Nuclear Operating Company

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

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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

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
Aging Management, Set 9 (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 December 6, 2011, "Requests for Additional Information for the Review of the South Texas Project, Units 1 and 2 License Renewal Application – Aging Management, Set 9 (TAC Nos. ME4936 and ME 4937)" (ML 11312A176)

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 requests for additional information is provided in Enclosure 1 to this letter. In addition, Enclosure 2 to this letter changes information in support of the STP LRA that was previously submitted in error. Changes to the LRA described in Enclosures 1 and 2 are depicted in line-in/line-out pages provided in Enclosure 3.

Enclosure 4 provides revised regulatory commitments to the LRA. There are no other regulatory commitments provided in 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.

A147
NRR

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

Executed on 1-5-2012
Date

G. T. Powell
Vice President,
Generation

KJT

Enclosure:
1. STPNOC Response to Requests for Additional Information
2. Corrections to the STP LRA
3. STP LRA Changes with Line-in/Line-out Annotations
4. Revised LRA Regulatory Commitments

cc:
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Enclosure 1

STPNOC Response to Requests for Additional Information

STPNOC Response to Requests for Additional Information

SOUTH TEXAS PROJECT, UNITS 1 AND 2
REQUEST FOR ADDITIONAL INFORMATION -
AGING MANAGEMENT, SET 9
(TAC NOS. ME4936 AND ME4937)

Bolting Integrity (019)

RAI B2.1.7-3

Background:

GALL Report AMP XI.M18, "Bolting Integrity," recommends that high strength structural bolting with greater than 1 inch nominal diameter be volumetrically examined for stress corrosion cracking in addition to the American Society of Mechanical Engineers (ASME) Code required visual examination. The applicant's Bolting Integrity Program Basis Document states that volumetric examinations of high strength structural bolts with greater than 1 inch nominal diameter is not required because the corrosive environment needed for stress corrosion cracking (SCC) to occur has been eliminated by following proper lubrication and sealant guidelines. By letter dated August 15, 2011, the staff issued RAI B2.1.7-2 requesting that the applicant provide additional information to demonstrate that all high strength structural bolts have been completely removed from a corrosive environment. In its response dated September 15, 2011, the applicant stated that the high strength structural bolts are located in the reactor containment building, which has an environment of plant indoor air that is not corrosive and that the subject bolts are visually inspected for corrosion in accordance with the ASME Code, Section XI, Subsection IWF.

The corrosive environment needed for SCC of high strength materials to occur, as documented in EPRI NP-5769 and NUREG-1339, is an environment containing moisture or humidity. The staff noted that typical reactor containment building environments are warm and humid, and that localized areas may experience high humidity and condensation. EPRI NP-5769 documents failures of high strength structural bolts for steam generators which were exposed to humidity. The staff also noted that degradation of sealants and lubricants increases with time and can allow for localized corrosive environments in the crevices of bolted connections. In addition, humidity can affect the threaded portions of bolting and cause corrosion that would not be identified by a visual inspection of the surface. The staff further noted that the visual inspections performed by the ASME Code, Section XI, Subsection IWF, are not intended to identify corrosion of the bolt threads or to identify SCC.

Issue:

It is unclear to the staff how a non-corrosive environment is achieved locally for each in-scope high strength structural bolt. It is also unclear to the staff how visual inspection of the exterior surface of the bolting is adequate to detect SCC in the threaded portions of the bolted connections.

Request:

Provide additional information to demonstrate that all in-scope high-strength structural bolts with greater than 1 inch nominal diameter have been completely removed from a localized corrosive environment and are not at risk of being exposed to a corrosive environment during the period of extended operation, or update the program to include volumetric examinations comparable to that of ASME Code Section XI, Table IWB-2500-1, Examination Category BG-1.

