Nuclear Operating Company

South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

October 10, 2011
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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2746

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Response to Requests for Additional Information for the
South Texas Project License Renewal Application (TAC Nos. ME4936 and ME4937)

References: 1. STPNOC Letter dated October 25, 2010, from G. T. Powell to NRC Document Control Desk, "License Renewal Application" (NOC-AE-10002607) (ML103010257)
2. NRC letter dated August 15, 2011, "Requests for Additional Information for the Review of the South Texas Project, Units 1 and 2 License Renewal Application – Aging Management Programs Audit, Structures/Electrical" (ML11214A005)

By Reference 1, STP Nuclear Operating Company (STPNOC) submitted a License Renewal Application (LRA) for South Texas Project (STP) Units 1 and 2. By Reference 2, the NRC staff requests additional information for review of the STP LRA. STPNOC's response to the request for additional information is provided in Enclosure 1 to this letter. Changes to LRA pages described in Enclosure 1 are depicted in marked in/marked out pages provided in Enclosure 2 as Amendment 4 to the LRA.

Revised and new regulatory commitments are contained in Table A4-1 in Enclosure 3 to this letter. Should you have any questions regarding this letter, please contact either Arden Aldridge, STP License Renewal Project Lead, at (361) 972-8243 or Ken Taplett, STP License Renewal Project regulatory point-of-contact, at (361) 972-8416.

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

Executed on 10-10-2011 Date

G. T. Powell
Vice President,
Technical Support & Oversight

KJT
Enclosure: 1. STPNOC Response to Requests for Additional Information
2. Mark-In/Mark-Out License Renewal Application Pages
3. Revised Regulatory Commitments

A147
NRR

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Enclosure 1

STPNOC Response to Requests for Additional Information

SOUTH TEXAS PROJECT UNITS 1 AND 2
LICENSE RENEWAL APPLICATION
RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION -
AGING MANAGEMENT PROGRAMS AUDIT,
STRUCTURES/ELECTRICAL

RAI B2.1.32-01

Background:

The U.S. Nuclear Regulatory Commission (NRC or the staff) review has determined that if ASTM A325, ASTM F1852, and/or ASTM A490 bolts are used, the preventive actions as discussed in Section 2 of the Research Council for Structural Connections "Specification for Structural Joints Using ASTM A325 or A490 Bolts" should be followed. This recommendation is now captured in structural AMPs XI.S1, XI.S3, XI.S6, and XI.S7 of the GALL Report.

Issue:

The staff reviewed the structural AMPs in license renewal application (LRA) Sections B2.1.27, B2.1.29, B2.1.32, and B2.1.33, as well as the associated support documents, and found no discussion of the preventive actions recommended in "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

Request:

If ASTM A325, ASTM F1852, and/or ASTM A490 bolts are used, explain how the preventive actions discussed in Section 2 of "Specification for Structural Joints Using ASTM A325 or A490 Bolts" are addressed, or why they are unnecessary. The response should address all structural bolting within the scope of license renewal.

STPNOC Response:

Plant procedures require that "...only new bolts, nuts and washers shall be used in bolted connections. Bolts, nuts, and washers shall be in good condition and not corroded, damaged, or dirty." Plant procedures will be enhanced to include the preventive actions recommended in Section 2 of the Research Council for Structural Connections "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for ASTM A325, ASTM F1852 and/or ASTM 490 bolts.

LRA Appendices B2.1.27, B2.1.29, B2.1.32, and B2.1.33 and LRA Basis Documents AMPs XI.S1 (B2.1.27), XI.S3 (B2.1.29), XI.S6 (B2.1.32), and XI.S7 (B2.1.33) will be revised to include the following enhancement:

> For ASTM A325, ASTM F1852, and/or ASTM A490 structural bolts, plant procedures will be revised to specify the preventive actions for storage, protection and lubricants recommended in Section 2 of Research Council for Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

The following will be added to revise LRA Table A4-1 Commitments 23 (B2.1.29), 25 (B2.1.32) and 26 (B2.1.33) and will be added as new Commitment 35 (B2.1.27).

> Specify the preventive actions for storage, protection and lubricants recommended in Section 2 of Research Council for Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for ASTM A325, ASTM F1852 and/or ASTM 490 bolts.

Enclosures 2 and 3 provide the mark-in/mark-out sections of the License Renewal Application.

RAI B2.1.32-02

Background:

Based on recent operating experience and recent NRC reviews, the staff has determined that structures within the scope of license renewal should be monitored on a frequency not to exceed five years. This current staff position is captured in GALL AMPs XI.S5 "Masonry Walls," and XI.S6, "Structures Monitoring Program."

Issue:

Program element 4, "detection of aging effects," of the Structures Monitoring Program states that inspections are scheduled so that all accessible areas of both units are inspected every 10 years. Program element 4 of the Masonry Wall Program states that a total inspection of an equivalent unit is completed at a frequency of no more than five years. It is unclear to the staff that the inspection frequency meets the recommendations of the GALL Report.

Request:

Identify the structures and masonry walls that will be inspected with an inspection interval greater than 5 years, and include a technical justification for the longer interval. The justification should include the environments the structures are exposed to and a summary of past degradation. This issue applies to both the Structures Monitoring and the Masonry Wall Programs.

STPNOC Response:

The current program allows the Structures Monitoring Program engineer to extend the frequency of inspection of structures to ten years if no degradation is found during the five year interval inspection. ACI 349.3R, Table 6.1, recommends inspection intervals of five years for some components and ten years for other components. Prior to entering the period of extended operation the program will be enhanced to fully comply with the recommended frequencies from ACI 349.3R, Table 6.1.

LRA Appendices B2.1.31 and B2.1.32 and LRA Basis Documents AMPs XI.S5 (B2.1.31) and XI.S6 (B2.1.32) will be revised to include the following enhancement:

Prior to the period of extended operation, Masonry Wall Program (B2.1.31) and Structures Monitoring Program (B2.1.32) procedures will be enhanced to specify that the inspection frequency for structures within the scope of license renewal will be in accordance with ACI 349.3R, Table 6.1, which specifies:

For below-grade structures and structures in controlled interior environment (except inside primary containment), all accessible areas of both units will be inspected every 10 years.

For all other structures (including inside primary containment), all accessible areas of both units will be inspected every 5 years.

This enhancement will also be added to revise Commitment 25 (B2.1-32) and will be added as new Commitment 36 (B2.1-31) to LRA Table A4-1.

Enclosures 2 and 3 provide the mark-in/mark-out sections of the License Renewal Application.

RAI B2.1.32-03

Background:

In GALL AMP XI.S6, ACI 349.3R-96 is noted to provide an acceptable basis for developing acceptance criteria for concrete structures. The GALL Report also states that applicants who are not committed to ACI 349.3R and elect to use plant-specific criteria for concrete structures should describe the criteria and provide a technical basis for deviations from those listed in ACI 349.3R.

Issue:

Element 6 of the LRA basis document states that the Structures Monitoring Program provides guidance for the determination of performance criteria for the SSCs included within the scope of the maintenance rule. Guidelines are used to establish the inspection attributes for SSCs monitored by the Structures Monitoring Program with classifications of acceptable, acceptable with degraded, and unacceptable used to classify levels of aging effects for each inspection attribute. It is unclear to the staff if ACI 349.3R-96 provides the basis to establish the South Texas Project (STP) aging classifications, or if some other basis is utilized and what criteria are used to categorize an SSC as having an acceptable, acceptable with degraded, and unacceptable classification of aging. This issue applies to all programs under the Structures Monitoring Program (i.e. RG 1.127 and Masonry Wall Programs).

Request:

1. Provide the quantitative acceptance criteria for the Structures Monitoring and the Inspection of Water-Control Structures Inspection Programs. If the concrete acceptance criteria deviate from those discussed in ACI 349.3R-96, provide technical justification for the differences.

2. If quantitative acceptance criteria will be added to the programs as an enhancement, provide plans and a schedule to conduct a baseline inspection with the quantitative acceptance criteria prior to the period of extended operation.

STPNOC Response:

1. The Structures Monitoring procedure (which includes inspection of water-control structures) provides checklists that identify the parameters to be monitored. The procedure requires structural deficiencies be quantitatively described. All deficiencies identified to date have been evaluated. None of the deficiencies identified were noted as being greater in size than a hairline crack, and all were determined to not have any impact on the capability of the structure to perform its intended function. Each identified deficiency falls into the first-tier categorization as specified in ACI 349.3R-96. Plant procedures will be enhanced before the next inspection period to provide inspection criteria and reference both ACI 349.3R-96 and ACI 201.1R-68.

2. Since all deficiencies have been evaluated and found not to exceed the quantitative acceptance criteria for first-tier categorization as specified in ACI 349.3R, a new baseline inspection is not required.

LRA Appendix B2.1.32, Appendix B2.1.33, Table A4-1 Commitments 25 and 26, LRA Basis Documents AMPs XI.S6 (B2.1.32), Structures Monitoring program, and AMP XI.S7 (B2.1.33), Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program, will be revised to specify ACI 349.3R-96 and ACI 201.1R-68 as the bases for defining quantitative acceptance criteria.

Enclosures 2 and 3 provide the mark-in/mark-out sections of the License Renewal Application.

RAI B2.1.32-04

Background:

In GALL AMP XI.S6, in program element 3 "parameters monitored or inspected" and program element 4, "detection of aging effects," notes that the structures monitoring program addresses detection of aging effects for inaccessible, below-grade concrete structural elements, and for plants with non-aggressive ground water/soil (pH > 5.5, chlorides < 500 ppm, and sulfates <1500 ppm), the program recommends: (a) evaluating the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas and (b) examining representative samples of the exposed portions of the below-grade concrete, when excavated for any reason. The GALL Report also notes that for plants with aggressive ground water/soil (pH < 5.5, chlorides > 500 ppm, or sulfates > 1500 ppm) and/or where the concrete structural elements have experienced degradation, a plant-specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.

Issue:

The LRA and element 3 of the LRA basis document state that plant procedures will be enhanced to monitor at least two groundwater samples every five years for pH, sulfates, and chlorides, but no results are provided to demonstrate that the groundwater is either aggressive or non-aggressive. Also in element 4 of the LRA basis documents for the Structures Monitoring Program and the Reg. Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program, no mention is made of opportunistic inspections of below-grade structures or a plant-specific program to address the below-grade structures if the ground water is aggressive. It is unclear to the staff how inaccessible concrete structures subjected to groundwater will be managed for aging.

Request:

1. Provide historical results, including seasonal variations, for groundwater chemistry (i.e., pH, sulfates, and chlorides) to demonstrate that the groundwater is either aggressive or non-aggressive.

2. If historical results indicate that the groundwater is considered to be non-aggressive, demonstrate that opportunistic inspections of exposed portions of the below-grade concrete, when excavated for any reason, will be performed under both the Structures Monitoring Program and the Reg. Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program, or explain why the inspections are not needed.

3. If historical results indicate that the ground water is aggressive, or where accessible concrete structural elements have experienced degradation, identify the plant-specific program that will be used to manage aging of these structures, or explain why the existing programs are adequate.

STPNOC Response:

STPNOC will provide a response to this RAI by October 21, 2011 under a separate cover letter.

RAI B2.1.32-05

Background:

In GALL AMP XI.S6, program elements 3 and 4 state that for each structure/aging effect combination the specific parameters monitored or inspected are selected to ensure that the aging degradation leading to loss of intended function will be detected and quantified before there is a loss of intended function.

Issue:

As a result of the field walk-down with the applicant's technical staff on June 14, 2011, the staff noticed that there was essentially no leakage from the spent fuel pool leak chase channels. Also during the walk-down visual examinations of the exterior wall of the spent fuel pool and the underside of the spent fuel pool indicated no signs of leakage or degradation of the reinforced

concrete. The staff is uncertain if the absence of leakage from the leak chase channels is representative of no leakage occurring, or if the leak chase channels are clogged. If the channels are clogged, leakage could accumulate behind the liner and eventually migrate through the concrete, possibly causing degradation of the reinforced concrete.

Request:

1. Discuss any actions taken to ensure that the spent fuel pool leak chase drainage system remains free and clear.

2. Describe how it will be verified that the leak chase drainage system remains free and clear during the period of extended operation (e.g., boroscope inspections of leak chase channels). If the verification involves actively inspecting or clearing the system, provide the frequency of the action and a justification for the proposed frequency.

STPNOC Response:

1. The spent fuel pool tell-tale drains are checked each shift by a Plant Operator and results are logged in the Mechanical Auxiliary Building Logsheets. The spent fuel pool leak chase drainage system has been monitored since startup of both units and none of the spent fuel pool tell-tale drains have a history of boric acid residue buildup. There has been some boric acid residue buildup at the tell-tale drains for the transfer canal in Unit 1. A corrective maintenance work order will provide verification that these drains are clear.

2. To ensure the spent fuel pool and transfer canal tell-tale drains remain free and clear through the period of extended operation, preventive maintenance activities will be developed to inspect the leak chase drainage system. The periodic inspection will include internal visual inspection of the accessible sections of the tell-tale drain lines. Based on the current condition of the spent fuel pool tell-tales, inspections will be performed at an initial inspection frequency of every five years. The STP preventive maintenance program has a continuous optimization process. Adjustments to the inspection activity frequency may be made based on as-found conditions to ensure an optimum frequency is maintained.

   LRA Appendix B2.1.32, Structures Monitoring Program and LRA Basis Documents AMP XI.S6 (B2.1.32) will be revised to include the following enhancement:

   > Procedures will be enhanced to require the performance of a periodic visual inspection of the accessible sections of the spent fuel pool and transfer canal tell-tale drain lines for blockage every five years. The first inspection will be performed within the 5 years before entering the period of extended operation.

   This enhancement will be added to revise LRA Table A4-1 Commitment 25 (B2.1.32).

   Enclosures 2 and 3 provide the mark-in/mark-out sections of the License Renewal Application.

RAI B2.1.32-06

Background:

In GALL AMP XI.S6, program elements 3 and 4 state that for each structure/aging effect combination the specific parameters monitored or inspected are selected to ensure that the aging degradation leading to loss of intended function will be detected and quantified before there is a loss of intended function.

Issue:

As a result of the field walk-down with the applicant's technical staff on June 14, 2011, the staff noticed that in the area between the fuel handling building and the Unit 2 containment, water had accumulated to a depth of 6 ft. or 7 ft. The staff also noted that some indications of deposits were observed on the wall of the fuel handling building above the current water level. When asked, the applicant noted that there were no criteria related to when to remove the water and that the surfaces of the containment and the fuel handling building subjected to the standing water were not routinely inspected after the water had been removed. The staff is uncertain whether the standing water has resulted in concrete degradation or could lead to degradation during the period of extended operation.

Request:

1. Explain where the standing water between the fuel handling building and the Unit 2 containment is coming from and provide justification for this conclusion.

2. Discuss any actions taken to address the accumulation of standing water between the fuel handling building and the Unit 2 containment (e.g. increased visual inspections, crack mapping, etc.)

3. Provide any plans to develop criteria related to when the standing water is removed and how the surfaces exposed to the standing water will be managed for aging during the period of extended operation (e.g. visual inspections, crack mapping, core bores, etc.). Provide technical justification that these actions will be adequate to manage aging.

4. If similar conditions exist in Unit 1, provide the above information for both units and a discussion of any differences in the aging management approaches between the units.

STPNOC Response:

1. The water between the Unit 2 Fuel Handling Building (FHB) and the Reactor Containment Building in Room 011 is located at the FHB base mat, elevation -29'. Groundwater around the site is at approximately elevation +16'. Waterstops are installed between the two buildings to prevent groundwater intrusion. However, groundwater imposes a head of approximately 40' and seeps into this area at a slow rate.

   Groundwater monitoring wells are located throughout the plant area. The nearest wells (221C and 221E) to Room 011 are located due east between the two Units. Recent water samples from both wells indicated a pH of 7.6. Recent water samples of the groundwater in

Room 011 indicated a pH of 8.7. These sample results are within the expected variability of other groundwater pH samples and confirm that the water in Room 011 is from groundwater intrusion.

