valid for the period of extended operation; (ii) the analyses have been projected to the end of the period of extended operation; or (iii) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

Issue

During the staff review of Section 4.7.1 (Leak Before Break of Reactor Coolant System Loop Piping) of the SLRA, the applicant stated that the PBN Unit 2 steam generator (SG) inlet and outlet nozzles contain Alloy 82/182 dissimilar metal welds which are susceptible to primary water stress corrosion cracking (PWSCC). To mitigate PWSCC due to the existence of Alloy 82/182, Alloy 52/152 weld inlays were applied to the SG primary nozzle safe end welds that are exposed to primary coolant. In Section 4.7.1, there is no mention of the material or whether weld inlays were applied to the SG inlet and outlet nozzles in Unit 1.

Request

Please provide this information and if this material is resistant to PWSCC.

SLRA Section 4.7.6, “Crane Cycle Load Limit”

DRAI 4.7.6-1

Regulatory Basis

10 CFR § 54.21(c)(1)(i) requires an applicant to demonstrate time-limited aging analyses remain valid for the period of extended operation.

Background

In Section 15.4.2, “Fatigue,” under title “Crane Load Cycle Limit,” of the UFSAR, the staff noted that the applicant states “Cranes designed in accordance with CMAA-70 Class “A” service are designed from 20,000 to 200,000 load cycles.” In SLRA Section 4.7.6 and Appendix A, Section 16.3.7.6, the applicant states, “Table 2.8-1 of CMAA Specification 70 states that a range of load cycles from 20,000 to 100,000 was considered for cranes in Service Class A service…” The staff further noted that in Section 4.7.6, “Crane Load Cycle Limit,” of FPLCORP00036-REPT-038, Revision 0, the applicant determined the service life of the cranes as 100,000 load cycles based on CMAA Specification # 70-1975.

Issue

Based on the apparent discrepancy between the load cycle limit identified in the SLRA and in Section 15.4.2 of the UFSAR, it is unclear to the staff which load cycle limit is correct.

Request

Clarify whether this discrepancy needs to be reconciled, and if so, identify the correct crane load cycle limit for the TLAA and update the impacted documents accordingly.