STPNOC Response:

LRA Appendix B2.1.29 provides requirements for inservice inspection of safety-related component support bolting and Appendix B2.1.32 provides requirements for inspection of structural bolting. LRA Appendices B2.1.29 and B2.1.32, Table A4-1 items 23 and 25, LRA Basis Documents XI.M18 (B2.1.7), Bolting Integrity, XI.S3 (B2.1.29), ASME Section XI, Subsection IWF, and XI.S6 (B2.1.32), Structures Monitoring Program, are revised to supplement the visual inspection of high strength bolts with volumetric examinations, in accordance with ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1, of a representative sample.

The representative sample size is 20 percent with a maximum of 25 per unit of high strength bolts greater than 1-inch nominal diameter and with actual yield strength greater than or equal to 150 ksi. The representative sample will be selected from bolts most susceptible to stress corrosion cracking based on bolts in susceptible environments. A susceptible environment contains moisture or humidity. The results of the volumetric examinations will be evaluated to determine further required actions including adjustment of future sample sizes.

Enclosure 2 provides the line-in/line-out revision to LRA Appendices B2.1.29 and B2.1.32. Enclosure 3 provides a line-in/line-out revision to Table A4-1 Items 23 and 25.

Aboveground Tanks (030)

RAI B2.1.20-5A (Follow-up):

Background:

The response to RAI B2.1.20-5 states:

> The auxiliary feedwater storage tank (AFST) penetrations are not caulked. The stainless steel tank liner is completely encased in concrete that was poured around the liner and all tank penetrations (approximately two feet thick). Any gaps or spaces on the tank exterior and around penetrations are grouted to prevent water entry.

The GALL Report AMP XI.M29, "Aboveground Metallic Tanks," "parameters monitored/inspected" program element states that, "[t]he AMP utilizes periodic plant inspections to monitor degradation of coatings, sealants, and caulking because it is a condition directly related to the potential loss of materials." The "detection of aging effects" program element states that, "[c]onducting periodic visual inspections at each outage to confirm that the paint, coating, sealant, and caulking are intact is an effective method to manage the effects of

corrosion on the external surface of the component." The "acceptance criteria" program element states, "[d]rying, cracking, or missing sealant and caulking are unacceptable and need to be evaluated using the corrective action program. The evaluation will determine the need to repair the sealant and caulking."

In addition, Table 3.0-1, Final Safety Analysis Report Supplement for Aging Management of Applicable Systems, "Aboveground Metallic Tanks" program states:

> This program includes preventive measures to mitigate corrosion by protecting the external surfaces of steel components, per standard industry practice, with sealant or caulking at the concrete-component interface. Visual inspection during periodic system walkdowns should be sufficient to monitor degradation of the protective paint, coating, cauking, or sealant.

Issue:

The staff considers that the grout that has been installed to prevent water entry between the stainless steel AFST liner and its concrete enclosure is equivalent to a sealant described in GALL AMP XI.M29. Therefore, the grout should be inspected for cracking to ensure that water is not leaking into the space between the liner and the concrete enclosure. The staff could not find any AMR items that manage this grout. LRA Section B1.20, External Surfaces Monitoring program and the appropriate AMR table should be revised to reflect the inspection of the grout as described in GALL AMP XI.M29.

In addition, given the function of the grout, the Updated Final Safety Analysis Report Supplement should be revised to reflect crediting the grout and its inspection to ensure that these aspects are reflected in the CLB during the period of extended operation.

Request:

Explain why periodic inspections of the grout are not needed to ensure that the grout is not degrading, or propose an AMP to manage the aging of the grout.

STPNOC Response:

A walkdown of the Unit 1 and Unit 2 Auxiliary Feedwater Storage Tanks (AFST) was performed to verify the use of grout on the AFSTs concrete shell. The walkdown verified that grout is not used around the AFST piping penetrations to fill gaps or spaces on the tank exterior concrete shell as previously stated in RAI B2.1.20-5. The concrete shell tightly adheres to the piping with no gaps for water entry.

Since grout or other sealants are not used around the AFST piping penetrations and the concrete shell (approximately two feet thick) tightly adheres to the piping penetrations, aging management of the concrete interface is managed by Aging Management Program B2.1.32, Structures Monitoring Program. Therefore, periodic inspection of the grout is not needed and the Updated Final Safety Analysis Report Supplement is not revised to reflect crediting the grout or other sealants and their inspection in the CLB.