2. A water sample from Room 011 was tested on August 8, 2011 for pH, sulfates, and chlorides. Test results were a pH of 8.76, a sulfate concentration of 13.7 ppm, and a chloride concentration of 25.8 ppm. Water considered aggressive to concrete has a ph < 5.5, sulfates > 1500 ppm, and chlorides > 500 ppm. Therefore, the August 8, 2011 sample results indicate that the water is non-aggressive to concrete.

   The water will be removed and the concrete surface will be inspected using the guidance in ACI-201.1R and ACI 349.3R. The inspection will be documented in the corrective action program database. Future inspections of this area will follow the frequency and inspection guidance of the Structures Monitoring Procedure. STPNOC responses to Requests for Additional Information B2.1.32-02 and B2.1.32-03 address the frequency and quantitative requirements for the inspections.

3. The water sample test discussed in 2 above indicates the water is non-aggressive to concrete. The 2008 version of the ACI 318 Code includes additional restrictions beyond those that existed in the 1971 Code, the STP Code of Record. The 2008 Code includes additional requirements in sections 4.2.1 and 4.3.1 for concrete exposed to groundwater. In particular, the 2008 Code limits water-to-cement ratio to 0.40 and the maximum chloride ion content to 0.06 percent for pre-stressed concrete and 0.15 percent for reinforced concrete. It also specifies higher strength requirements (5000 psi) and larger concrete cover. STP concrete strength is specified as f_c greater than 5000 psi for the containment shell. Concrete strength for the FHB is specified as 4000 psi, but actual tests of sample cylinders revealed all pours had actual strength in excess of 5000 psi by 90 days. As stated in Tables 3.8.1-4 and 3.8.1-5 of the STP Updated Final Safety Analysis Report (UFSAR), chloride content does not exceed 475 parts per million, or 0.0475 percent. This meets the 0.06 percent maximum chloride limit for pre-stressed concrete exposed to groundwater and also meets the 0.15 percent limit for reinforced concrete. The Concrete Properties Report confirms that the water-to-cement ratio does not exceed 0.40 for the Reactor Containment Building and does not exceed 0.48 for the FHB. Thus, the areas exposed to standing groundwater meet the licensed Code requirements for exposure to water and also meet all of the additional current Code requirements except the 0.40 limit on water/cement ratio in the FHB and the requirement for additional concrete cover in the FHB. Section 7.7.6.1 of ACI 318-08 waives the requirement for increased cover for pre-stressed concrete not in tension under sustained loads. STP containment structures qualify for this waiver.

   The principal concern with standing water is the increased potential for corrosion. The current Code requires additional concrete cover to protect the rebar. Insufficient cover could potentially expose a layer of rebar to corrosion. Rust stains would be visible at the surface should mild corrosion occur. If more severe corrosion occurs, spalled concrete due to expanded volume of corroded rebar could result. Either of these symptoms would be observable during normally scheduled structures monitoring walkdowns. Therefore, observation of concrete exposed to standing water does not pose any special challenges.

   The water will be removed and the concrete surface will be inspected using the guidance in ACI-201.1R and ACI 349.3R. The inspection will be documented in the corrective action

database. Future inspections of this area will follow the frequency and inspection guidance as per the Structures Monitoring Procedure. The STPNOC responses to Requests for Additional Information B2.1.32-02 and B2.1.32-03 address the frequency and quantitative requirements for the inspections.

4. Conditions similar to those described in Unit 2 do not exist in Unit 1. A drain installed in Unit 1 directs water in this area to the tendon gallery. The area was drained and visually inspected. No aging effects have been identified in this area. Both Units will follow similar aging management approaches.

RAI B2.1.32-07

Background:

In GALL AMP XI.S7, program elements 3 and 4 state that for each structure/aging effect combination the specific parameters monitored or inspected are selected to ensure that the aging degradation leading to loss of intended function will be detected and quantified before there is a loss of intended function. Element 4 also states that inspections should be conducted at an interval of no greater than 5 years.

Issue:

The LRA includes an enhancement to program element 4, "detection of aging effects," which states that the program will be enhanced to specify inspection at intervals not to exceed 5 years; however, it does not clearly state that concrete structures below the water-line will be inspected on this frequency.

Request:

1. Describe the procedure and acceptance criteria for visual inspections for below water ECW intake and discharge structures (e.g., drain the areas, utilize divers, etc.).

2. Provide the frequency of inspection for these structures. If the frequency does not meet the recommendations in the GALL Report, provide justification for the inspection frequency.

STPNOC Response:

1. The Structures Monitoring Program (B2.1.32) requires the inspection of submerged concrete structures. The ECW intake and discharge structures are dewatered and visually examined, or visually inspected using divers every third cycle. As noted in response to RAI B2.1.32-03, the Structures Monitoring Program, which includes the inspection of water-control structures, requires structural deficiencies be quantitatively described. All deficiencies identified to date have been evaluated, and none were noted as being greater in size than a hairline crack. No deficiency was determined to have a negative impact on the capability of the structure to perform its intended safety function. Each identified deficiency falls into the first-tier categorization specified in ACI 349.3R-96.

2. The inspection frequency of every third cycle is consistent with the five-year interval recommended in the GALL report.

RAI B2.1.27-01

Background:

Based on operating experience and recent NRC reviews, the staff has determined that containment stainless steel penetration sleeves, dissimilar metal welds, bellows, and steel components that are subject to cyclic loading but have no current licensing basis fatigue analysis should be monitored for cracking through surface examinations. This current staff position is captured in GALL AMP XI.S1 "ASME [American Society of Mechanical Engineers Boiler and Pressure Vessel Code] Section XI, Subsection IWE," program element "detection of aging effects."

Issue:

LRA Section 4.6.2 states that all containment penetrations whose design is supported by a fatigue or cyclic load analysis are addressed as TLAAs. However, the LRA does not state whether or not there are additional containment penetrations exposed to cyclic loads which are not covered by the analysis.

Request:

Identify any containment stainless steel penetration sleeves, dissimilar metal welds, bellows, or steel components that are subject to cyclic loading but have no current licensing basis fatigue analysis. If there are components which meet these criteria, explain how they are monitored for cracking. If surface examinations are not used, justify why they are not needed.

STPNOC Response:

The specification for containment penetrations identifies and requires a fatigue analysis for all penetrations experiencing significant transients. These fatigue analyses are discussed in LRA Section 4.6.2. Review of the stress reports of containment penetrations did not reveal any other containment penetrations that would be subject to fatigue that are not included in LRA Section 4.6.2. Based on this review, there are no containment stainless steel penetration sleeves, dissimilar metal welds, bellows, or steel components subject to cyclic loading that do not have a current licensing-basis fatigue analysis.

RAI B2.1.27-02

Background:

ASME Code, IWE-1241 states that containment surface areas subject to accelerated degradation and aging require augmented inspection. The code goes on to list concrete-to-steel shell or liner interfaces as an example of one such area.

Issue:

During the audit, it was not clear to the staff whether or not the moisture barrier is considered an area requiring augmented examination per IWE-1241.

Request:

a. State whether or not the moisture barrier is identified as an area requiring augmented examination per IWE-1241 and whether or not augmented examinations are being performed on the area. If it is not identified as an area requiring augmented examination, provide the justification for why augmented examination is not needed.

b. Explain whether or not any degradation has been identified on the actual moisture barrier and if so how it was addressed.

STPNOC Response:

a. IWE-1241 requires augmented examinations for containment surface areas subject to accelerated corrosion where the absence or repeated loss of protective coatings has resulted in substantial corrosion and pitting. Typical locations of such areas are those exposed to standing water, repeated wetting and drying, persistent leakage, and those with geometries that permit water accumulation, condensation, and microbiological attack.

   At STP, the area near the moisture barrier at the interface between the containment steel liner and the concrete is not identified as an area requiring augmented examination per IWE-1241. Previous inspections of accessible surfaces in this area have not identified any substantial corrosion and pitting. There has been no indication of significant absence of or repeated loss of protective coatings. There are no areas exposed to standing water, repeated wetting and drying, persistent leakage, or those with geometries that permit water accumulation, condensation, and microbiological attack.

b. There have been no aging effects identified on the actual moisture barrier. The most recent inspections of the containment steel liner and the moisture barrier were performed in 2008. The June 23, 2008 Summary Report for the 1RE14 Inservice Inspection of Unit 1 (ML081830516) and the January 20, 2009 Summary Report for the 2RE13 Inservice Inspection of Unit 2 (ML090360580) provide documentation that no relevant indications were found for these components.

RAI B2.1.28-1

Background:

GALL AMPXI.S2, "ASME Section XI, Subsection IWL," program element 3, "parameters monitored or inspected," recommends that concrete surfaces are to be examined for evidence of damage or degradation. During the STP Unit 2 walkdown, the following issues were noted by NRC staff on June 14, 2011:

1. Grease-stains on the south containment wall (between south containment wall and fuel handling building) at -13 feet floor elevation between penetrations M-14 and M-13, and adjacent to penetrations M12 and M11.

2. Accumulated grease in the tendon gallery at -36 feet floor elevation. It appeared that grease was leaking from the grease-cans of tendons 137, 136, 232, 212, 145, and 211.

3. Grease-stains in the tendon gallery ceiling around the grease-can for tendons 236, 237, and 238.

Issue:

Grease leaking from pre-stressing tendon anchorage cans and sheathing into concrete may degrade the structural integrity of containment concrete and the pre-stressing system over the long term during the period of extended operation.

Request:

Explain how the effect of degradation on the containment concrete, including on reinforcement and on pre-stressing tendons, will be adequately managed so that Units 1 and 2 containments intended functions are maintained consistent with the current licensing basis (CLB) during the period of extended operation, as required by Title 10 of the Code of Federal Regulations (10 CFR) Part 54.21.(a)(3). The response should include the following:

1. Long term effect of grease leakage on the strength and durability of concrete.

2. Loss of corrosion protection of the pre-stressing tendons and anchorage components due to uncontrolled leakage of the grease from grease cans and tendon sheathings.

3. Long term effects on concrete-rebar bonding, if any. Provide discussion for applicable reinforcements supported by detailed containment structural drawings.

STPNOC Response:

The existing tendon surveillance program monitors grease leakage, water intrusion, and aging effects associated with corrosion of the tendons. The program adequately maintains the intended functions of the pre-stressing system consistent with the Current Licensing Basis during the period of extended operation.

1. STP has no operating experience and STPNOC does not know of any industry operating experience that would indicate concrete strength or durability is reduced due to grease leakage from unbonded tendons. A study sponsored by the USNRC Office of Nuclear Regulatory Research ("An Investigation of Tendon Corrosion-Inhibitor Leakage into Concrete", D. J. Naus, C. B. Oland, and J. F. Costello, July 5, 1999, Report Number ORNL/CP-102334) did not find any indication of harmful interactions between concrete and the corrosion-inhibiting grease used as tendon sheathing filler in commercial nuclear power plants. The concrete containment is included in the structures monitoring program. Any concrete degradation that may result from the grease would be identified as part of the structures monitoring program walk downs.

2. The quantity of grease leakage that has been identified is minor. In most instances, leakage has only been evident as a visible stain. The permanent corrosion prevention coating for tendons is a petroleum or microcrystalline wax-base material containing additives to enhance the corrosion-inhibiting and wetting properties, as well as forming a chemical bond with tendon steel. Minor leakage has not inhibited the tendons from remaining adequately coated with the corrosion inhibitor. STP operating experience has not identified any unacceptable corrosion of the tendons.

3. The pre-stressing system for the STP containment utilizes post-tensioned tendons installed in embedded sheaths after the concrete has been placed. Bonding between the conventional reinforcing steel and the concrete begins during the early stages of hydration and is essentially complete before the grease is installed later in the construction process. There has been no operating experience at STP, nor does STPNOC know of any operating experience in the industry, that would indicate that leakage of corrosion-inhibiting grease could contribute to a reduction of bond strength after the bond has properly formed.

RAI B2.1.28-2

Background:

GALL AMPXI.S2, "ASME Section XI, Subsection IWL," program element 10, "operating experience," recommends that the applicant's AMP for concrete containments consider the degradation concerns described in the NRC's generic communications, including NRC Information Notice 99-10, "Degradation of Pre-stressing Tendon Systems in Pre-stressed Concrete Containments."

Issue:

It is not clear from the LRA if the effect of high temperature on the tendon pre-stressing forces, as described in Information Notice 99-10, has been considered by the applicant as a part of the AMP.

Request:

Explain how the effects of high temperature on the pre-stressing forces in tendons has been considered so that STP Units 1 and 2 containments' intended functions are maintained consistent with the CLB during the period of extended operation, as required by 10 CFR Part 54.21.(a)(3).

STPNOC Response:

Information Notice 99-10 includes the observation that steel relaxation in containment tendons at some plants has been more rapid than predicted. This was attributed to elevated temperatures. As stated in the Information Notice, actual lifetime (40 year) relaxation losses may be in the range of 15.5 to 20 percent at 90 degrees Fahrenheit vs. design predictions in the range of 4 – 12 percent that are typically established at 68 degrees Fahrenheit. STP used tests at 68 degrees Fahrenheit to validate the conservatism of the predicted losses. At STP,

predicted relaxation loss over 40 years for a typical tendon is 10 percent of installed tendon stress. Comparing this to the 20 percent loss suggested by Information Notice 99-10 implies an additional 10 percent loss is possible. If this discrepancy existed, it would have been observed during surveillances. The actual liftoff tests through the first 20 years of plant life have been at least 95 percent of predicted, except for two that were 94 percent of predicted.

As stated in NRC Regulatory Guide 1.35.1, *Determining Prestressing Forces for Inspection of Prestressed Concrete Containments,* tendon losses are assumed to occur linearly with the logarithm of time. Therefore, most of the lifetime losses would have occurred during the first 20 years and would have been seen in surveillances conducted during the first 20 years of plant life. On a logarithmic scale, the expected losses during the period of 40 to 60 years of plant life are very small compared to the losses during the first 20 years. The surveillance data through the first 20 years (when most of the lifetime loss occurs) closely matches predicted losses. This confirms the accuracy of the methods used to predict losses. Therefore, the containment's intended functions are maintained consistent with the Current Licensing Basis during the period of extended operation.

RAI B2.1.28-3

Background:

GALL AMPXI.S2, "ASME Section XI, Subsection IWL," program element 6, "acceptance criteria," refers to ACI 201.1R and ACI 349.3R to provide an acceptable basis for developing acceptance criteria for concrete structures. The GALL Report also states that "Quantitative acceptance criteria based on the Evaluation Criteria provided in Chapter 5 of ACI 349.3R also be used to augment the quantitative assessment of the Responsible Engineer."

Issue:

During the audit, the NRC staff reviewed the implementing procedures used for concrete containment inspection. PSC procedure 8.4 "PSC Quality Surveillance Procedure, General Visual Examination of Concrete Containment," dated November 19, 2010, was used for the general inspection of exposed accessible exterior surface of the concrete containments during the 2010 inspection. ACI 349.3R is not referenced in the PSC's procedure. However, Section 3.6 "Acceptance Criteria" of STP license renewal basis document for ASME Code, Section XI, Subsection IWL refers to ACI 201.1R and ACI 349.3R to establish the general structural condition of containment surface. It is unclear to the staff if the quantitative acceptance criteria of ACI 349.3R have been used to establish the general structural condition of containment surface.

Request:

1. Provide the quantitative acceptance criteria used for concrete containment inspection. If the concrete acceptance criteria deviate from those discussed in ACI 349.3R, provide technical justification for the differences.

2. If quantitative acceptance criteria will be added to the AMP as an enhancement, provide plans and a schedule to conduct a baseline inspection with the quantitative acceptance criteria prior to the period of extended operation.

