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
Washington, DC 20555-0001

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Supplement to the South Texas Project License Renewal Application
(CAC Nos. ME4936 and ME4937)

Reference: Letter; G. T. Powell to the NRC Document Control Desk; "License Renewal Application", NOC-AE-10002607; dated October 25, 2010. (ML103010257)

By the referenced letter, STP Nuclear Operating Company (STPNOC) submitted a License Renewal Application (LRA). The enclosure to this letter provides additional details associated with the Aging Management Programs AMP XI.M18, Bolting Integrity, and AMP XI.M36, External Surfaces Monitoring Program line in/line out revisions to the License Renewal Application appendices A1.7, A1.20, B2.1.7, and B21.20, and Table A4-1 regulatory commitment changes.

There are no other regulatory commitments in this letter.

If there are any questions regarding this submittal, please contact Arden Aldridge, STP License Renewal Project Lead, at (361) 972-8243 or Rafael Gonzales, STP License Renewal Project regulatory point-of-contact, at (361) 972-4779.

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

Executed on April 19, 2017
Date

James Connolly
Site Vice President

rjg

A147
NRR

Enclosures:
1) Additional Aging Management Program Details
2) STPNOC License Renewal Application Appendix A and B Line in/out Sections
3) STPNOC Regulatory Commitment Item #3 and #15 - line in/out

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Enclosure 1

Additional Aging Management Program Details

License Renewal Application (LRA) appendices A1.7, A1.20, B2.1.7, B2.1.20, Table A4-1 item #15 and LRA Basis Documents AMP XI.M18, Bolting Integrity and AMP XI.M36, External Surfaces Monitoring Program have been revised to provide additional guidance on techniques utilized to verify bolting integrity for air or gas filled systems.

The following table is the list of systems with pressure boundary bolted connections where the internal environment consists of dry gas, compressed air, plant indoor air or diesel exhaust.

Managed systems with Dry Gas, Air, Compressed Air

System	System Title	Component Internal Environment
AF	-Table 3.4.2-6 Auxiliary Feedwater	Nitrogen
CC	-Table 3.3.2-6 Component Cooling Water	Nitrogen
CS	-Table 3.2.2-1 Containment Spray	Air
DG	-Table 3.3.2-18 Standby Diesel Generator Fuel Oil Storage and Transfer System	Compressed Air, Air (Diesel exhaust)
DL	-Table 3.3.2-28 Lighting Diesel Generator	Air (Diesel exhaust)
IA	-Table 3.3.2-7 Compressed Air Systems	Compressed Air
IL	-Table 3.2.2-2 Integrated Leak Rate Test	Air
RC	-Table 3.1.2-2 Reactor Coolant System	Air
SI	-Table 3.2.2-4 Safety Injection System	Air, Nitrogen

Enclosure 2
STPNOC License Renewal Application Appendix A and B Line in/out Sections

Affected LRA Section
A1.7
A1.20
B2.1.7
B2.1.20

A1.7 Bolting Integrity

The Bolting Integrity program manages cracking, loss of material, and loss of preload for pressure retaining bolting and ASME component support bolting. The program includes preload control, selection of bolting material, use of lubricants/sealants consistent with EPRI NP-5067, *Good Bolting Practices*, and performance of periodic inspections for indication of aging effects. The program also includes inservice inspection requirements established in accordance with ASME Section XI, Subsections IWB, IWC, IWD, and IWF for ASME Class bolting. All ASME pressure boundary bolted connections where the internal environment consists of dry gas or compressed air will be leak checked using a method that detects leakage. Bolted connections where the internal environment consists of air at atmospheric pressure, connections will be checked for tightness.

STP good bolting practices are established in accordance with plant procedures. These procedures include requirements for proper disassembling, inspecting, and assembling of connections with threaded fasteners. In addition to the inspection activities noted above, the Bolting Integrity program includes activities for preload control, material selection and control, and use of lubricants/sealants. The general practices that are established in this program are consistent with EPRI TR-104213, *Bolted Joint Maintenance and Applications Guide*, EPRI NP-5769, *Degradation and Failure of Bolting in Nuclear Power Plants*, Volume 1 and 2, and the recommendations delineated in NUREG-1339.

The Essential Cooling Water (ECW) Pump column closure bolts, submerged in raw water, are managed for loss of preload using good bolting practices in accordance with plant procedures. The ECW pump column closure bolts are inspected during ECW pump refurbishment nominally every 10 years. The ECW pumps are performance tested quarterly, pump parameters such as pressure and flow are trended to identify any potential leakage before the leakage could affect the ECW system from performing its intended functions.