Water Chemistry (002)

RAI 3.3.2.3.19-2

Background:

The GALL Report XI.M2, "Water Chemistry," states that verification of the effectiveness of the chemistry control program is undertaken to ensure that significant degradation is not occurring and the component's intended function is maintained during the period of extended operation. An acceptable verification program is a one-time inspection of selected components at susceptible locations in the system.

In LRA Table 3.3.2-19, the applicant states that the chemical and volume control system's concentrated boric acid sample cooler will be managed for loss of material by only the Water Chemistry program.

In LRA Tables 3.2.2-3 and 3.3.2-2, the applicant manages reduction of heat transfer in the residual heat removal (RHR) heat exchanger, the RHR pump seal water cooler, and the spent fuel pool cooling and cleanup system's spent fuel pool heat exchanger with the Water Chemistry and the One-Time Inspection program.

Issue:

The chemical and volume control system's concentrated boric acid sample cooler is only managed by the Water Chemistry program, which is inconsistent with the guidance in the GALL Report and inconsistent with the aging management pattern shown in the LRA for other similar heat exchangers.

Given that heat exchangers can have low flow or stagnant areas, it is prudent to include a verification program with the primary aging management program.

Request:

State the basis for omitting the One-Time Inspection program in conjunction with the Water Chemistry program for the chemical and volume control system's concentrated boric acid sample cooler. This arrangement would verify the effectiveness of the Water Chemistry's aging management for this component consistent with the GALL Report.

STPNOC Response:

AMP XI.M32, One-Time Inspection for aging management of the Concentrated Boric Acid Sample Cooler was inadvertently omitted. AMP XI.M2, Water Chemistry and AMP XI.M32, One-Time Inspection should have been specified.

LRA Table 3.3.2-19 is revised to include AMP XI.M32, One-Time Inspection with AMP XI.M2, Water Chemistry for loss of material aging management of the Concentrated Boric Acid Sample Cooler.

Enclosure 2 provides a line-in/line-out markup of LRA Table 3.3.2-19.

Inaccessible Cable (051)

RAI B2.1.25-4

Background:

GALL Report AMP XI.E3, program element "Detection of Aging Effects" states, "For power cables exposed to significant moisture, test frequencies are adjusted based on test results (including trending of degradation where applicable) and operating experience."

Issue:

The applicant in its LRA supplement dated June 16, 2011, and RAI response dated October 10, 2011, revised the basis document associated with 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 to include trending of the cable test results based on the type of test performed. However, the applicant did not indicate whether test frequencies may be increased based on test results or operating experience consistent with the recommendations in GALL AMP XI.E3.

Request:

Explain why the basis document associated with LRA AMP B2.1.25, Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements program, LRA Appendix B2.1.25, LRA Appendix A1.25, and Table A4-1, Item 20 does not address adjusting the test frequency based on test results and operating experience.

STPNOC Response:

The South Texas Project LRA was submitted prior to the issuance of NUREG-1801, Revision 2. The requirement to address adjusting the test frequency based on test results and operating experience is a NUREG-1801, Revision 2 requirement that was inadvertently omitted when Aging Management Program B2.1.25 was updated to increase the scope of the program to include 480V power cables.

LRA Appendices A1.25 and B2.1.25, Table A4-1, Item 20 and LRA Basis Document XI.E3 (B2.1.25) are revised to address adjusting the test frequency based on test results and operating experience.

Enclosure 2 provides the line-in/line-out revision to LRA Appendices A1.25 and B2.1.25. Enclosure 3 provides a line-in/line-out revision to Table A4-1 Item 20.