STPNOC Response:

1. LRA Appendix B2.1.28 states, "...Acceptance criteria, corrective actions, and expansion of the inspection scope, when degradation exceeding the acceptance criteria is found, are in accordance with ASME Section XI, Subsection IWL." IWL-2510 specifies that, "Concrete surface areas ... shall be visually examined ... for evidence of conditions indicative of damage or degradation, such as described in ACI 201.1 and ACI 349.3R." STP specifications state that acceptance criteria for examinations are consistent with the guidance of ACI 349.3R, and "The condition of the exterior concrete surface is acceptable if the Responsible Engineer determines that there is no evidence of damage or degradation sufficient to warrant further evaluation or repair, using the guidance in reference ACI 349.3R."

   Inspections of the exterior concrete surface of the containment building are performed in accordance with STP specifications, the ASME IWL code, and applicable ACI standards including ACI 201.1 and ACI 349.3R.

2. The most recent inspections of the exterior concrete surfaces of the containment buildings were completed in accordance with ACI 201.1R-92. ACI 349.3R is cited by ACI 201.1R as an additional reference to be used when visually inspecting concrete. ACI 349.3R states that cracks less than 0.015 inch wide are acceptable without further evaluation. No cracks wider than 0.010 inch were found.

   Since the use of ACI 349.3R acceptance criteria is required by the LRA Bases Document AMP XI.S2, ASME Section XI, Subsection IWL program, and STP specifications, these criteria have been properly applied to past inspections and no enhancement or new baseline inspection is required.

RAI B2.1.29-1

Background:

GALL AMP XI.S3, program element 5, "monitoring and trending" states that examinations of component supports that reveal indications which exceed the acceptance standards and require corrective measure are extended to include additional examinations in accordance with IWF 2430.

Issue:

Upon review of plant-specific operating experience, the staff noted that during inservice inspection examination activities for a component support on the essential cooling water intake structure, excessive corrosion was found on the support base plate and base plate bolts. The licensee performed an engineering evaluation of the corroded support to determine whether the

component was acceptable for continued service. The engineering evaluation determined that the component support still met the criteria for functionality in accordance with subsection IWF 3000. The licensee used the provisions of ASME code case N-491-2, Section IWF-2430 to justify that no successive or additional examinations would need to be conducted. However, the applicant chose to rework the component to arrest further corrosion. During a walkdown, the staff noticed that adjacent supports in the same area showed signs of excessive corrosion. The licensee created a Condition Record (CR) to repair the supports the staff identified as showing signs of degradation.

The staff is concerned that the applicant's approach of selectively reworking the support that did not meet the acceptance criteria of IWF-3400, and not extending the inspection to increase the number of supports to be inspected in accordance with IWF-2430, may not be effective in managing aging of the component supports during the period of extended operation. This is reflected by the as-found conditions of adjacent supports during the staff's walkdown and issuance of a CR. A component support included in the scope of inservice inspection (ISI), that is reworked to an as-new condition prior to meeting the threshold for expansion of the ISI scope per the ASME Code, is no longer representative of adjacent component supports that show similar signs of aging but are not in the specific ISI inspection sample. During successive inspections as part of the ISI-IWF aging management program, the re-worked component support would be inspected but would no longer represent the aging effects of the surrounding supports with the same material/environment combination. The concern is that those surrounding supports could continue to age, possibly to the point of exceeding the acceptability criteria of IWF subsection 3000 but would not be re-worked since they would be outside the inspection sample that is subject to ASME code requirements.

Request:

Describe how a repair made to a component support outside of the ISI program criteria, resulting in an "as-new" ISI program sample component, without an expansion of ISI program sample population size, will be effective in managing aging of similar/adjacent components that are not included in the ISI program sample population.

STPNOC Response:

To the extent practical, the same supports selected for examination during the first inspection interval shall be examined during each successive inspection interval. In accordance with the 2004 Edition of ASME Section XI, STP will meet the requirements of IWF-3120 (ISI Acceptance Methods) and IWF-2430. When relevant conditions defined in IWF-3400 (Acceptance Standards) are identified, sample expansion criteria are applied.

When component support conditions are found to include minor age-related degradation that does not meet the threshold of "unacceptable for continued service" as defined in IWF-3400, an evaluation will be performed in accordance with the corrective action program. If this evaluation determines that the component, without repair, will continue to perform its intended function until the next scheduled inspection, the component support will not be repaired but will be monitored for increased degradation. The evaluation will also consider which inspections/repairs may be required for similar/adjacent components not included in the ISI program sample population and assure additional inspections are performed during the next scheduled inspection. As an alternative, STPNOC may choose to repair the degraded

component and replace it in subsequent inspections by a randomly selected component that is more representative of the general population.

STPNOC will update the aging management program procedure to incorporate the above mentioned guidance.

RAI B3.3-2

Background:

GALL AMP X.S1 states that plant-specific operating experience must be evaluated for relevancy to a licensee's aging management program, and appropriate actions be taken and documented. In addition, program element 3, "parameters monitored," of GALL AMP X.S1 recommends that containment tendon pre-stressing forces be monitored in accordance with Subsection IWL of Section XI of ASME Code, as incorporated by reference in 10 CFR 50.55a.

Issue:

Upon onsite review of the applicant's Inservice Surveillance of Containment Post-tensioning System Program basis documents, the staff noted that the applicant's procedure defines the acceptance criteria for an individual tendon as having a prestress force greater than 95 percent of predicted force. LRA section B3.3 states that two of the 140 tendon lift-off tests did not meet acceptance criteria for the containment tendon prestress program. During its review, the staff noted the following:

1. LRA Section B3.3 states that one deficient tendon was found in year 1 in Unit 2 and the other was found in year 5 in Unit 1. However, program documentation reviewed on site indicated that the deficient tendons were both found in Unit 2.

2. According to IWL- 2421, "Sites With Multiple Plants," for the containment with the first Structural Integrity Test, all examinations required by IWL-2500 shall be performed at 1, 3, and 10 years and every 10 years thereafter. For each subsequent containment, all examinations required by IWL-2500 shall be performed at 1, 5 and 15 years and every 10 years thereafter.

3. Staff reviewed onsite documentation that stated that corrective actions in the form of additional tendon inspections were taken after the deficient tendons were found, but that these additional inspections were not done until after the year 10 surveillance inspection, even though the deficiencies were found in the year 1 and year 5 surveillance inspections. The LRA does not explain the corrective actions that were taken per the program procedure or any follow-up actions to resolve the issue.

Request:

1. Resolve the discrepancy between the LRA and the onsite program basis documents as to which Unit each of the deficient tendons were located.

2. Describe, from the first containment structural integrity test, the tendon surveillance intervals for both containments (Units 1 and 2), and address how these intervals are in accordance with IWL-2421 requirements for sites with multiple plants.

3. Regarding corrective actions:

   a. Describe what corrective actions were taken as a result of discovering conditions that did not meet acceptance criteria per program procedure. Explain how these corrective actions meet the requirements of IWL-3221.1.

   b. Provide information on when corrective actions were taken. If corrective actions were not performed during the surveillance interval for each of the identified deficient tendons, provide justification for delaying the implementation of the corrective actions.

STPNOC Response:

1. LRA Section B3.3 and LRA AMP B3.3 (X.S1) are correct in that one deficient tendon was found for year 1 in Unit 2 and the other was found for year 5 in Unit 1.

2. STP was originally licensed for a containment inspection program that was in accordance with Regulatory Guide 1.35 (April 1979, proposed rev. 3). Subsequently, 10 CFR 50.55a required all licensees to adapt ASME IWL by September 2001. All surveillances (15th year and 20th year) since September 2001 are conducted in compliance with IWL. All previous surveillances were in compliance with RG 1.35.

   The proposed RG 1.35 required liftoff testing in Unit 1 at years 1, 5, 10, 20, and 30 and in Unit 2 at years 1, 5, 15, 25 and 35. The only difference between this schedule and IWL-2421 is that IWL-2421 requires liftoff testing in Unit 1 at year 3 instead of year 5. The actual liftoff testing was performed in Unit 1 at year 5, not year 3, in accordance with the schedule given in RG 1.35.

   The structural integrity test was performed in Unit 1 in March 1987 and Unit 2 in March 1988. Thus, the two units are one year apart. Beginning at the 10th year surveillance (performed in 1998), surveillances were aligned so that both units would be done at the same time. In other words, the "10th year" surveillance performed in 1998, was really the 11th year in Unit 1 and the 10th year in Unit 2. This is consistent with IWL-2410(c), which allows a one year grace period (plus or minus) on surveillance intervals.

3a. Corrective actions were implemented as described in STP Licensee Event Report LER 1-98-001. As described in response to item 2, IWL 3221.1 did not become effective at STP until the 15th year surveillance performed in 2003. The corrective actions were implemented during the 10th year surveillance in 1998, in accordance with the proposed RG 1.35 and the Technical Specifications applicable at the time. Nevertheless, the physical corrective actions were entirely consistent with IWL 3221.1. For each of the two affected tendons, the tendon was retested, and two additional adjacent tendons were tested. These liftoff tests all met the IWL 3221.1 criterion (acceptable if greater than 95 percent of predicted). In addition, some administrative corrective actions were implemented, including revision of the calculation used to predict tendon liftoff forces and revision to the calculation procedure to add more stringent requirements for calculation review.

3b. In January 1998, during a review of program documentation in preparation for the 10th year surveillance, an error was discovered in the calculation used to predict liftoff forces. Liftoff forces measured during previous surveillances (years 1 and 5 in both units) were retroactively compared to the corrected acceptance criteria (95% of predicted force). It was determined that two tendons (one per unit) that had been accepted using the incorrect acceptance criteria would have been deemed unacceptable using the corrected calculation. As described above in item 3a, the corrective action involved testing two additional tendons adjacent to each affected tendon. This testing was done during the scheduled 10th year surveillance in 1998, the first opportunity after discovery of the condition.

RAI B3.3-3

Background:

GALL AMP X.S1 states that plant-specific operating experience must be evaluated for relevancy to a licensee's aging management program, and appropriate actions be taken and documented.

Issue:

Upon review of the applicant's inservice surveillance of containment post-tensioning system program review, the staff noted that the applicant's procedure sets a limit to the volume of grease voids that can exist in any one tendon. The license renewal application states that grease voids in excess of surveillance requirements were found during the Unit 1 year 3, 5, and 10 inspections, and Unit 2 year 3, 5, and 15 inspections. Although the LRA identifies a condition where inspected areas did not meet acceptance criteria, it does not go on to explain any corrective actions taken per the program procedure or any follow-up actions taken.

Request:

Provide information on what corrective actions were taken as a result of discovering conditions that did not meet acceptance criteria or justify why corrective actions were unnecessary.

STPNOC Response:

Each time grease voids in excess of surveillance requirements were discovered, STPNOC reported the condition to the NRC by letter. Each letter included detailed discussion of the condition and the reasons for concluding that the condition was acceptable.

These occurrences were determined to be the result of grease shrinkage. The exterior walls of the containment were visually examined to confirm there were no indications of grease leakage or seepage from the tendon ducts. Following examination of wires pulled during the surveillance, it was confirmed that the grease shrinkage had no impact on the corrosion protection of the affected tendons. The only corrective action performed was to re-fill the voids with grease.

RAI B2.1.30-1

Background:

10 CFR Part 50, Appendix J, states that containment isolation valves are subject to Type C tests. By letters dated July 13, 1999, as supplemented October 14 and 22, 1999, January 26 and August 31, 2000, and January 15, 18, 23, March 19, May 8 and 21, 2001, (hereinafter, the submittal, Adams accession number ML011430090), STPNOC requested an exemption from 10 CFR Part 50, Appendix J, Option B, Section III.B, "Type B and C Tests," for the life of each unit (STPNOC has 2 PWR units) to the extent that this regulation imposes Type C leakage rate testing on certain containment isolation valves. The scope of the exemption includes containment isolation valves categorized as low safety significant (LSS) or non-risk significant (NRS).

The staff also noted that 10 CFR 54.4(a)1, states "Plant systems, structures, and components within the scope of this part are safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the integrity of the reactor coolant pressure boundary; (and) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in § 50.34(a)(1), § 50.67(b)(2), or § 100.11 of this chapter, as applicable."

Issue:

The staff reviewed the LRA, including the AMR Tables line items, but was not clear whether the containment isolation valves and associated penetrations which are exempt from 10 CFR Part 50, Appendix J testing are within the scope of license renewal.

In addition, the staff noted that the Operating Experience Community database indicates that containment isolation valves could be damaged by operating conditions. In 2006, NRC issued IN 2006-15 alerting licensees of possible vibration induced degradations and failures of containment isolation valves. According to the applicant's letter to NRC, dated August 31, 2000 (ML37490010), the applicant stated that its alternate reliability strategy for these valves and penetrations includes corrective actions and periodic feedbacks. It is not clear to the staff, however, what action(s) the applicant has taken in regards to IN 2006-15.

Request:

1. Indicate whether the containment isolation valves and associated penetrations, for which the exemption for Type B and C 10 CFR Part 50, Appendix J Tests was granted, are within the scope of license renewal. If not, provide justification.

2. Describe if any modifications or changes have taken place on the LSS/NRS valves/penetrations, including (but not limited to) those in response to IN 2006-15. If so, how did these modifications or changes impact the aging management of the components? If any valves/penetrations that once were exempt, but now because of corrective or other actions/modifications, are subject to aging management as recommended, for example, by GALL Report XI.S4, "10 CFR Part 50, Appendix J" Program, explain how the applicant will manage aging effects for these during the period of extended operation.

3. Discuss whether or not the applicant's specific management program/controls (see STPNOC letter to NRC referenced in Request 1 above and UFSAR section 13.7) will ensure the functionality of the valves and integrity of penetrations are adequate to provide aging management (e.g. cracking, loss of material, loss of leak tightness and sealing) during the period of extended operation.

4. Indicate if any other components that have been exempted under 10 CFR 50.12(a)(2)(vi) are subject to 10 CFR 54.4. If so, explain how these components are dispositioned within the LRA.

STPNOC Response:

1. Isolation valves and penetrations that are part of the containment pressure boundary are within the scope of license renewal. Even those isolation valves and penetrations exempted from Type B and C testing are still subject to Type A testing and visual examination, if required, under the 10 CFR Part 50, Appendix J program.

2. Modifications or changes to LSS/NRS valves/penetrations, including (but not limited to) those in response to IN 2006-15, have not impacted the aging management of the components. No systems, structures, or components (SSCs) are exempt from the scope of license renewal based on risk significance. Any SSC classified as low safety significant (LSS) or non-risk significant (NRS) credited with performing a intended function will be managed for aging throughout the period of extended operation as referenced in implementing procedure 0PSP11-ZA-0005 "Local Leakage Rate Test Calculations, Guidelines, and Program" section 4.11 and described in UFSAR Chapter 13.7 "Risk-informed Special Treatment Requirements" and Table 13.17-1, "Exemptions from Special Treatment Requirements".

3. The functionality of the valves and integrity of penetrations are ensured by managing the aging of these components with the appropriate aging management program. No SSCs are exempt from the scope of license renewal based on risk significance. Any SSC classified as low safety significant (LSS) or non-risk significant (NRS) credited with performing a intended function will be managed for aging throughout the period of extended operation as referenced in implementing procedure 0PSP11-ZA-0005 "Local Leakage Rate Test Calculations, Guidelines, and Program" section 4.11 and described in UFSAR Chapter 13.7 "Risk-informed Special Treatment Requirements" and Table 13.17-1, "Exemptions from Special Treatment Requirements".

4. No SSCs are exempt from the scope of license renewal based on risk significance. Any SSC classified as low safety significant (LSS) or non-risk significant (NRS) credited with performing a intended function will be managed for aging throughout the period of extended operation as referenced in implementing procedure 0PSP11-ZA-0005 "Local Leakage Rate Test Calculations, Guidelines, and Program" section 4.11 and described in UFSAR Chapter 13.7 "Risk-informed Special Treatment Requirements" and Table 13.17-1, "Exemptions from Special Treatment Requirements".