A1.20 External Surfaces Monitoring Program

The External Surfaces Monitoring program manages loss of material for external surfaces of steel, stainless steel, aluminum, copper alloy components and elastomers, including protective paints, coatings, caulking, sealants, and insulation for reduced thermal insulation resistance. The program also manages loss of preload for non-ASME pressure boundary bolting, hardening and loss of strength for elastomers, and cracking of stainless steel. The program includes those systems and components within the scope of license renewal that require external surface monitoring. Visual inspections of external surfaces conducted during engineering walkdowns will be used to identify aging effects and leakage. All non-ASME pressure boundary bolted connections where the internal environment consists of dry gas, compressed air or diesel exhaust will be leak checked using a method that detects leakage. Bolted connections where the internal environment consists of air at atmospheric pressure, connections will be checked for tightness. When appropriate for the component configuration and material, physical manipulation of at least 10 percent of the available surface area will be used to augment visual inspection to confirm the absence of elastomer hardening and loss of strength.

Visual inspections are conducted on insulation jacketing, outdoor insulated components, and indoor insulated components exposed to condensation. A minimum of 20 percent of the in scope piping length or 20 percent of the surface area whose configuration does not conform to a 1-foot axial length determination is inspected every 10 years during the period of extended operation after the insulation is removed. As an alternate any combination of a minimum 25 1-foot axial length sections and components are inspected for each material type. For each insulated tank, the exterior surface is inspected after the removal of insulation from 25 1-square-foot sections or 20 percent of the surface area.

Where inspection determine that there is no loss of material or evidence of stress corrosion cracking (SCC), subsequent inspection may consists of visual inspection of the exterior surface of the insulation jacketing material or protective outer layer for evidence of damage that could allow in-leakage of moisture. If insulation jacket or protective outer layer damage is observed, the insulation will be removed for inspection of the component exterior surface. Removal of tightly adhering insulation that is impermeable to moisture is not required unless there is evidence of damage.

Periodic monitoring of the stainless steel external surfaces of Refueling Water Storage Tanks will include visual inspection for leakage to detect cracks.

Loss of material for external surfaces is managed by the Boric Acid Corrosion program (A1.4) for components in a system with treated borated water or reactor coolant environment on which boric acid corrosion may occur, Buried Piping and Tanks Inspection program (A1.8) for buried components, Fire Water System Program (B2.1.13) for components in the fire protection system, and Structures Monitoring Program (A1.32) for civil structures, and other structural items which support and contain mechanical and electrical components.

The External Surfaces Monitoring 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.

B2.1.7 Bolting Integrity

Program Description

The Bolting Integrity program manages cracking, loss of material, and loss of preload for pressure retaining bolting and ASME component support bolting. The program includes preload control, selection of bolting material, use of lubricants/sealants consistent with EPRI NP-5067, *Good Bolting Practices*, and performance of periodic inspections for indication of aging effects. The program also includes inservice inspection requirements established in accordance with ASME Section XI, Subsections IWB, IWC, IWD, and IWF for ASME Class bolting. ASME pressure boundary bolted connections where the internal environment consists of dry gas, compressed air, or diesel exhaust will be leak checked using a method that detects leakage. Bolted connections where the internal environment consists of air at atmospheric pressure, connections will be checked for tightness prior to the period of extended operation and once every six years thereafter.

STP good bolting practices are established in accordance with plant procedures. These procedures include requirements for proper disassembling, inspecting, and assembling of connections with threaded fasteners. In addition to the inspection activities noted above, the Bolting Integrity program includes activities for preload control, material selection and control, and use of lubricants/sealants. The general practices that are established in this program are consistent with EPRI TR-104213, *Bolted Joint Maintenance and Applications Guide*, EPRI NP-5769, *Degradation and Failure of Bolting in Nuclear Power Plants*, Volumes 1 and 2, and the recommendations delineated in NUREG-1339.

The Essential Cooling Water (ECW) Pump column closure bolts, submerged in raw water, are managed for loss of preload using good bolting practices in accordance with plant procedures. The ECW pump column closure bolts are inspected during ECW pump refurbishment nominally every 10 years. The ECW pumps are performance tested quarterly, pump parameters such as pressure and flow are trended to identify any potential leakage before the leakage could affect the ECW system from performing its intended functions.