Enclosure 2

Corrections to the STP LRA

Corrections to the STP LRA

References

1. STPNOC letter dated October 10, 2011 from G. T. Powell to the NRC Document Control Desk, "Response to Requests for Additional Information for the South Texas Project License Renewal Application (TAC Nos. ME4936 and ME4937)" (NOC-AE-11002732) (ML11291A152)

2. STPNOC letter dated October 18, 2011 from G. T. Powell to the NRC Document Control Desk, "Supplement to the South Texas Project License Renewal Application (TAC Nos. ME4936 and ME4937)" (NOC-AE-11002737) (ML11298A082)

3. STPNOC Letter dated December 7, 2011, from D. W. Rencurrel to NRC Document Control Desk, "Supplement to the South Texas Project License Renewal Application (TAC NOS. ME 4936 and ME4937)" (NOC-AE-11002769) (ML11347A365)

RAI B2.1.32-05

In Reference 1, the following enhancement was added to LRA Appendix B2.1.32, Structures Monitoring Program, under *Parameters Monitored or Inspected (Element 3).*

> 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.

In Reference 2, the following words were inadvertently deleted from LRA Appendix B2.1.32.

> "..... of the accessible sections...."

Enclosure 3 (Appendix B2.1.32) and Enclosure 4 (Item 25) reinsert these words with a lined-in annotation.

RAI B2.1.25-1

In Reference 3, the following enhancement to South Texas Project Aging Management Program (AMP) B2.1.25, Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, was inadvertently deleted.

> Manhole inspection results are evaluated based on actual plant experience with the inspection frequency increased based on experience with water accumulation.

AMP B2.1.25 is revised to include the above enhancement.

Enclosure 3 provides the line-in/line-out revision to LRA Appendix B2.1.25. Enclosure 4 provides a line-in/line-out revision to Table A4-1 Item 20.

Enclosure 3

STP LRA Changes with Line-in/Line-out Annotations

List of Revised LRA Sections

RAI	Affected LRA Section
B2.1.7-3	Appendix B2.1.29 Appendix B2.1.32 Table A4-1 Item 23 (see Enclosure 3) Table A4-1 Item 25 (see Enclosure 3)
.3.3.2.3.19-2	Table 3.3.2-19
B2.1.25-4	Appendix A1.25 Appendix B2.1.25 Table A4-1 Item 20 (see Enclosure 3)
B2.1.25-1	Appendix B2.1.25 Table A4-1 Item 20 (see Enclosure 3)

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.

Visual examinations are augmented with volumetric examinations, in accordance with ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1, of a representative sample of high strength bolts. The representative sample size is 20 percent with a maximum of 25 per unit of high strength bolts greater than 1-inch nominal diameter and with actual yield strength greater than or equal to 150 ksi. The representative sample will be selected from bolts most susceptible to stress corrosion cracking based on bolts in susceptible environments. A susceptible environment contains moisture or humidity. The results of the volumetric examinations will be evaluated to determine further required actions, including adjustment of future sample sizes.

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."

Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4)

Plant procedures will be revised to specify that visual examinations are augmented with volumetric examinations, in accordance with ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1, to detect stress corrosion cracking for 20 percent (25 bolts maximum per unit) of high strength bolts greater than 1-inch nominal diameter and with an actual yield strength greater than or equal to 150 ksi.

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.

B2.1.32 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.

Visual examinations are augmented with volumetric examinations in accordance with ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1, of a representative sample of high strength bolts. The representative sample size is 20 percent with a maximum of 25 per unit of high strength bolts greater than 1-inch nominal diameter and with actual yield strength greater than or equal to 150 ksi. The representative sample will be selected from bolts most susceptible to stress corrosion cracking based on bolts in susceptible environments. A susceptible environment

contains moisture or humidity. The results of the volumetric examinations will be evaluated to determine further required actions, including adjustment of future sample sizes.

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:

Scope of Program (Element 1)

Procedures will be enhanced to include the switchyard control building into the scope of the Structures Monitoring Program.

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)

Groundwater samples will be taken at multiple locations around the site every three months for at least 24 consecutive months. The samples will analyze for pH, sulfates, and chlorides. This sampling plan will begin no later than September 2012.

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. This sampling will follow the initial 24 month monitoring activity.

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.

Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4)

Plant procedures will be enhanced to specify that visual examinations are augmented with volumetric examinations in accordance with ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1, to detect stress corrosion cracking for 20 percent (25 bolts maximum per unit) of high strength bolts greater than 1-inch nominal diameter and with an actual yield strength greater than or equal to 150 ksi.

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.

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.

Procedures will be enhanced to perform opportunistic inspections of exposed portions of the below-grade concrete, when excavated for any reason.

Procedures will be enhanced to require an evaluation should ground water be determined to be aggressive or inspections of accessible concrete structural elements identify degradation. The evaluation will be performed to determine the appropriate actions necessary to assure that the affected structures will continue to perform their intended function. These actions may include increased visual inspections or other examination techniques.

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.

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System(Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Conc Boric Acid Sample Clr)	LBS	Nickel-Alloys	Borated Water Leakage (Ext)	None	None	None	None	G, 1
Heat Exchanger (Conc Boric Acid Sample Clr)	LBS	Nickel-Alloys	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G
Heat Exchanger (CVCS BTRS Letdown Chiller)	LBS, SIA	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	A

A1.25. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

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 lasts more than a few days) not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49, and within the scope of license renewal.

All manholes and trenches that contain in-scope Non-EQ inaccessible medium or low voltage power cables are being inspected for water collection. Collected water is being removed as required. This inspection and water removal is being performed based on actual plant experience with inspection frequency being at least annually. Event-driven inspections are performed as an on-demand activity based on actual plant experience. Test frequency may be adjusted based on test results and operating experience.

The program provides for testing of in-scope Non-EQ inaccessible medium and low voltage (>400 volts) power cables to provide an indication of the conductor insulation condition. At least once every six years, 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. The first test will be completed prior to the period of extended operation.

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. 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. 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. Event-driven inspections are performed as an on-demand activity based on actual plant experience.

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. Test frequency may be adjusted based on test results or operating experience. 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, manholes and trenches that are within the scope of the program.

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.
- Manhole inspection results are evaluated based on actual plant experience with the inspection frequency increased based on experience with water accumulation.
- Event-driven inspections of in-scope manholes will be performed as an on-demand activity based on actual plant experience.
- 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 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. Test frequency may be adjusted based on test results or operating experience.

Acceptance Criteria (Element 6)

Procedures will be enhanced to define the following:

- 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 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.

Enclosure 4

Revised LRA 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, manholes, and trenches that are within the scope of the program, • require all in-scope non-EQ inaccessible medium and low voltage power cables (>400 volts) power cables exposed to significant moisture be tested 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, • 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, • require inspections be conducted at least annually, • event-driven inspections of in-scope manholes will be performed as an on-demand activity based on actual plant experience, • 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.	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
	• 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, • test frequency may be adjusted based on test results or operating experience, • 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.		
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, and • specify that visual examinations are augmented with volumetric examinations, in accordance with ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1, to detect stress corrosion cracking for 20 percent (25 bolts maximum per unit) of high strength bolts greater than 1-inch nominal diameter and with an actual yield strength greater than or equal to 150 ksi.	B2.1.29	Prior to the period of extended operation CR 10-23598-1
25	Enhance the Structures Monitoring Program procedures to: • include the switchyard control building into the scope of the Structures Monitoring Program, • 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 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 (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.	B2.1.32	Prior to the period of extended operation CR 10-23600-1

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
	• 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 prior 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. • Procedures will be enhanced to perform opportunistic inspections of exposed portions of the below-grade concrete when excavated for any reason, • Procedures will be enhanced to require an evaluation should ground water be determined to be aggressive or inspections of accessible concrete structural elements identify degradation. The evaluation will be performed to determine the appropriate actions necessary to assure that the affected structures will continue to perform their intended function. These actions may include increased visual inspections or other examination techniques. • specify that visual examinations will be augmented with volumetric examinations, in accordance with ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1, to detect SCC for 20 percent (25 bolts maximum) of high strength bolts greater than 1-inch nominal diameter and with an actual yield strength greater than or equal to 150 ksi.		