RAI B2.1.30-2

Background:

By letter dated November 27, 2000, in accordance with the provisions of 10 CFR 50.55a (a)(3)(i), the applicant requested relief for Units 1 and 2 from ASME Code, Section XI, Article IWE-5000 requirements to perform VT-2 visual examinations in connection with system pressure testing following repairs or modifications of pressure retaining boundaries or replacement of Class MC and Class CC components. As an alternative to the VT-2 examination, the applicant proposed to rely on Type B and Type C testing conducted pursuant to 10 CFR Part 50, Appendix J, to detect leakage from pressure-retaining components as an acceptable level of quality and safety. In conjunction with the test, the applicant also proposed to perform a general visual examination of the accessible areas to further ensure the overall integrity of the repaired/replaced component(s). For deferred or not-performed tests, the applicant would perform a VT-1 or detailed visual examination test for repairs or replacements affecting the containment pressure boundary.

The NRC staff, pursuant to 10 CFR 50.55a(a)(3)(i), authorized the proposed alternative for the remainder of the term of the current operating licenses for South Texas Units 1 and 2, because it provided an acceptable level of quality and safety for protecting the containment pressure boundary integrity.

Issue:

The current operating licenses for South Texas Units 1 and 2 expire in 2027 and 2028 respectively. In the original granting of the relief, there was no discussion or approval of the relief for the period of extended operation. The staff therefore is unclear how the applicant plans to provide an acceptable level of quality and safety for the protection of the containment pressure boundary integrity during the PEO.

Request:

Please state your plan of action to satisfy ASME Code requirements under Article IWE-5000 of Section XI, for VT-2 visual examinations in connection with the system pressure testing following repairs or modifications of pressure retaining boundaries or replacement of Class MC and Class CC components.

STPNOC Response:

As stated in LRA Section B2.1.30, "The 10 CFR Part 50 Appendix J program establishes compliance with the regulations and guidance provided in 10 CFR Part 50 Appendix J, ... Regulatory Guide 1.163, ... NEI 94-01, ... and ANSI/ANS 56.8..."

Testing and examinations performed during the period of extended operations will be in accordance with the Code edition applicable at that time consistent with the provisions of 10 CFR 50.55a. If any variances from these requirements are necessary, they will be submitted for approval through the relief request process.

RAI B2.1.24-1

Background:

GALL AMP XI.E1 states that an adverse localized environment exists based on the most limiting condition for temperature, radiation, or moisture for the insulation material of cables or connections. It further states that adverse localized environments can be identified through the use of an integrated approach, such as reviews of EQ zone maps that show radiation levels and temperature for various plant areas, consultations with plant staff who are cognizant of plant conditions, utilization of infrared thermography to identify hot spots on a real-time basis, and the review of relevant plant-specific and industry operating experience.

Issue:

In LRA Section B2.1.24, the applicant states that Non-EQ cables, connections and terminal blocks within the scope of license renewal in accessible areas within adverse localized environments are inspected. However, the applicant has not provided its methodology for identification of adverse localized environments.

Request:

Provide your methodology for identification of adverse localized environments.

STPNOC Response:

The STP Plant Data Management System (PDMS) is used to track plant cables. This database contains a listing of cable codes used. The non-EQ cable codes were reviewed to identify the insulating material for each cable type. Any cable codes where the insulating material could not be identified are assumed to be polyvinyl-chloride (PVC). The following are the insulation types used for non-EQ in-scope cables:

Butyl Rubber (BR);
Chlorosulfonated Polyethylene (CSPE/HYP)
Cross-Linked Polyethylene (XLPE)
Cross-Linked Polyolefin (XLPO)
Ethylene Propylene and Ethylene Propolene Rubber (EP/EPR)
Polyethylene (PE)
Polypropylene (PP)
Polyvinyl Chloride (PVC)
Teflon (FEP)
Tefzel (ETFE)

The 60-year service limiting thermal and radiological environment for each cable insulation material was established using Table 10-1 of EPRI-TR1013475, "Plant Support Engineering: License Renewal Electrical Handbook," Revision 1. The normal plant environment for temperature and radiation are established from the STP Updated Final Safety Analysis Report (UFSAR) Table 3.11-1, Environmental Conditions.

Based on the 60-year service limiting thermal conditions for cable insulation material, a graded approach to identifying an adverse localized environment was established. PVC or PE insulated cables have the most limiting 60-year service temperature of 112 degrees Fahrenheit. An adverse localized environment exists where temperatures exceed 112 degrees Fahrenheit within three feet of in-scope cables. If PVC or PE insulated cables are not present, the criterion is raised to 125 degrees Fahrenheit based on the next most limiting insulation material, butyl rubber. If butyl rubber is not present, the next most limiting temperature for all other cable types used is 167 degrees Fahrenheit.

Phenolic material used for fuse block insulation and terminal material has a 60-year service limiting temperature of 231 degrees Fahrenheit. An adverse localized environment exists where temperatures exceed 231 degrees Fahrenheit within three feet of in-scope fuse or terminal boxes.

The 60-year normal radiation dose is determined by multiplying the 40-year cumulative dose in UFSAR Table 3.11-1 by 1.5. The most limiting 60-year normal radiation dose for Teflon insulation material is 5 x 10E4 rads. This dose is established as the radiation criterion for an adverse localized environment for cables containing Teflon. Where Teflon is not present, the next most limiting 60-year normal radiation for all other cable types is 2 x 10E6 rads. Any area exceeding 2 x 10E6 rads is considered an adverse localized environment.

Ultra-violet radiation can cause an adverse localized environment due to exposure to sunlight or fluorescent lighting. Cables exposed to sunlight or located within three feet of a fluorescent light without a protective cover are considered to be in an adverse localized environment.

Significant moisture is an adverse localized environment and is defined as periodic exposures to moisture that last for more than a few days. Cables or connections exposed to significant moisture are considered to be in an adverse localized environment.

RAI B2.1.25-1

Background:

NUREG-1801, Rev. 1, "Generic Aging Lessons Learned," (the GALL Report) addresses inaccessible medium voltage cables in Aging Management Program (AMP) XI.E3, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The purpose of this program is to provide reasonable assurance that the intended functions of inaccessible medium voltage cables (2 kV to 35 kV), that are not subject to environmental qualification requirements of 10 CFR 50.49 and are exposed to adverse localized environments caused by moisture while energized, will be maintained consistent with the current licensing basis. The scope of the program applies to inaccessible (in conduits, cable trenches, cable troughs, duct banks, underground vaults or direct buried installations) medium-voltage cables within the scope of license renewal that are subject to significant moisture simultaneously with significant voltage (energized 25% of the time).

The application of AMP XI.E3 to medium voltage cables was based on the operating experience available at the time Revision 1 of the GALL Report was developed. However, industry operating experience subsequent to GALL Report Revision 1 indicates that the

presence of water or moisture can be a contributing factor in inaccessible power cable failures at lower service voltages (400 V to 2 kV). Applicable operating experience was identified in licensee responses to Generic Letter (GL) 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients," which included failures of power cable operating at service voltages of less than 2 kV where water was considered a contributing factor. The staff also noted that the significant voltage screening criterion (subject to system voltage for more than energized 25% of the time) was not applicable for all the inaccessible power cable failures noted.

Industry operating experience provided by NRC licensees in response to GL 2007-01 has shown: (a) that there is an increasing trend of cable failures with length in service, (b) that the presence of water/moisture or submerged conditions appears to be the predominant factor contributing to cable failure. The staff has determined, based on the review of the cable failure data, that an annual inspection of manholes and a cable test frequency of at least every 6 years (with evaluation of inspection results to determine the need for an increased inspection frequency) is a conservative approach to ensuring the operability of power cables and, therefore, should be considered. The use of test and inspection results in the determination of the need for adjustment of test and inspection frequencies should also be considered.

In addition, industry operating experience subsequent to GALL Report Revision 1 has shown that some NRC licensees may experience cable manhole water intrusion events, such as flooding or heavy rain, that subjects cables within the scope of program for GALL Report XI.E3 to significant moisture. The staff has determined that event driven inspections of cable manholes, in addition to a 1 year periodic inspection frequency, is a conservative approach and, therefore, should be considered.

This information has been incorporated into the GALL Report, Revision 2, AMP XI.E3.

Issue:

The applicant's Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program does not address the above staff guidance and recommendations as incorporated into GALL Report AMP XI.E3, Revision 2. Reference TR-11ST, "Electrical Components Aging Evaluation License Topical Report," Revision 0, OPGP04ZE0007, "License Renewal Electrical Aging Management," STP-AMP-B2.1.25, "Inaccessible Medium Voltage Cables Not Subject 10 CFR 50.49 EQ Requirements - B2.1.25 NUREG 1801 Program XI.E3," Revision 3.

Request:

1. Provide a summary of your evaluation of recently identified industry operating experience and plant-specific operating experience concerning inaccessible low voltage power cable failures within the scope of license renewal (not subject to 10 CFR 50.49 environmental qualification requirements), and how this operating experience applies to the need for additional aging management activities at your plant for such cables.

2. Explain how you will manage the effects of aging on inaccessible low voltage power cables within the scope of license renewal; with consideration of recently identified industry operating experience and plant-specific operating experience. The discussion should

include assessment of your Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program description, program elements (i.e., "scope of program," preventive actions," parameters monitored/inspected," "detection of aging effects," "monitoring and trending," acceptance criteria, and "corrective actions"), FSAR summary description and applicable license renewal commitment to demonstrate reasonable assurance that the intended functions of inaccessible low voltage power cables subject to adverse localized environments will be maintained consistent with the current licensing basis through the period of extended operation. Specifically, the assessment should address the program described in GALL AMP XI.E3, Revision 2 including the following:

- The deletion of the "exposure to significant voltage" criterion (defined as subject to system voltage for more than 25 percent of the time).
- Increased scope to include 400V to 2kV inaccessible power cables.
- Revised frequency of inspections for water collection in manholes to at least annually.
- Revised frequency of testing of in-scope inaccessible power cables (400V to 35kV) for degradation of cable insulation to at least once every 6 years.
- Incorporated event-driven inspections (e.g., as a result of heavy rain or flood).
- Cable test results and manhole inspection results are evaluated to determine the need for more frequent testing and inspections.
- Corrective actions are taken and an engineering evaluation is performed when the test or inspection acceptance criteria are not met. Actions are taken to keep the cable dry and to assess cable degradation.

3. Explain how the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program, FSAR supplement, and commitment, incorporate recent industry and plant-specific operating experience for both inaccessible low and medium voltage power cables.

STPNOC Response:

1. A review of site-specific operating experience determined that STP has not experienced any failures of in-scope inaccessible low voltage power cables due to moisture. A review of the industry operating experience has determined that the industry has had failures of in-scope inaccessible low voltage power cables due to moisture. LRA Appendix A1.25, B2.1.25 and Table A4-1 Item 20 were amended in STP LRA Amendment 2 NOC-AE-11002681 dated June 16, 2011 (ML11172A096) to include in-scope inaccessible low voltage power cables subject to moisture into the scope of the program.

2. STP LRA Appendix A1.25, B2.1.25 and Table A4-1 Item 20 were amended in STP LRA Amendment 2 to:

   a. Delete the exposure to significant voltage criterion.

   b. Increase the scope to include in-scope non-EQ inaccessible medium or low voltage (>400 volts) power cables.

   c. Revise the inspection frequency for water accumulation in manholes to at least once annually.

d. Revise the testing frequency of in-scope inaccessible medium and low voltage (>400 volts) power cables routed through manholes to at least once every six years.

e. Solar-powered sump pumps enable removal of water from some manholes prior to accumulation. At STP, water in the manholes is not caused by rain entering through the top of the manholes because the manhole covers are sealed. Event-driven inspections are performed as an on-demand activity based on actual plant experience.

Manholes and trenches containing in-scope non-EQ inaccessible medium or low voltage (>400 volts) power cables are inspected for water collection. Any collected water is removed as required. This inspection and water removal is performed based on actual plant experience with the inspection frequency being at least once annually as discussed in STPNOC response 2.c above.

f. LRA Basis Document AMP XI.E3 (B2.1.25), Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements program, LRA Appendix B2.1.25 and Table A4-1 Item 20 will be revised to include trending of the cable test results based on the type of test being performed and that manhole inspection results are evaluated based on actual plant experience with the inspection frequency increased as required.

g. LRA Basis Document AMP XI.E3 (B2.1.25), Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements program, was revised to state an engineering evaluation that considers the age and operating environment of the cable will be performed when the test or inspection acceptance criteria are not met. LRA Appendix B2.1.25 will be enhanced to state that the engineering evaluation considers the significance of test or inspection results, the operability of the component, the reportability of the event, the extent of the concern, the potential root causes for not meeting the test or inspection acceptance criteria, the corrective actions required, and the likelihood of recurrence.

Actions have been taken to keep cable dry. Solar-powered sump pumps provide for removal of water from some manholes prior to accumulation and manhole covers are sealed to minimize the accumulation of water that is event driven.

3. STP LRA Appendix B2.1.25 and Commitment 20 (B2.1.25) in Table A4-1 were amended by STP LRA Amendment 2 to incorporate recent industry and plant-specific operating experience. Additional enhancements to LRA Appendix B2.1.25 are discussed in STPNOC responses 2.f and 2.g to this RAI. The items that the engineering evaluation will consider, discussed in response 2.g to this RAI, will be added to Commitment 20 (B2.1.25) in Table A4-1

Enclosures 2 and 3 provide the mark-in/mark-out sections of the applicable License Renewal Application.

RAI B2.1.25-2

Background:

The GALL Report, Revision 2, states that periodic actions are taken to prevent inaccessible cables from being exposed to significant moisture, such as identifying and inspecting in-scope accessible cable conduit ends and cable manholes for water collection, and draining the water, as needed.

The GALL Report, Revision 2, further states that the inspection frequency for water collection is established and performed based on plant-specific operating experience with cable wetting or submergence in manholes (i.e., the inspection is performed periodically based on water accumulation over time and on event-driven occurrences, such as heavy rain or flooding). The periodic inspection should occur at least annually. The inspection should include direct observation that cables are not wetted or submerged, that cables/splices and cable support structures are intact, and that dewatering/drainage systems (i.e., sump pumps) and associated alarms operate properly. In addition, operation of dewatering devices should be inspected and operation verified prior to any known or predicted heavy rain or flooding events. If water is found during inspection (i.e., cable exposed to significant moisture), corrective actions are taken to keep the cable dry and to assess cable degradation.

Issue:

STP Procedure 0PGP04ZE0007, Section 5.2.2, - states in part, "Appendix B, "Manholes Subject to Moisture Intrusion Containing In-Scope Medium Voltage Cables" lists all manholes subject to inspection for water collection that contain in-scope medium voltage cable." It is not clear from Appendix B that all in-scope manholes are subject to inspection for water intrusion.

Request:

It is not clear from OPGP04ZE0007 whether the Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program includes all in-scope manholes and that all in-scope manholes are subject to inspection for water collection. Explain why OPGP04ZE0007 appears to limit the in-scope manholes only to manholes subject to water intrusion.

STPNOC Response:

Appendix B of STP draft procedure 0PGP04ZE0007 lists those manholes containing in-scope medium or low voltage cables.

Draft procedure 0PGP04ZE0007 Appendix B title will be revised to read, "In-scope Manholes". The second paragraph of draft procedure 0PGP04ZE0007 section 5.2.2 Scope will be revised to read, "Appendix B, In-Scope Manholes lists all manholes containing in-scope medium or low voltage cables."

RAI B2.1.25-3

Background:

The GALL Report, Revision 2, states that periodic actions are taken to prevent inaccessible cables from being exposed to significant moisture, such as identifying and inspecting in-scope accessible cable conduit ends and cable manholes for water collection, and draining the water, as needed.

The GALL Report, Revision 2, further states if water is found during inspection (i.e., cable exposed to significant moisture), corrective action is taken to keep the cable dry and to assess cable degradation.