The following STP aging management programs supplement the Bolting Integrity program with management of loss of preload, cracking, and loss of material:

(a) ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD (B2.1.1) provides the requirements for inservice inspection of ASME Class 1, 2, and 3 safety-related pressure retaining bolting.

(b) ASME Section XI, Subsection IWF (B2.1.29) provides the requirements for inservice inspection of safety-related component support bolting.

(c) External Surfaces Monitoring Program (B2.1.20) provides the requirements for inspection of non-ASME pressure boundary closure bolting within the scope of license renewal.

(d) Structures Monitoring Program (B2.1.32) provides the requirements for inspection of structural bolting.

(e) Open-Cycle Cooling Water Program (B2.1.9) manages the loss of material for the Essential Cooling Water (ECW) Pump column closure bolts.

NUREG-1801 Consistency

The Bolting Integrity program is an existing program, that following enhancement, will be consistent, with exception to NUREG-1801, Section XI.M18, Bolting Integrity.

Exceptions to NUREG-1801

Program Elements Affected:

Parameters Monitored or Inspected (Element 3)

NUREG-1801 states that bolting for safety-related pressure retaining components is inspected for loss of preload/loss of prestress. Loss of preload of ASME pressure boundary bolted connections where the internal environment consists of dry gas, compressed air, or air at atmospheric pressure is ~~not a parameter of~~ inspectioned for the STP Bolting Integrity program. A~~T~~t STP the application of good bolting techniques provided in plant procedures and vendor instructions during assembly of bolted joints minimizes the possibility for a loss of preload/loss of prestress. The discussion of bolt preload in EPRI NP-5769, Vol. 2, Section 10, indicates that job inspection torque is non-conservative since for a given fastener tension more torque is required to restart the installed bolts. The techniques for measuring the amount of bolt tension in an assembled joint are both difficult and unreliable. Inspection of preload is usually unnecessary if the installation method has been carefully followed. Torque values are provided in plant procedure if not provided by the vendor instructions, design documents or specifications. These torque values are based on the industrial experience that includes the consideration of the expected relaxation of the fasteners over the life of the joint and gasket stress in the application of pressure closure bolting. Additionally visual inspections for leakage would detect a loss of preload/loss of prestress in the connection prior to a loss of intended function.

Monitoring and Trending (Element 5)

NUREG-1801, Section XI.M18 specifies that if bolting connections for pressure retaining components (not covered by ASME Section XI) are reported to be leaking, then they may be inspected daily. If the leak rate does not increase, the inspection frequency may be decreased to biweekly or weekly. STP procedures require the inspection frequency be adjusted as necessary based on the trending of inspection results to ensure there is not a loss of intended function between inspection intervals. For pressure retaining components reported to be leaking, STP procedures initiate the site corrective action process. Consideration is also given to adequate frequency of subsequent inspections to ensure the inspection interval is adequate to detect further aging degradation so that a loss of intended function is avoided.

Enhancements

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

Scope (Element 1) and Detection of Aging Effects (Element 4)

Procedures will be enhanced to include the following:

Require a leak check of ASME pressure boundary bolted connections where the internal environment consists of dry gas, or compressed air using a method that detects leakage such as a visual inspection for discoloration, monitoring and trending for pressure decay, leak fluid detection, or when the temperature of the system is higher than ambient conditions thermography testing.

ASME pressure boundary bolted connections where the internal environment consists of air at atmospheric pressure are checked for tightness prior to the period of extended operation and once every six years thereafter.

Scope (Element 1)

Procedures will be enhanced to conform to the guidance contained in EPRI TR-104213.

Corrective Actions (Element 7)

Procedures will be enhanced to evaluate loss of preload of the joint connection, including bolt stress, gasket stress, flange alignment, and operating condition to determine the corrective actions consistent with EPRI TR-104213.

Operating Experience

Both the industry and NRC have revealed a number of instances of bolting concerns from material control and certification (e.g. NRC Bulletin 87-02) to bolting practices, use of lubrication and injection sealants and its effect on SCC (e.g., NRC Bulletin 82-02, and INPO SOER 84-05). The Bolting Integrity program incorporates the applicable industry experience on bolting issues into the program. Actions taken include confirmatory testing/analysis or inspections. Also included are the addition of procedures of inspection, material procurement and verification processes. NRC Information Notices, Bulletins, Circulars, and Generic Letters listed in Section 3 of NUREG-1339 were evaluated for applicability to the STP Bolting Integrity program to ensure conformance with the recommendations of NUREG-1339.

There is no reported case of cracking of bolting due to stress corrosion cracking.

A review of operating experience contained in STP condition reports (CRs) were evaluated for aging effects associated with the Bolting Integrity program. Of these CRs only 19 were determined to have applicable aging effects associated with the Bolting Integrity program. The following is a summary of the aging effects reported in these CRs.

Condensation has been observed to cause surface corrosion of bolting associated with chilled water bolted connections. The instances were evaluated and it was determined that the corrosion was limited to the surface and did not affect the integrity of the bolted joint. To prevent this corrosion from reoccurring the bolting was either painted to prevent water droplets coming in direct contact with carbon steel bolting or insulation was installed to prevent the cool surface temperatures from creating the condensation.

Leakage from fittings and pump mechanical seals has also caused corrosion of bolting when the leaking system fluid came in contact with bolting. The bolting was evaluated for each joint and replaced where required.

Boric acid accumulations have been observed on bolting. After the boric acid accumulations were removed the bolting was evaluated. The bolting was determined to be acceptable as found or replaced if the bolting material was degraded by boric acid corrosion.

Incorrect materials have been found in bolting connections during system walkdowns and inspections. The bolting was replaced with the correct material.

Conclusion

The continued implementation of the Bolting Integrity 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.

B2.1.20 External Surfaces Monitoring Program

Program Description

The External Surfaces Monitoring Program manages loss of material for external surfaces of steel, stainless steel, aluminum, copper alloy components including protective paints, coatings, caulking, sealants, and insulation for reduced thermal insulation resistance. The program also manages loss of preload for non-ASME pressure boundary bolting, hardening and loss of strength for elastomers, and cracking of stainless steel. The program is a monitoring program that includes those systems and components within the scope of license renewal. Visual inspections are used to identify aging effects and leakage of steel, stainless steel, aluminum, copper alloy components, and elastomers. When appropriate for the component configuration and material, physical manipulation of at least 10 percent of the available surface area of elastomers is used to augment visual inspections to confirm the absence of hardening or loss of strength. Non-ASME pressure boundary bolted connections where the internal environment consists of dry gas, compressed air, or diesel exhaust will be leak checked using a method that detects leakage. Bolted connections where the internal environment consists of air at atmospheric pressure, connections will be checked for tightness prior to the period of extended operation and once every six years thereafter. Personnel performing external surfaces monitoring inspections will be qualified in accordance with site controlled procedures and processes.

Visual inspections are conducted on insulation jacketing, outdoor insulated components, and indoor insulated components exposed to condensation, which operated below the dew point (100 deg. F). A minimum of 20 percent of the in scope piping length or 20 percent of the surface area whose configuration does not conform to a 1-foot axial length determination is inspected Every 10 years during the period of extended operation after the insulation is removed. As an alternate any combination of a minimum 25 1-foot axial length sections and components are inspected for each material type. For each insulated tank, the exterior surface is inspected after the removal of insulation from 25 1- square-foot sections or 20 percent of the surface area.

Where inspection determine that there is no loss of material or evidence of stress corrosion cracking (SCC), subsequent inspection may consists of visual inspection of the exterior surface of the insulation jacketing material or protective outer layer for evidence of damage that could allow in-leakage of moisture. If insulation jacket or protective outer layer damage is observed, the insulation will be removed for inspection of the component exterior surface. Removal of tightly adhering insulation that is impermeable to moisture is not required unless there is evidence of damage.

The External Surfaces Monitoring Program will be implemented by a new procedure. System inspections and walkdowns will be required and will consist of periodic visual inspections of 100 percent of the accessible components surface for indications of loss of material, leakage, elastomer hardening and loss of strength, and aging effects of protective paints, coatings, caulking, sealants, and insulation for reduced thermal insulation resistance.

Periodic monitoring of the stainless steel external surfaces of Refueling Water Storage Tanks at least every re-fueling cycle will include visual inspection for leakage to detect cracks.

The following aging management programs are used to manage aging for external surfaces that are not within the scope of the External Surfaces Monitoring Program.

1) Boric Acid Corrosion program (B2.1.4) for components in a system with treated borated water or reactor coolant environment in which boric acid corrosion may occur.

2) Buried Piping and Tanks Inspection program (B2.1.18) for buried components.

3) Structures Monitoring Program (B2.1.32) for civil structures, and other structural items which support and contain mechanical and electrical components.

4) Fire Water System Program (B2.1.13) for components in the fire protection system.

The External Surfaces Monitoring Program is a new program that will be implemented prior to the period of extended operation. Within the ten year period prior to the period of extended operation, and continuing into the period of extended operation, periodic inspections will be performed.