STP procedure 0PGP04ZE0007, Section 5.2.4, "Solar Powered Sump Pump System," Section 5.2.4.2.1 states that if any of the manhole sump pumps are found not to be operating, do the following:

- Initiate a condition report
- Increase sump pump inspection frequency

Section 5.2.5, "Inspection for Water Collection in Manholes not Equipped With Sump Pumps," Section 5.2.5.2 states that if any of the manholes are found to contain water that would result in wetted in-scope cable, the following actions are to be performed:

- If any cables are submerged, initiate a condition report
- Pump Manhole below level of lowest in-scope cable
- Investigate the source of water intrusion
- Increase manhole inspection frequency based on past experience with water accumulation in the manhole

Basis document B2.1.25, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements," Section 3.2.2 states, in part, "Any sump pumps found inoperable, accumulated water, if any, is removed and the inspection frequency increased based on past experience." For manholes not equipped with sump pumps Section 3.2.2 states, "Manholes found containing water are pumped dry, the source of water investigated, and the inspection frequency increased based on past experience."

Issue:

1. Basis document B2.1.25, LRA Section B2.1.25, and procedure 0PGP04ZE0007 provide inconsistent guidance with respect to corrective actions to remove accumulated water from in-scope manholes.

2. Basis document B2.1.25, LRA section B2.1.25, and procedure 0PGP04ZE0007 are inconsistent in documenting submerged cables during inspection and the corrective action to be taken (such as initiating a condition report).

Request:

Reconcile LRA B2.1.25, basis document B2.1.25, and plant procedures including draft procedure 0PGP04ZE0007, "License Renewal Electrical Aging Management," such that consistent inspection activities are used to identify in-scope cable submergence, accumulated water removal, and appropriate corrective actions are taken to keep in-scope cable dry and to assess cable degradation.

STPNOC Response:

The following revisions will be made to provide consistent guidance with respect to:

(1) removal of accumulated water from in-scope manholes; and
(2) documentation of submerged cables and corrective action to be taken.

LRA Appendix B2.1.25 and LRA Table A4-1 were revised with Amendment 2 to the LRA. The following additional revisions will be made to LRA Appendix B2.1.25, LRA Table A4-1 Item 20, and LRA Basis Document XI.E3 (B2.1.25), Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements program. The enhancements in the revised LRA Appendix B2.1.25 are reformatted to a "bullet" format. See Enclosures 2 and 3 for the revisions.

Preventive Actions (Element 2)

Procedures will be enhanced to require the following:

- Inspection of in-scope manholes and trenches based on plant-specific operating experience with inspection being conducted at least annually;
- Direct observation that cables are not wetted or submerged;
- Removal of collected water and verification of sump pump operability;
- Corrective action if wetted cables or inoperable sump pumps are found;
- Inspection of the cables/splices and cable support structures for degradation if wetted cables are found; and
- Corrective actions to keep cables dry.

In addition, the following revisions will be made to plant procedures.

For Manholes Equipped with Solar-Powered Sump Pump System

The inspection shall include:

- Direct observation that cables are not wetted or submerged;
- Removal of collected water; and
- Verification of solar-powered sump pump operability.

If wetted cables are found, perform the following:

- Initiate a condition report;
- Remove collected water and take corrective action to keep cables dry;
- Inspect cables/splices for surface anomalies;

- Inspect support structures for corrosion; and
- Increase the frequency of next inspection based on experience with water accumulation.

If any of the manhole sump pumps are found to be not operating:

- Repair inoperable sump pumps; and
- Initiate a condition report

For Manholes Not Equipped with Solar Powered Sump Pumps and Trenches

The inspection shall include:

- Direct observation that cables are not wetted or submerged; and
- Removal of collected water.

If wetted cables are found, perform the following:

- Initiate a condition report;
- Remove collected water and take corrective action to keep cables dry;
- Inspect cables/splices for surface anomalies;
- Inspect support structures for corrosion; and
- Increase the frequency of next inspection based on experience with water accumulation.

Enclosures 2 and 3 provide the mark-in/mark-out sections of the applicable License Renewal Application.

RAI B2.1.26-1

Background:

GALL AMP XI.E4 under Element 4 (Detection of Aging Effects), states that a sample of accessible bolted connections is inspected for increased resistance of connection by using thermography or by measuring connection resistance using a micro-ohmmeter. Twenty percent of the population with a maximum sample of 25 constitutes a representative sample size. Otherwise, a technical justification of the methodology and sample size used for selecting components should be included as part of the AMP's site documentation. The GALL AMP further states that if an unacceptable condition or situation is identified in the selected sample, a determination is made as to whether the same condition or situation is applicable to other connections not tested. In the South Texas Project (STP) Aging Program Evaluation Report for Metal Enclosed Bus (MEB) B2.1.26, STP-AMP-B2.1.26 under same element states that a sample of non-segregated phase bus accessible bolted connections in each bus section shall be inspected for evidence of overheating using thermography.

Issue:

The applicant has not identified a sample size of bolted connections nor developed the technical basis for selecting samples of bolted connections in each MEB section.

Request:

Discuss how sample selection approach under program elements 4 in AMP B2.1.26 is consistent with those in GALL AMP XI.E4.

STPNOC Response:

At STP the non-segregated phase bus bolted connections are covered with insulation material. Instead of thermography, a sample of the in-scope non-segregated phase bus accessible bolted connections covered by insulation material will be visually inspected to detect surface anomalies, such as embrittlement, cracking, melting, discoloration, swelling, or surface contamination. The sample will be 20 percent of the population with a maximum sample of 25 connections. The sample will be selected to include at least one connection in each section of the non-segregated phase bus up to a maximum of 25 connections and will include sections that are exposed to plant indoor air and atmosphere/weather (outdoors). The first inspection will be completed prior to the period of extended operation and every five years thereafter.

LRA Appendix B2.1.26, LRA Commitment 21 in Table A4.1, and AMP XI.E4 (B2.1.26), Metal Enclosed Bus program, and procedure 0PGP04ZE0007 will be revised to use visual inspection of the non-segregated phase bus bolted connections covered by insulation material. The sample will be 20 percent of the population with a maximum sample of 25. The first inspection will be completed prior to the period of extended operation and every five years thereafter.

Enclosures 2 and 3 provide the mark-in/mark-out sections of the applicable License Renewal Application.

RAI B2.1.26-2

Background:

In the STP basis document, STP-AMP-B2.1.26-Rev 2, the applicant stated that a sample of the MEB accessible bolted connections in each bus section shall be inspected using thermography for evidence of overheating. The applicant also stated that acceptable criteria will be based on a temperature rise above the reference temperature, where the reference temperature will be the ambient temperature or the baseline temperature data from the same type of connections being tested. The inspections are performed on all accessible bus sections while the bus is energized. In general, windows are installed on the MEB for thermography inspections.

Issue:

The metal enclosed cover may mask the heat created by loosening of bus connections and the temperature differences between bus connections which may not be detected if windows are not installed on MEBs.

Request:

Discuss how the MEB connection inspections at STP are effective in detecting loosening of bus connections using external thermography measurements.

STPNOC Response:

At STP, the non-segregated phase bus bolted connections are covered with insulation material. Instead of thermography, a sample of the in-scope non-segregated phase bus accessible bolted connections covered by insulation material will be visually inspected to detect surface anomalies, such as embrittlement, cracking, melting, discoloration, swelling or surface contamination. The sample will be 20 percent of the population with a maximum sample of 25 connections. The sample will be selected to include at least one connection in each section of the non-segregated phase bus up to a maximum of 25 connections and will include sections that are exposed to plant indoor air and atmosphere/weather (outdoors). The first inspection will be completed prior to the period of extended operation and every five years thereafter.

LRA Appendices A1.26 and B2.1.26, LRA Commitment 21 in Table A4.1, and AMP XI.E4 (B2.1.24), Metal Enclosed Bus program, and procedure 0PGP04ZE0007 will be revised to use visual inspection of the non-segregated phase bus bolted connections covered by insulation material. The sample will be 20 percent of the population with a maximum sample of 25. The first inspection will be completed prior to the period of extended operation and every five years thereafter. The internal portions of the bus, insulation and insulators, internal bus supports, and bus enclosure assemblies will be inspected every ten years thereafter.

Enclosures 2 and 3 provide the mark-in/mark-out sections of the License Renewal Application. A number of additional enhancements to the Metal Enclosed Bus AMP (B2.1.26) and to LRA Commitment 21 in Table A4.1 are also included in the mark-in/mark-out sections of the License Renewal Application.

RAI B2.1.26-3

Background:

The "detection of aging effects" program element of GALL AMP XI.E4 states that a sample of accessible bolted connection will be checked for loose connections. In basis document STP-AMP-B2.1.26-Rev 2, the applicant only requires a sample of the non-segregated phase bus bolted connections to be inspected; the report was silent on the inspection of iso-phase bus connections.

Issue:

Iso-phase bus connections could be loose due to ohmic heating and could cause iso-phase bus failure.

Request:

Explain why iso-phase bus connections are not included in the scope of AMP B2.1.26.

STPNOC Response:

The sections of the iso-phase bus are welded joints and do not contain bolted connections. There are bolted connections at the main transformers, the unit auxiliary transformer, and the main generator breaker. These connection points are managed as part of transformer or breaker active component maintenance.

RAI B2.1.36-1

Background:

In the program basis document STP-AMP-B2.1.36-Rev 2, under the "parameters monitored or inspected" program element, the applicant stated that the infrared thermography testing is being performed to identify loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation. The document also states that connections associated with cables within the scope of license renewal are splices (butt or bolted), crimp-type ring lugs, connectors, and terminal blocks as described in the program description in GALL AMP XI.E6.

Issue:

The NRC staff believes that loosening of cable connections may also occur in different types of connections and may not be limited to only bolted connections.

Request:

Provide technical justification of why only bolted connections are considered in the inspection sample criteria.

STPNOC Response:

The scope of the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements includes both bolted and non-bolted cable connections.

LRA Appendix A1.36, B2.1.36, and AMP XI.E6 (B2.1.36), Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be revised to clarify the scope of this aging management program to include both bolted and non-bolted cable connections.

Enclosure 2 provides the mark-in/mark-out sections of the License Renewal Application.

RAI B2.1.36-2

Background:

In "parameters monitored/inspected" program element of the basis document STP-AMP-B2.1.36-Rev 2, the applicant stated that the technical basis for sample selection will be documented. GALL AMP XI.E6 Rev. 2 recommends that twenty percent of the population with a maximum sample of 25 constitute a representative. Otherwise a technical justification of the methodology and sample size used for selecting components for one-time test should be included as part of the AMP's site documentation.

Issue:

It is not clear to the staff that "parameters monitored or inspected" program element is consistent with those in GALL Report because the applicant has not developed the technical basis and/or the criteria for sample selection technique.

Request:

Provide the technical basis for the sample size selection.

STPNOC Response:

LRA Appendix A1.36, B2.1.36, and AMP XI.E6 (B2.1.36) Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be revised to state "The selected sample (twenty percent of the population, with a maximum of 25) to be tested is based upon application (medium and low voltage), circuit loading (high or low load), and environment (temperature, high humidity, vibration, etc.)."

Enclosure 2 provides the mark-in/mark-out sections of the License Renewal Application.

RAI B3.2-1

Background:

GALL Report AMP XI.E2 manages the aging of electrical cables and connections used in circuits with sensitive, high voltage, low-level current signals, installed in adverse localized environments caused by temperature, radiation, or moisture, such as radiation monitoring instrumentation and nuclear instrumentation.

Issue:

The applicant stated that it will not use GALL AMP XI.E2 to manage the aging of electrical cables and connections used in circuits with sensitive, high voltage, low-level current signals because instrumentation electrical cables and connections which would normally be included in GALL AMP XI.E2 are in scope of LRA AMP B3.2, "Environmental Qualification (EQ) of Electrical Component Program."

Request:

Identify the cables and connections used in circuits with sensitive, high voltage, low-level current signals that are within the scope of LRA AMP B3.2.

STPNOC Response:

The components listed below are the only components within the scope of STP license renewal that have sensitive, high voltage, low-level current signals. A review of the cables and connections for these in-scope components determined that the cables, connections and Raychem heat shrink tubing used for these sensitive, high voltage, low-level current signals are Environmentally Qualified (EQ) to meet the requirements of 10 CFR 50.49 and are within the scope of LRA Appendix B3.2, Environmental Qualification (EQ) of Electrical Components program.

The component list is:

Excore source range and power range neutron detectors NE-31, NE-32, NE-35, NE-36, NE-41A/B, NE-42A/B, NE-43A/B and NE-44A/B, cable codes XA3YJ, XB3YJ, XC3YJ, XD3YJ, YA3TX, YB3TX, YC3TX, and YD3TX, connections, and Raychem heat shrink tubing.

Radiation Monitors

- Steam Generator A Blowdown High Range Radiation RE-8022B cable code XC2GB and connections
- Steam Generator B Blowdown High Range Radiation RE-8023B cable code XA2GB and connections
- Steam Generator C Blowdown High Range Radiation RE-8024B cable code XC2GB and connections
- Steam Generator D Blowdown High Range Radiation RE-8025B cable code XA2GB and connections
- Main Steam Line A High Range Radiation Detector RE-8046B cable code XA2GB and connections
- Main Steam Line B High Range Radiation Detector RE-8047B cable code XC2GB and connections
- Main Steam Line C High Range Radiation Detector RE-8048B cable code XA2GB and connections
- Main Steam Line D High Range Radiation Detector RE-8049B cable code XC2GB and connections
- Reactor Containment Building High Range Area Radiation Detectors RE8050 and RE8051, cable code XA2GA and XC2GA, and connections

RAI 4.7.1-1

Background:

LRA Section 4.7.1 states that the estimated number of significant lifts per refueling outage for each machine is estimated from the UFSAR Section 9.1.4.2.2 description of refueling

operations. A factor of 1.5 is used to account for non-refueling lifts. LRA Section 4.7.1 further states that based on an 18-month refuel cycle, approximately 27 refuel cycles are expected over a 40-year plant design life, or about 40 refuel cycles in a 60-year plant design life.

Issue:

LRA table 4.7-1 shows that the estimated maximum number of significant crane lifts for the cask handling overhead crane is 420 for a 40-year design life and 740 for a 60-year design life. The table indicates that the calculation uses 10 refuels for the 40-year calculation and 20 refuels for the 60-year calculation; however, no explanation of why these numbers were used instead of the 27 and 40 refuel cycles as described in LRA Section 4.7.1. It is unclear to the staff how the estimated maximum number of significant crane lifts were calculated for the cask handling overhead crane and why the calculation is based on a different number of refuels than that described in LRA Section 4.7.1.

Request:

1. Provide the basis for the estimated maximum number of significant crane lifts for the cask handling overhead crane for both a 40 and 60-year design life.

2. Explain why the number of refuels used in the calculation differs from the 27 refuel cycles expected over a 40-year design life, and the 40 refuel cycles expected over a 60-year design life, based on an 18-month refuel cycle.

STPNOC Response

1. The number of lifts for the cask handling overhead crane is based on three lifts per cask and seven casks per refueling outage, which equals 21 lifts per unit per refueling outage. As noted in the LRA Table 4.7-1, the calculated number for each outage was multiplied by 1.5 for conservatism, resulting in an estimated 32 significant lifts per refueling outage. In addition to the refueling outage lifts, the 40-year and 60-year cycles include an estimated 100 construction lifts.

2. The number of refueling outages differs because cask loading is assumed to begin in year 30 of plant operation.

RAI 4.7.1-2

Background:

LRA Section 4.7.1 states that the estimated number of significant lifts per refueling outage for each machine is estimated from the UFSAR Section 9.1.4.2.2 description of refueling operations. A factor of 1.5 is used to account for non-refueling lifts. LRA Section 4.7.1 further states that based on an 18-month refuel cycle, approximately 27 refuel cycles are expected over a 40-year plant design life, or about 40 refuel cycles in a 60-year plant design life.

Issue:

LRA table 4.7-1 shows that the estimated maximum number of significant crane lifts for the containment polar crane is 2,411 for a 40-year design life and 3,542 for a 60-year design life. Based on an 18 month refuel cycle, and an estimated 54 lifts per refuel, the staff is unclear how the estimated maximum number of significant crane lifts was calculated for the containment polar crane.

Request:

Provide the calculation for the estimated maximum number of significant crane lifts for the containment polar crane for both a 40 and 60-year design life.

STPNOC Response:

The number of lifts for the polar crane is based on the following refueling lifts: reactor head (two per refueling); reactor upper internals (two per refueling); and maintenance and repair operations (50 lifts per refueling). The 40-year and 60-year estimates also include 9 and 13 lower internals lifts, respectively (once every three refuelings); and an additional 150 construction lifts.

While reviewing this RAI, a calculation error was found in LRA Table 4.7-1 for the number of polar crane lifts. This correction does not change the disposition of the crane Time-Limited Aging Analysis (TLAA) evaluation as shown below.

(2 + 2 + 50) x 1.5 = 81 lifts per outage

Number of Lifts for 40 Years:
81 x 27 = 2187
2187 + 9 x 2 Internals + 150 construction = 2355 lifts (not 2,411) < 200,000

Number of Lifts for 60 Years:
81 x 40 = 3240
3240 + 13 x 2 Internals + 150 construction = 3416 lifts (not 3,542) < 200,000

LRA Table 4.7-1 will be revised to show 2355 lifts for 40-year cycles and 3416 lifts for 60-year cycles.

Enclosure 2 provides the mark-in/mark-out section of the License Renewal Application.

Enclosure 2

STP LRA Changes with line-in/line-out annotations

List of Revised LRA Sections

Affected LRA Section	RAI
Table 4.7-1	4.7.1-2
A1.26	B2.1.26-2
A1.36	B2.1.36-1 and B2.1.36-2
B2.1.25	B2.1.25-1 and B2.1.25-3
B2.1.26	B2.1.26-1 and B2.1.26-2
B2.1.27	B2.1.32-01 and B2.1.32-03
B2.1.29	B2.1.32-01
B2.1.31	B2.1.32-02
B2.1.32	B2.1.32-01, B2.1.32-02 and B2.1.32-03
B2.1.33	B2.1.32-01 and B2.1.32-03
B2.1.36	B2.1.36-1 and B2.1.36-2

Table 4.7-1 Estimated Maximum Number of Significant Crane Lifts

Lifting Machine	Per Refuel (Pr)	Per Refuel Estimate, Pr x 1.5	40 year Cycles	60 year Cycles, (1.5 x 40 year) (except as noted)	Design Lifts
Containment Polar Crane	54	81	~~2,411~~2,355	~~3,542~~3,416	200,000

A1.26 METAL ENCLOSED BUS

The Metal Enclosed Bus program manages aging of in-scope non-segregated phase and isolated phase bus.

The non-segregated phase portion of the program manages loosening of bolted connections, embrittlement, cracking, melting, swelling, discoloration of insulation, electrical failure, loss of dielectric strength leading to reduced insulation resistance (IR), loss of material, and hardening and loss of strength to ensure that non-segregated phase buses within the scope of license renewal are capable of performing their intended function. Internal portions of non-segregated phase buses are visually inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulation is inspected for signs of embrittlement, cracking, melting, swelling, hardening or discoloration, which may indicate overheating or aging degradation. The internal bus supports are inspected for structural integrity and signs of cracks. The bus enclosure assemblies are inspected for loss of material due to corrosion and hardening of boots and gaskets. A sample of the in-scope non-segregated phase bus accessible bolted connections insulation material will be inspected ~~for loose connections using thermography~~ to detect surface anomalies.

The isolated-phase portion of the program manages the effects of cracking and loss of material of bus enclosure assemblies, hardening of boots and gaskets, and cracking of internal bus supports to ensure that isolated phase metal enclosed buses within the scope of license renewal are capable of performing their intended function. Internal portions of isolated phase buses are visually inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulators are inspected for signs of embrittlement, cracking, melting, swelling, hardening or discoloration, which may indicate overheating or aging degradation. The internal bus supports are inspected for structural integrity and signs of cracks. The bus enclosure assemblies are inspected for loss of material due to corrosion and hardening of boots and gaskets.

A1.36 ELECTRICAL CABLE CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program manages loosening of bolted and non-bolted external connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation to ensure that electrical cable connections not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49 and within the scope of license renewal are capable of performing their intended function. As part of the STP predictive maintenance program, infrared thermography testing is being performed on Non-EQ electrical cable connections associated with active and passive components within the scope of license renewal. A representative sample will be tested once prior to the period of extended operation using infrared thermography to confirm that there are no aging effects requiring management during the period of extended operations. The selected sample (twenty percent of the population with a maximum of 25) is based upon application (medium and low voltage), circuit loading (high or low load), and environment (temperature, high humidity, vibration, etc.). Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

B2.1.25 Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Program Description

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program manages localized damage and breakdown of insulation leading to electrical failure of inaccessible or underground medium- and low voltage (>400 volts) power cables exposed to adverse localized environments caused by significant moisture~~,~~ (periodic exposures to moisture that last more than a few days) to ensure that inaccessible medium and low voltage power cables not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49, and within the scope of license renewal are capable of performing their intended function. This program considers the technical information and guidance provided in NUREG/CR-5643, *Insights Gained From Aging Research*, IEEE Std. ~~P~~1205, *IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations*, SAND 96-0344, *Aging Management Guideline for Commercial Nuclear Power Plants – Electrical Cable and Terminations*, and EPRI TR-109619, *Guideline for the Management of Adverse Localized Equipment Environments.*

All manholes and trenches that contain in-scope non-EQ inaccessible medium or low voltage (>400 volts) power cables are inspected for water collection. ~~Any c~~Collected water is removed as required. This inspection and water removal is performed based on actual plant experience with the inspection frequency being at least once annually. Solar powered sump pumps provide for removal of water from some manholes prior to accumulation.

All in-scope non-EQ inaccessible medium and low voltage (>400 volts) power cables routed through manholes or trenches are tested to provide an indication of the conductor insulation condition. A dielectric loss (dissipation factor/power factor), AC voltage withstand, partial discharge, step voltage, time domain reflectometry, insulation resistance, polarization index, line resonance analysis, or other testing that is state-of-the-art at the time of the testing is performed at least once every six years. The first test will be completed prior to the period of extended operation.

NUREG-1801 Consistency

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.E3, Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.

Exceptions to NUREG-1801

None

Enhancements

Prior to the period of extended operation, the following enhancement will be implemented in the following program elements:

Scope of Program (Element 1)

Procedures will be enhanced to identify the cables, ~~and~~ manholes and trenches that are within the scope of the ~~Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements~~ program ~~including low voltage power cables (>400 volts)~~.

Preventive Actions (Element 2) ~~and Detection of Aging Effects (Element 4)~~

Procedures will be enhanced to require ~~that~~ the following: ~~cable manholes be inspected for water collection based on plant experience. The enhancement requires that sump pump operability for those in-scope manholes equipped with sump pumps be verified operable. The enhancement requires inspection frequencies for all in-scope manholes and trenches be at least once annually. The enhancement requires any manholes containing water be pumped dry, the source of the water is investigated, and the inspection frequency increased based on past experience. The enhancement also requires a direct inspection of cables/splices and cable support structures whenever a manhole/trench cover is removed.~~

- Inspection of in-scope manholes and trenches based on plant-specific operating experience with inspection being conducted at least annually.
- Manhole inspection results are evaluated based on actual plant experience with the inspection frequency increased based on experience with water accumulation.
- Direct observation that cables are not wetted or submerged.
- Removal of collected water and verification of sump pump operability.
- The initiation of a corrective action if wetted cables or inoperable sump pumps are found.
- Inspection of the cables/splices and cable support structures whenever wetted cables are found.
- Corrective actions to be taken to keep cables dry.

Parameters Monitored or Inspected (Element 3)

Procedures will be enhanced to require the following: ~~inspection for sump pump operability or water collection in all in-scope manholes and trenches at least annually. Procedures will also be enhanced to require all in-scope non-EQ inaccessible medium and low voltage (>400 volts) power cables exposed to significant moisture be tested to provide an indication of the conductor insulation condition.~~

- Inspection of the in-scope manholes and trenches for water accumulation based on plant experience with water accumulation.
- The inspection frequency is to be at least annually.

- Conduct testing of in-scope inaccessible medium and low voltage (>400 volts) power cables exposed to significant moisture using a test capable of detecting reduced insulation resistance.

Detection of Aging Effects (Element 4)

Procedures will be enhanced to require the following:

- Test in-scope inaccessible medium and low voltage (>400 volts) power cables exposed to significant moisture at least once every six years with the first test being completed prior to the period of extended operation.
- Conduct testing of in-scope inaccessible medium and low voltage (>400 volts) power cables exposed to significant moisture using a test capable of detecting reduced insulation resistance.

Monitoring and Trending (Element 5)

Procedures will be enhanced to require inspection and test results that can be trended be trended to provide additional information on the rate of cable insulation degradation.

Acceptance Criteria (Element 6)

Procedures will be enhanced to define the following: ~~require that the acceptance criteria for testing be defined prior to each test for the specific type of test performed and the specific cable tested.~~

- The acceptance criterion for manhole and trench cables/splices and support structures is that they are not submerged or immersed in water.
- The acceptance criteria for cable testing will be defined prior to each test for the specific type of test performed and the specific cable tested.

Corrective Actions (Element 7)

Procedures will be enhanced to require the following: ~~an engineering evaluation that considers the age and operating environment of the cable be performed when the test acceptance criteria are not met.~~

- An engineering evaluation is performed when the test or inspection acceptance criteria are not met. The engineering evaluation shall consider the significance of the test or inspection results, the operability of the component, the reportability of the event, the extent of the concern, the potential root causes for not meeting the test or inspection acceptance criteria, the corrective actions required, and the likelihood of recurrence.
- An extent of condition when an unacceptable condition or situation is identified.

Operating Experience

Industry operating experience has shown that insulation materials are most susceptible to water tree formation. Formation and growth of water trees varies directly with operating voltage. Aging effects of reduced insulation resistance due to other mechanisms may also result in a decrease in the dielectric strength of the conductor insulation.

Site-specific operating experience has shown that STP has not experienced a failure of any in-scope inaccessible power cables (>400 volts). A review of the plant operating experience indicates that STP has experienced a situation in which water was leaking into the Unit 2 cable vault and electrical auxiliary building battery rooms. The source of the water was determined to be a series of manholes leading into the rooms. The cause of the water in the manholes was discovered to be a result of damaged manhole covers as well as temporary power cable installation where the sump cover was propped open for an extended period of time. In addition, STP has experienced a recurring groundwater incursion to some manholes. Solar powered sump pumps have been installed in the affected manholes and have been found effective in preventing cable exposure to significant moisture.

STP is developing a cable management program. The development of the program is ongoing utilizing guidance from EPRI 1020805, *Aging Management Guidance for Medium Voltage Cable Systems for Nuclear Power Plants* and EPRI 1020804, *Aging Management Development Guidance for AC and DC Low-Voltage Power Cable Systems for Nuclear Power Plants.* STP is also assessing guidance provided by NUREG/CR-7000, *Essential Elements of an Electric Cable Condition Monitoring Program, and* draft Regulatory Guide DG-1240, *Condition Monitoring for Electric Cables Used in Nuclear Power Plants.*

As additional industry and applicable plant-specific operating experience becomes available, the operating experience will be evaluated and appropriately incorporated into the program through the STP corrective action and operating experience programs. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

Conclusion

The continued implementation of the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.26 Metal Enclosed Bus

Program Description

The Metal Enclosed Bus program manages aging of in-scope non-segregated phase and isolated phase bus. The metal enclosed buses (MEBs) within the scope of this program are the MEBs that are used during station blackout recovery.

The non-segregated phase portion of the program manages loosening of bolted connections, embrittlement, cracking, melting, swelling, discoloration of insulation, electrical failure, loss of dielectric strength leading to reduced insulation resistance (IR), loss of material of bus enclosure assemblies, and hardening and loss of strength of boots and gaskets, and cracking of internal bus supports to ensure that non-segregated phase buses within the scope of license renewal are capable of performing their intended function. The non-segregated phase bus bolted connections are covered with insulation material. A sample of the in-scope non-segregated phase bus accessible bolted connections ~~will~~ shall be visually inspected ~~for loose connections using thermography~~to detect surface anomalies.

All non-segregated phase bus sections will be inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulation will be inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. The internal bus supports will be inspected for structural integrity and signs of cracks. The bus enclosure assemblies will be inspected for loss of material due to corrosion and hardening of boots and gaskets.

The isolated-phase portion of the program manages the effects of cracking and loss of material of bus enclosure assemblies, hardening of boots and gaskets, and cracking of internal bus supports to ensure that isolated phase metal enclosed buses within the scope of license renewal are capable of performing their intended function.

Internal portions of isolated phase buses are visually inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulators are inspected for signs of embrittlement, cracking, melting, swelling, hardening or discoloration, which may indicate overheating or aging degradation. The internal bus supports are inspected for structural integrity and signs of cracks. The bus enclosure assemblies are inspected for loss of material due to corrosion and hardening of boots and gaskets.

The first inspection of all sections of the in-scope MEBs will be completed prior to the period of extended operation. A sample of in-scope non-segregated phase bus bolted connections insulation material will be inspected every five years thereafter. The internal portions of the bus, insulation and insulators, internal bus supports, and bus enclosure assemblies will be inspected every ten years thereafter.

NUREG-1801 Consistency

The Metal Enclosed Bus program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.E4, Metal Enclosed Bus.

Exceptions to NUREG-1801

None

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the program elements:

~~*Scope of Program (Element 1), Preventive Actions (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6), and Corrective Actions (Element 7)*~~

~~The existing bus inspection activities for inspection and testing of the MEBs will be proceduralized to identify license renewal scope, specific bus inspections requirements, and aging effects to be inspected for, frequencies of inspections, acceptance criteria, and actions to be taken when acceptance criteria are not met.~~

Scope of Program (Element 1)

Procedures will be enhanced to identify the metal enclosed buses that are within the scope of the program.

Parameters Monitored or Inspected (Element 3)

Procedures will be enhanced to require the following:

- Inspection of internal portions of all MEBs for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion.
- Inspect non-segregated phase bus insulation and isolated phase bus insulators for signs of embrittlement, cracking, melting, swelling, or discoloration.
- Inspection of internal bus supports for structural integrity and signs of cracks.
- Inspection of bus enclosure assemblies for loss of material due to corrosion and hardening of boots and gaskets.
- Inspection of a sample of non-segregated phase bus accessible bolted connections insulation material for surface anomalies.

Detection of Aging Effects (Element 4)

Procedures will be enhanced to require the following:

- Inspect internal portions of all MEBs for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion every ten years.
- Inspect non-segregated phase bus insulation and isolated phase bus insulators for signs of embrittlement, cracking, melting, swelling, or discoloration every ten years.
- Inspect internal bus supports for structural integrity and signs of cracks every ten years.

- Inspect bus enclosure assemblies for loss of material due to corrosion and hardening of boots and gaskets every ten years.
- Inspect 20 percent of the population with a maximum sample size of 25 non-segregated phase bus accessible bolted connections insulation material for surface anomalies such as embrittlement, cracking, melting, discoloration, swelling, or surface contamination every five years.
- Perform the first inspection of all portions of in-scope MEBs prior to the period of extended operation.