NUREG-1801 Consistency

The External Surfaces Monitoring program is a new program that, when implemented, will be consistent, with exception to NUREG-1801, Section XI.M36, External Surfaces Monitoring.

Exceptions to NUREG-1801

Program Elements Affected:

Scope of Program (Element 1) and Detection of Aging Effects (Element 4)

NUREG-1801, Section XI.M36 requires the program to visually inspect the external surface of in-scope components and monitor external surfaces of steel components in systems within the scope of license renewal and subject to AMR for loss of material and leakage. The External Surfaces Monitoring Program has expanded the materials inspected to include stainless steel, aluminum, copper alloy, and elastomer external surfaces within the scope of license renewal. The use of visual inspection to detect loss of material and leakage of stainless steel, aluminum, copper alloy and elastomer external surfaces is an effective method for these materials.

NUREG-1801, Section XI.M36 requires the program to manage loss of material and leakage. The External Surfaces Monitoring Program also includes, among the aging effects to be managed, cracking, elastomer hardening and loss of strength. Elastomer hardening and loss of strength is managed by physical manipulation of elastomer components to detect hardening and loss of strength.

NUREG-1801, Section XI.M36 requires a program of visual inspection to detect loss of material and leakage. The External Surfaces Monitoring Program primarily uses visual inspection to detect loss of material and leakage and is augmented by physical manipulation of at least 10 percent of the available surface area of elastomers when appropriate to the component material and design. Manipulation of elastomers is an effective method to augment the visual inspection of elastomers in detecting the aging effect of hardening and loss of strength.

Enhancements

~~None~~

Scope (Element 1) and Detection of Aging Effects (Element 4)

Existing plant procedures will be enhanced to include the following:

Require a leak check of non-ASME pressure boundary bolted connections where the internal environment consists of dry gas, compressed air, or diesel exhaust using a method that detects leakage such as a visual inspection for discoloration, monitoring and trending for pressure decay, leak fluid detection, or when the temperature of the system is higher than ambient conditions thermography testing.

Require bolted connections where the internal environment consists of air at atmospheric pressure be checked for tightness prior to the period of extended operation and once every six years thereafter.

Operating Experience

The External Surfaces Monitoring Program is a new program. Routine system walkdowns are performed as part of the systems engineering program. The STP condition reporting program is used in conjunction with the system walkdowns to identify and resolve issues to plant equipment. Industry operating experience that forms the basis for this program is included in the operating experience element of the corresponding NUREG-1801 aging management program. A review of plant condition reporting documents, as well as other STP current licensing basis documents, since 1998, was performed to ensure that there is no unique, plant-specific operating experience in addition to that in NUREG-1801. The review identified no unique operating experience. The condition reporting program was proven to be effective in maintaining the material condition of plant systems.

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 the External Surfaces Monitoring 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

STPNOC Regulatory Commitment Item #3 and #15 - line in/out

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
3	Enhance the Bolting Integrity program procedures to: • conform to the guidance contained in EPRI TR-104213 • evaluate loss of preload of the joint connection, including bolt stress, gasket stress, flange alignment, and operating condition to determine the corrective actions consistent with EPRI TR-104213. • Require a leak check of ASME pressure boundary bolted connections where the internal environment consists of dry gas, or compressed air using a method that detects leakage such as a visual inspection for discoloration, monitoring and trending for pressure decay, leak fluid detection, or when the temperature of the system is higher than ambient conditions thermography testing. • ASME pressure boundary bolted connections where the internal environment consists of air at atmospheric pressure are checked for tightness prior to the period of extended operation and once every six years thereafter.	B2.1.7	Complete no later than six months prior to the period of extended operation CR 10-23255-1
15	Implement the External Surfaces Monitoring Program as described in LRA Section B2.1.20. Existing plant procedures will be enhanced to include the following: Require a leak check of non-ASME pressure boundary bolted connections where the internal environment consists of dry gas, compressed air, or diesel exhaust using a method that detects leakage such as a visual inspection for discoloration, monitoring and trending for pressure decay, leak fluid detection, or when the temperature of the system is higher than ambient conditions thermography testing. Require bolted connections where the internal environment consists of air at atmospheric pressure be checked for tightness prior to the period of extended operation and once every six years thereafter.	B2.1.20	Complete no later than six months prior to the period of extended operation. Inspections to be complete no later than six months prior to the PEO or the end of the last refueling outage prior to the PEO, whichever occurs later. CR 10-23272