Acceptance Criteria (Element 6)

Procedures will be enhanced to ensure the following:

- Non-segregated phase bus insulation and isolated phase bus insulators exhibit no unacceptable visual indications of surface anomalies.
- Non-segregated phase bus sections and internal portions of isolated phase bus exhibit no unacceptable indication of corrosion, cracks, foreign debris, excessive dust buildup, loss of material, hardening, or evidence of water intrusion.
- The exterior of MEBs exhibit no unacceptable indications of general corrosion.
- Boots and gaskets exhibit no unacceptable indications of cracking, checkering, or discoloration.
- The sample of non-segregated phase bus accessible bolted connection insulation material exhibits no unacceptable evidence of embrittlement, cracking, melting, discoloration, swelling, or surface contamination.

Corrective Actions (Element 7)

Procedures will be enhanced to require the following:

- An engineering evaluation is performed when the acceptance criteria are not met. This engineering evaluation will include determining corrective actions.
- A determination will be made whether the unacceptable conditions may be applicable to other accessible or inaccessible MEBs.

Operating Experience

Industry experience has shown that failures have occurred on MEBs caused by cracked insulation and moisture or debris buildup internal to the MEB. Experience has also shown that bus connections in the MEBs exposed to appreciable ohmic heating during operation may experience loosening due to repeated cycling of connected loads. NRC Information Notices IN 2000-14, *Non-Vital Bus Fault Leads to Fire and Loss of Offsite Power* and IN 89-94, *Electrical Bus Failures* are examples of non-segregated bus duct failures.

A review of the plant operating experience has determined that there has been no aging-related degradation that resulted in the loss of intended function of the MEBs. Sections of the MEBs are inspected every outage; the iso-phase bus is inspected every outage, and the non-segregated bus is inspected every third outage. ~~Thermography is performed on the non-segregated bus at the switchgear once a year.~~ The inspection results for the MEB during the last 10 years have revealed only one instance of insulation installation which required ~~rework~~replacement, and one instance where ~~repairs to~~ cracked Noryl sleeving ~~have been made~~was replaced. No occurrences of corrosion, loss of material, hardening, foreign debris, excessive dust buildup, water intrusion or overheating have been found.

As additional Industry and applicable plant-specific operating experience become available, the operating experience will be evaluated and appropriately incorporated into the program through the STP quality assurance program. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

Conclusion

The continued implementation of the Metal Enclosed Bus program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.27 ASME Section XI, Subsection IWE

Program Description

The ASME Section XI, Subsection IWE program manages cracking, loss of material, loss of sealing, and leakage through containment by providing aging management of the steel liner of the concrete containment building. IWE inspections are performed in order to identify and manage containment liner aging effects that could result in loss of intended function. Included in this inspection program are the containment liner plate and its integral attachments, containment hatches and airlocks, and pressure-retaining bolting. Pressure retaining containment seals and gaskets are not addressed by the 2004 Edition of ASME Section XI, Subsection IWE (no addenda). The aging effects of these components are managed by the 10 CFR Part 50, Appendix J program (B2.1.30). Acceptance criteria for components subject to IWE examination requirements are specified in Article IWE-3000.

Surface and volumetric examinations are performed to identify indications of degradation. The primary inspection method is a general visual examination (VT-3 and VT-1). Ultrasonic thickness measurements are performed, as required. All areas requiring augmented examination per criteria IWE-1240 and IWE-2420 receive a detailed visual inspection.

For the second containment inspection interval commencing September 9, 2009, STP performs IWE containment inservice inspections in accordance with the 2004 Edition of ASME Section XI, Subsection IWE (no addenda), supplemented with the applicable requirements of 10 CFR 50.55a(b)(2)(ix). This program is consistent with provisions in 10 CFR 50.55a that specify use of the ASME Code edition in effect 12 months prior to the start of the inspection interval. STP will use the ASME Code edition consistent with the provisions of 10 CFR 50.55a during the period of extended operation.

NUREG-1801 Consistency

The ASME Section XI, Subsection IWE program is an existing program that is consistent, with exception to NUREG-1801, Section XI.S1, ASME Section XI, Subsection IWE.

Exceptions to NUREG-1801

Program Elements Affected:

Scope of Program (Element 1)

NUREG-1801 specifies that ASME Section XI, Subsection IWE inspections include pressure retaining containment seals and gaskets. These components are not addressed by the 2004 Edition of ASME Section XI, Subsection IWE (no addenda). The aging effects of these components are managed by the 10 CFR 50, Appendix J program (B2.1.30).

Parameters Monitored or Inspected (Element 3)

NUREG-1801 states that Table IWE-2500-1 specifies seven categories for examination. The STP ASME Section XI, Subsection IWE program will be in accordance with the 2004 Edition of the ASME Section XI, Subsection IWE (no addenda). This edition of the code does not specify the seven categories for examination in Table IWE-2500-1.

Monitoring and Trending (Element 5)

According to ASME Section XI, Paragraphs IWE-2420(b) and (c), flaws or areas of degradation that have been accepted by engineering evaluation shall be reexamined during the next inspection period, and if they are found to remain essentially unchanged for this inspection period, these areas no longer require augmented examination. This is not consistent with Element 5, which requires that they remain essentially unchanged for three consecutive inspection periods.

IWE-2430 was deleted prior to the issuance of the 2004 Edition of ASME Section XI, (no addenda). The changes to Table IWE-2500-1 eliminate several examination categories. The categories that remain all require 100 percent examination. Therefore no items are available for additional examinations.

Acceptance Criteria (Element 6), Corrective Actions (Element 7), and Confirmation Process (Element 8)

Table IWE-3410-1 was deleted prior to the issuance of the 2004 Edition of ASME Section XI, (no addenda). The acceptance standards previously specified in Table IWE-3410-1 are now given in Section IWE-3500.

Enhancements

~~None~~ Prior to the period of extended operation, the following enhancement will be implemented in the following program element:

Preventive Actions (Element 2)

For ASTM A325, ASTM F1852, and/or ASTM A490 structural bolts, plant procedures will be revised to specify the preventive actions for storage, protection and lubricants recommended in Section 2 of Research Council for Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

Operating Experience

STP procedures have confirmed that the components of containment liners are capable of performing their intended functions.

The containment liners for both Units are inspected per the ASME Section XI, Subsections IWE programs. Exams are conducted every refueling outage, when necessary, to meet the frequency requirements of once per period of 3 1/3. The most recent examination results for the Unit 1 and 2 containment liners were found to be acceptable and no indication were found that would result in loss of the containment liner intended function.

Based on a review of 10 years of STP operating experience, no significant degradation or corrosion of the components of containment liners have been identified. In 2000, areas of minor surface corrosion were identified on Unit 2 containment building liner plate at the interface of liner and concrete basemat, randomly spaced along the circumference of the building. No pitting of the liner plate was identified. Repairs of these areas have been completed. The STP operating experience findings are consistent with those identified in NUREG-1801. Therefore, the ASME XI, Subsection IWE program has been effective in ensuring that the STP components of containment liners will continue to operate within the current licensing basis.

Conclusion

The continued implementation of the ASME Section XI, Subsection IWE program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.29 ASME Section XI, Subsection IWF

Program Description

The ASME Section XI, Subsection IWF program manages loss of material, cracking, and loss of mechanical function for supports of Class 1, 2, and 3 piping and components. There are no Class MC supports at STP. The program conforms to Inspection Program B of ASME Section XI. During the third inservice inspection interval (September 2010 to September 2020 for Unit 1 and October 2010 to October 2020 for Unit 2), STP will perform inspections of supports for Class 1, 2, and 3 piping and components in accordance with 2004 Edition with no addenda of ASME Section XI. In conformance with 10 CFR 50.55a(g)(4)(ii), the STP ISI program is updated during each successive 120-month inspection interval to comply with the requirements of the latest edition and addenda of the Code specified 12 months before the start of the inspection interval. STP will use the ASME Code edition consistent with the provisions of 10 CFR 50.55a during the period of extended operation.

Supports for Class 1, 2, and 3 piping and components are selected for examination per the requirements of ASME Section XI, Subsection IWF. Acceptance standards are specified in Article IWF- 3400. Scope of the inspection for supports is based on class and total population as defined in Table IWF-2500-1. When a component support requires corrective measures in accordance with the provisions of IWF-3112.2 or IWF-3122.2, that support is reexamined during the next inspection period. When the reexaminations do not require additional corrective measures during the next inspection period, the inspection schedule reverts to the requirements of the original inspection program. Component support examinations that detect flaws or relevant conditions exceeding the acceptance criteria of IWF-3400 are extended to include additional examinations in accordance with IWF-2430.

The ASME Section XI, Subsection IWF program provides a systematic method for periodic examination of supports for Class 1, 2, and 3 piping and components. The primary inspection method is visual examination. The instructions and acceptance criteria for the visual examinations are included in STP plant procedures.

NUREG-1801 Consistency

The ASME Section XI, Subsection IWF program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S3, ASME Section XI Subsection IWF.

Exceptions to NUREG-1801

None

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

Scope of Program (Element 1), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6), Corrective Actions (Element 7)

Procedures will be enhanced to incorporate the 2004 Edition of ASME Section XI, Subsection IWF (with no addenda).

Preventive Actions (Element 2)

For ASTM A325, ASTM F1852, and/or ASTM A490 structural bolts, plant procedures will be revised to specify the preventive actions for storage, protection and lubricants recommended in Section 2 of Research Council for Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

Operating Experience

Performance of inservice inspections in accordance with plant procedures has confirmed that the supports for Class 1, 2, and 3 piping and components are capable of performing their intended functions. Review of 10 years of plant-specific operating experience has not identified any program adequacy or implementation issues with the STP ASME Section XI, Subsection IWF program. Industry operating experience is evaluated by STP for relevancy to STP, and appropriate actions are taken and documented. Based on these results, the STP ASME Section XI, Subsection IWF program is effective in monitoring ASME Class 1, 2 and 3 component supports and detecting aging effects prior to loss of intended function.

A review of the 2RE13 outage summary report concluded with four relevant IWF conditions that required evaluation for continued service and were marked for repair/replacement. Two ASME Class 1 support spring cans were found with out of tolerance load readings and one with an out of plate reading. There was also one ASME Class 3 support found with corroded bolts. A review of 1RE14 (April 2008) showed no items with flaws.

The ASME Section XI, Subsection IWF program at STP is updated to account for industry operating experience. ASME Section XI is also revised every three years and addenda are issued in the interim, which allows the code to be updated to reflect industry operating experience. The requirement to update the ASME Section XI, Subsection IWF program to reference more recent editions of ASME Section XI at the end of each inspection interval ensures the ASME Section XI, Subsection IWF program reflects enhancements due to operating experience that have been incorporated Into ASME Section XI.

Therefore, the ASME Section XI, Subsection IWF program operating experience information provides objective evidence to support the conclusion that the effects of aging will be adequately managed so that the structure and component intended functions will be maintained during the period of extended operation.

Conclusion

The continued implementation of the ASME Section XI, Subsection IWF program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.31 Masonry Wall Program

Program Description

The Masonry Wall Program manages cracking of masonry walls, as well as degradation of the structural steel restraint systems of the masonry walls. The Masonry Wall Program is integrated and administered as part of the Structures Monitoring Program (B2.1.32) that implements structures monitoring requirements as specified by 10 CFR 50.65 (Maintenance Rule). In Seismic Category I structures, masonry walls are within scope of license renewal based on guidance provided in IE Bulletin 80-11, *Masonry Wall Design* and NRC Information Notice 87-67, *Lessons Learned from Regional Inspections of Licensee Actions in Response to NRC IE Bulletin 80-11*. Some masonry walls in Non-Category I structures are in-scope for license renewal based on UFSAR commitments to satisfy fire protection requirements. The guidance of NRC Bulletin 80-11 does not apply to these walls. See the Fire Protection program (B2.1.12) for aging management of the masonry wall fire barriers intended function.

The Masonry Wall Program contains inspection guidelines and lists attributes that cause aging of masonry walls, which are to be monitored during structural monitoring inspections, as well as establishes examination criteria, evaluation requirements, and acceptance criteria. The provisions of the program are consistent with the guidance provided in NRC Information Notice 87-67 for inspections and evaluation of masonry wall cracking in Category I structures not addressed in the evaluation basis in response to NRC Bulletin 80-11.

Concrete Masonry Unit (CMU) walls in proximity to safety-related systems and equipment such that wall failure could adversely affect the safety-related systems or equipment are designed as reinforced CMU walls, and/or restrained with steel framing provided on both faces of the walls to prevent collapse of the units. Removable CMU walls, which are built with masonry or concrete units stacked without any grouting or reinforcing, are also restrained with steel framing on both faces of the wall. Some of these removable walls are constructed with reinforced concrete panels, which are evaluated as concrete elements in the Structures Monitoring Program (B2.1.32). No safety-related piping systems or equipment are attached to the CMU walls.

NUREG-1801 Consistency

The Masonry Wall Program, is an existing program that is consistent with NUREG-1801, Section XI.S5, Masonry Wall Program.

Exceptions to NUREG-1801

None

Enhancements

~~None~~ Prior to the period of extended operation, the following enhancement will be implemented in the following program element:

Detection of Aging Effects (Element 4)

Procedures will be enhanced to specify that the inspection frequency for structures within the scope of license renewal will be in accordance with ACI 349.3R, Table 6.1, which specifies:

- For below-grade structures and structures in controlled interior environment (except inside primary containment), all accessible areas of both units will be inspected every 10 years.

- For all other structures (including inside primary containment), all accessible areas of both units will be inspected every 5 years.

Operating Experience

The Structures Monitoring Program (B2.1.32), which includes the Masonry Wall Program, has been effective in controlling cracking and various types of aging effects that could invalidate the evaluation basis. The walkdowns conducted as part of the Structures Monitoring Program (B2.1.32) inspect and monitor a number of attributes to masonry walls that are consistent with recommendations delineated in NRC Information Notice 87-67 that ensure the intended functions of all masonry walls within scope of license renewal are maintained for the period of extended operation.

The baseline evaluation of maintenance rule observations was completed in March 1998. Aging Effects were observed in masonry walls in the mechanical auxiliary building and turbine generator building. There was one wall missing only a partial block in the Unit 1 mechanical auxiliary building. This deficiency was evaluated out as Acceptable. Through the subsequent inspections, all masonry walls were found to be in good condition with their structural integrity and functional intent in compliance with their design criteria. One recent condition report describing cracking of a fire wall in the turbine generator building was evaluated as a "condition not adverse to quality." A work order was issued to repair the cracking per plant procedures.

At STP, all areas of degradation identified during the structures monitoring inspections are documented in condition reports and work orders issued prior to any loss of intended functions or invalidation of licensing basis. The STP Masonry Walls Program operating experience information provides objective evidence to support the conclusion that the effects of aging will be managed adequately so that the intended functions will be maintained during the period of extended operation.

Conclusion

The continued implementation of the Masonry Wall Program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.32 Structures Monitoring Program

Program Description

The Structures Monitoring Program (SMP) monitors the condition of structures and structural supports that are within the scope of license renewal to manage the following aging effects:

- Concrete cracking and spalling
- Cracking
- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increase in porosity and permeability, loss of strength
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of mechanical function
- Loss of sealing
- Reduction of concrete anchor capacity

The SMP implements the requirements of 10 CFR 50.65, *The Maintenance Rule*, consistent with guidance of NUMARC 93-01, *Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*, Revision 2 and Regulatory Guide 1.160, *Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,* Revision 2.

The SMP provides inspection guidelines and walk-down checklists for structural steel, roof systems, reinforced concrete, masonry walls and metal siding. Electrical duct banks and manholes, valve pits, access vaults, and structural supports are inspected as part of the SMP. STP is committed to Regulatory Guide 1.127 and the scope of the SMP includes water-control structures. The scope of SMP also includes masonry walls. The SMP monitors settlement for each major structure utilizing geotechnical monitoring techniques, with benchmarks installed on major structures to allow for monitoring of heave and settlement movements during plant operation. The SMP will monitor groundwater, at least two samples every five years for pH, excessive chlorides and sulfates. STP does not take credit for any coatings to manage the aging of structural components, and coating degradation is used only as an indicator of the condition of underlying material.

NUREG-1801 Consistency

The Structures Monitoring Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S6, Structures Monitoring Program.

Exceptions to NUREG-1801

None

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

Preventive Actions (Element 2)

For ASTM A325, ASTM F1852, and/or ASTM A490 structural bolts, plant procedures will be revised to specify the preventive actions for storage, protection and lubricants recommended in Section 2 of Research Council for Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

Parameters Monitored or Inspected (Element 3)

Procedures will be enhanced to specify inspections of seismic gaps, caulking and sealants, duct banks and manholes, valve pits and access vaults, doors, electrical conduits, raceways, cable trays, electrical cabinets/enclosures and associated anchorage.

Procedures will be enhanced to monitor at least two groundwater samples every five years for pH, sulfates, and chloride concentrations.

Procedures will be enhanced to require the performance of a periodic visual inspection of the accessible sections of the spent fuel pool and transfer canal tell-tale drain lines for blockage every five years. The first inspection will be performed within the 5 years before entering the period of extended operation.

Detection of Aging Effects (Element 4)

Procedures will be enhanced to specify ~~inspection intervals so that all accessible areas of both units are inspected every ten years.~~ that the inspection frequency for structures within the scope of license renewal will be in accordance with ACI 349.3R, Table 6.1, which specifies:

- For below-grade structures and structures in controlled interior environment (except inside primary containment), all accessible areas of both units will be inspected every 10 years.
- For all other structures (including inside primary containment), all accessible areas of both units will be inspected every 5 years.

Procedures will be enhanced to specify inspector qualifications in accordance with ACI 349.3R-96.

Procedures will be enhanced to specify ACI 349.3R-96 and ACI 201.1R-68 as the bases for defining quantitative acceptance criteria.

Operating Experience

The STP SMP began with a baseline walkdown inspection in 1997. The examination included a careful walkdown and visual examination of accessible areas in the scoped structures. All the structures were found to be acceptable with the exception of the Unit 1 fuel handling building,

room 011, which had a significant water leak resulting in corrosion of structural steel columns. The columns were recoated in 1997. The area of the fuel handling building was classified as "acceptable with deficiencies" because the structure continued to function as designed, but was subject to periodic inspections to verify water level was being adequately controlled and structural coatings had been reapplied to control corrosion.

Subsequent Maintenance Rule structures inspections in 2002-03 concluded that all Maintenance Rule scoped structures were meeting their established (a)(2) performance criteria. The only aging related condition report noted an inundation problem in Unit 2 similar to the one that was found in the Unit 1 fuel handling building, room 011, during the baseline inspections. The problem persisted through 2004; and in 2005 gravity drains were installed similar to the ones installed in Unit 1.

At STP, all areas of degradation identified during the structures monitoring inspections are documented in condition reports and work orders issued prior to any loss of intended functions or invalidation of licensing basis. The STP Structures Monitoring Program operating experience information provides objective evidence to support the conclusion that the effects of aging will be managed adequately so that the intended functions will be maintained during the period of extended operation.

Conclusion

The continued implementation of the Structures Monitoring Program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.33 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants

Program Description

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program, which is implemented as part of the Structures Monitoring Program (SMP), manages cracking, loss of bond, loss of material (spalling, scaling), cracking due to expansion, increase in porosity and permeability, loss of strength, and loss of form by performing inspection and surveillance activities for all water control structures associated with emergency cooling water systems. STP is committed to conform to the intent of RG 1.127 with respect to the essential cooling pond (ultimate heat sink). The Structures Monitoring Program (B2.1.32) in compliance with 10 CFR 50.65, *The Maintenance Rule*, includes all water control structures within the scope of RG 1.127, as evaluated in NUREG-1801. The essential cooling pond, the essential cooling pond intake structure, and the essential cooling pond discharge structure are the water-control structures within the scope of license renewal that are monitored by this program. The essential cooling pond (ultimate heat sink) receives periodic monitoring of its hydraulic and structural condition, which includes evaluation of erosion inhibiting structures, conditions of benchmarks and piezometers, and measuring the essential cooling pond volume as indicative of any sediment accumulation. Additionally, STP performs a seepage rate evaluation for the essential cooling pond every five years.

NUREG-1801 Consistency

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program, is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S7, RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants.

Exceptions to NUREG-1801

None

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

Preventive Actions (Element 2)

For ASTM A325, ASTM F1852, and/or ASTM A490 structural bolts, plant procedures will be revised to specify the preventive actions for storage, protection and lubricants recommended in Section 2 of Research Council for Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

Detection of Aging Effects (Element 4)

Procedures will be enhanced to specify inspections at intervals not to exceed five years or to immediately follow significant natural phenomena.

Procedures will be enhanced to specify ACI 349.3R-96 and ACI 201.1R-68 as the basis for defining quantitative acceptance criteria.

Operating Experience

A review of the structures monitoring inspection documents shows that the water control structures at STP including the essential cooling pond, ECW intake and ECW discharge structures have been subject to relatively few aging effects. These inspections include scheduled structures monitoring inspections and detailed visual inspections of the essential cooling pond. All structures have always been in acceptable condition and met engineering functional requirements including performance, maintainability, and safety.

Essential cooling pond inspection report from 1997 states measurements of pond volume over the years have indicated virtually no accumulation of sediments within the pond. The differential settlements of the ECW intake structure and ECW discharge structure were well within the allowable limit of ¾ in. The deflections measured along buried ECW pipe routes using benchmark elevations were found to be well within allowable of 1.5 in. All of the essential cooling pond benchmarks and piezometers were found to be fully functional and measurements were being taken as specified in the UFSAR. There was an array of shrinkage cracks running longitudinal along the soil-cement and concrete paved exterior slopes of embankments, however, this was attributed due to the fluctuating moisture contents of the soil within and as such did not exhibit any signs of erosion

Two minor potential consequences of growing vegetation around the essential cooling pond slopes have been identified. The potential for cracking of areas with soil-cement and concrete leading to soil erosion and the issue of clogging (owing to soil and vegetation) possibly leading to entrapping of debris near the trash racks of the ECWIS was identified. These conditions are non-aging related and could easily be fixed by regular herbicide application.

Conclusion

The continued implementation of the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program provides reasonable assurance that aging

effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.36 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Program Description

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program manages loosening of bolted and non-bolted external connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation to ensure that electrical cable connections not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49 and within the scope of license renewal are capable of performing their intended function.

As part of the STP predictive maintenance program, infrared thermography testing is being performed on non-EQ electrical cable connections associated with active and passive components within the scope of license renewal. A representative sample of external connections will be tested once prior to the period of extended operation using infrared thermography to confirm that there are no aging effects requiring management. The infrared thermography test will detect loosening of bolted and non-bolted connections or high resistance of cable connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation.

The selected sample (20 percent of the population, with a maximum of 25) to be tested is based upon application (medium and low voltage), circuit loading (high or low load), and environment (temperature, high humidity, vibration, etc.). The technical basis for the sample selection is documented.

The acceptance criteria for thermography testing will be based on the temperature rise above the reference temperature. The reference temperature will be ambient temperatures or the baseline temperature data from the same type of connections being tested. The one time testing of a sample of non-EQ electrical cable connectors is representative, with reasonable assurance, that non-EQ electrical cable connections within similar application, circuit loading conditions, and environments is bounded by the testing.

Corrective actions for conditions that are adverse to quality will be performed in accordance with the corrective action program as part of the QA program. The corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

NUREG-1801 Consistency

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that, when implemented, will be consistent with License Renewal Interim Staff Guidance LR-ISG-2007-02 and NUREG-1801, Section XI.E6, Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Operating experience has shown that loosening of connections and corrosion of connections are aging mechanisms that, if left unmanaged, could lead to a loss of electrical continuity and potential arcing or fire.

STP routinely performs infrared thermography on electrical components and connections. A review of the plant operating experience identified a small number of scans where electrical cable connections showed thermal anomaly. No loss of equipment intended function has occurred due to these thermal anomalies.

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program; therefore, plant-specific operating experience to verify the effectiveness of the program is not available. Industry operating experience that forms the basis for these programs is included in the operating experience element of the corresponding NUREG-1801, aging management program description. Plant-specific operating experience was reviewed to ensure that the operating experience discussed in the corresponding NUREG-1801, program is bounding, (i.e., that there is no unique, plant-specific operating experience in addition to that in NUREG-1801).

As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the STP condition reporting and operating experience programs.

Conclusion

The implementation of Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

Enclosure 3

Revised Regulatory Commitments

A4 LICENSE RENEWAL COMMITMENTS

Table A4-1 identifies proposed actions committed to by STPNOC for STP Units 1 and 2 in its License Renewal Application. These and other actions are proposed regulatory commitments. This list will be revised, as necessary, in subsequent amendments to reflect changes resulting from NRC questions and STPNOC responses. STPNOC will utilize the STP commitment tracking system to track regulatory commitments. The Condition Report (CR) number in the Implementation Schedule column of the table is for STPNOC tracking purposes and is not part of the amended LRA.

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
20	Enhance the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program procedures to: • identify the cables, ~~and~~ manholes, and trenches that are within the scope of the program, • ~~require that the cable manholes and trenches be inspected for water collection based on plant experience. The enhancement requires that the inspection frequencies for all in-scope manholes be at least once a year. The enhancement requires any manholes containing water be pumped dry, the source of the water is investigated, and the inspection frequency increased based on past experience.~~ • require all in-scope non-EQ inaccessible medium and low voltage power cables (>400 volts) power cables exposed to significant moisture be tested ~~to provide an indication of the conductor insulation condition.~~ at least once every six years with the first test being completed prior to period of extended operation, • require that the acceptance criteria be defined prior to each test for the specific type of test performed and the specific cable tested, ~~and~~ • require an engineering evaluation that considers the age and operating environment of the cable be performed when the test acceptance criteria are not met. The engineering evaluation shall consider the significance of the test or inspection results, the operability of the component, the reportability of the event, the extent of the concern, the potential root causes for not meeting the test or inspection acceptance criteria, the corrective actions required, and the likelihood of recurrence. • inspect in-scope manholes and trenches based on plant-specific operating experience with water accumulation,	B2.1.25	Prior to the period of extended operation CR 10-23275-1

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
	• require inspections be conducted at least annually, • perform direct observation that cables are not wetted or submerged, • remove collected water and verification of sump pump operability, • initiate a corrective action if wetted cables or inoperable sump pumps are found, • inspect cables/splices and cable support structures if wetted cables are found, • take corrective actions to keep cables dry, • manhole inspection results are evaluated based on actual plant experience with the inspection frequency increased based on experience with water accumulation. • testing of in-scope inaccessible medium and low voltage (>400 volts) power cables exposed to significant moisture using a test capable of detecting reduced insulation resistance, • trend inspection and test results to provide additional information on the rate of cable insulation degradation, • require that the acceptance criterion for manhole and trench be cables/splices and support structures is that they are not submerged or immersed in water, and • require an extent of condition when an unacceptable condition or situation is identified.		
21	Enhance the Metal Enclosed Bus program procedures to: • ~~proceduralize the existing bus inspection activities for inspection and testing of the MEBs to identify license renewal scope, specific bus inspections requirements, and aging effects to be inspected for, frequencies of inspections, acceptance criteria, and actions to be taken when acceptance criteria are not met.~~ Identify the metal enclosed buses that are within the scope of the program. • Inspect internal portions of all MEBs for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion every 10 years. • Inspect non-segregated phase bus insulation and isolated phase bus insulators for signs of embrittlement, cracking, melting, swelling, or discoloration every 10 years. • Inspect internal bus supports for structural integrity and signs of cracks every 10 years. • Inspect bus enclosure assemblies for loss of material due to corrosion and hardening of boots and gaskets every 10 years. • Inspect 20 percent of the population of non-segregated phase bus accessible bolted connections insulation material (with a maximum sample size of 25) for surface anomalies every five years. • Perform the first inspection of all portions of in-scope MEBs prior to the period of extended operation.	B2.1.26	Prior to the period of extended operation CR 10-23280-1

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
	• Identify acceptance criteria for non-segregated phase bus insulation and isolated phase bus insulators as no unacceptable visual indications of surface anomalies. • Identify acceptance criteria for non-segregated phase bus sections and internal portions of isolated phase bus as no unacceptable indications of corrosion, cracks, foreign debris, excessive dust buildup, loss of material, hardening, or evidence of water intrusion. • Identify acceptance criteria for the exterior of MEBs as no unacceptable indications of general corrosion. • Identify acceptance criteria for boots and gaskets as no unacceptable indications of cracking, checkering, or discoloration. • Identify acceptance criteria for accessible bolted connection insulation material as no unacceptable evidence of embrittlement, cracking, melting, discoloration, swelling, or surface contamination. • Require an engineering evaluation when acceptance criteria are not met, to include a determination of corrective actions • Require an engineering evaluation to determine whether the unacceptable conditions may be applicable to other accessible or inaccessible MEBs.		
23	Enhance the ASME Section XI, Subsection IWF program procedures to: • incorporate the 2004 Edition of ASME Section XI, Subsection IWF (with no addenda). • specify the preventive actions for storage, protection and lubricants recommended in Section 2 of Research Council for Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for ASTM A325, ASTM F1852 and/or ASTM 490 bolts.	B2.1.29	Prior to the period of extended operation CR 10-23598-1
25	Enhance the Structures Monitoring Program procedures to: • specify inspections of seismic gaps, caulking and sealants, duct banks and manholes, valve pits and access vaults, doors, electrical conduits, raceways, cable trays, electrical cabinets/enclosures and associated anchorage, • monitor at least two groundwater samples every five years for pH, sulfates, and chloride concentrations, • ~~specify inspection intervals so that all accessible areas of both units are inspected every ten years, and~~ • specify that the inspection frequency for structures within the scope of license renewal will be in accordance with ACI 349.3R, Table 6.1, which specifies: o For below-grade structures and structures in controlled interior environment	B2.1.32	Prior to the period of extended operation 10-23600-1

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
	(except inside primary containment), all accessible areas of both units will be inspected every 10 years. o For all other structures (including inside primary containment), all accessible areas of both units will be inspected every 5 years. • specify inspector qualifications in accordance with ACI 349.3R-96. • require the performance of a periodic visual inspection of the accessible sections of the spent fuel pool and transfer canal tell-tale drain lines for blockage every five years. The first inspection will be performed within the 5 years before entering the period of extended operation. • specify ACI 349.3R-96 and ACI 201.1R-68 as the basis for defining quantitative acceptance criteria, and • specify the preventive actions for storage, protection and lubricants recommended in Section 2 of Research Council for Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for ASTM A325, ASTM F1852 and/or ASTM 490 bolts.		
26	Enhance the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program procedures to: • specify inspections at intervals not to exceed five years or to immediately follow significant natural phenomena. • specify the preventive actions for storage, protection and lubricants recommended in Section 2 of Research Council for Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for ASTM A325, ASTM F1852 and/or ASTM 490 bolts. • specify ACI 349.3R-96 and ACI 201.1R-68 as the basis for defining quantitative acceptance criteria.	B2.1.33	Prior to the period of extended operation CR 10-23601-1
35	Enhance the ASME Section XI, Subsection IWE program procedures to: • specify the preventive actions for storage, protection and lubricants recommended in Section 2 of Research Council for Structural Connections publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for ASTM A325, ASTM F1852 and/or ASTM 490 bolts.	B2.1.27	Prior to the period of extended operation CR 11-19936-1
36	Enhance the Masonry Wall Program procedures to: • Procedures will be enhanced to specify that the inspection frequency for structures within the scope of license renewal will be in accordance with ACI 349.3R, Table 6.1, which specifies:	B2.1.31	Prior to the period of extended operation CR 11-19937-1

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
	○ For below-grade structures and structures in controlled interior environment (except inside primary containment), all accessible areas of both units will be inspected every 10 years. ○ For all other structures (including inside primary containment), all accessible areas of both units will be inspected every 5 years.		