Nuclear Operating Company

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

June 16, 2011
NOC-AE-11002681
10 CFR 54
STI: 32877293
File: G25

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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Rockville, MD 20852

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

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

By the referenced letter, STP Nuclear Operating Company (STPNOC) submitted a License Renewal Application (LRA) for South Texas Project (STP) Units 1 and 2. Enclosure 1 identifies changes to the STPNOC LRA (Amendment 2) that are being made to incorporate industry operating experience provided in Revision 2 to the NRC Generic Aging Lessons Learned (GALL) Report, December 2010.

Enclosure 2 contains changes to existing commitments contained in Table A4-1 of the LRA. There are no other regulatory commitments 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.

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

Executed on June 16, 2011.
Date

G. T. Powell

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

KJT

Enclosure 1: Amendment 2 to the STPNOC LRA
Enclosure 2: List of Revised Licensing Commitments

A035
NRR

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Amendment 2 to the STPNOC LRA

STPNOC LRA Changes

The following table lists the affected STPNOC LRA Sections and Tables and provides the reason for each change based on industry operating experience provided in Revision 2 of the GALL Report. Following the table are the changes formatted in a "line-out" (i.e. text being deleted from the LRA) and "line-in" (i.e. text being added to the LRA) structure.

Affected LRA Sections/Tables	Reason for Change
Section 2.1.2.2	Clarified Auxiliary Feedwater Storage Tank piping scope.
Table 2.3.1-4	Clarified Steam Generator component types subject to aging management review.
Table 3.1.2-4	Clarified Steam Generator component subject to aging management review.
Table 3.3.2-4	Changed the Aging Management Program (AMP) for managing the aging effects associated with Essential Cooling Water piping of ductile iron material. Added AMP for copper alloy (Aluminum >8%) material piping in a buried environment.
Table 3.3.2-9	Deleted Closed-Cycle Cooling Water pump of cast iron material from Selective Leaching of Materials AMP.
Table 3.3.2-18	Deleted buried carbon steel piping from the Buried Piping and Tanks Inspection AMP.
Table 3.4.2-4	Deleted row to remove Demineralized Water piping from the Buried Piping and Tanks AMP.
Table 3.4.2-6	Various changes to piping and valve components in the Auxiliary Feedwater System
Section 3.3.2.1.4	Deleted Selective Leaching of Materials AMP for piping of ductile iron material from the Essential Cooling Water and ECW Screen Wash System.
Section 3.3.2.1.18	Deleted "buried" as an environment exposed to the Standby Diesel Generator Fuel Oil Storage and Transfer System. In addition, deleted the Buried Piping and Tanks Inspection AMP for this system. Added concrete as an environment.
Section 3.4.2.1.4	Deleted "buried" as an environment exposed to the Demineralizer Water (Make-up) System. In addition, deleted the "Buried Piping and Tanks Inspection" AMP from the system. Added the "External Surfaces Monitoring Program" AMP – this was an omission in the original LRA.
Section B2.1.10	Deleted Jacket water coolant monitoring for Balance of Plant and Fire Pump Diesel Generators. Made a clarification to the Operating Experience discussion.
Section A1.14	Clarified what is included in the Fuel Oil Chemistry program.

Affected LRA Sections/Tables	**Reason for Change**
Section B2.1.14	Same as for Section A1.14. In addition, incorporated inspections for biological activity, fouling to the Fuel Oil Chemistry program. Clarified that the fuel oil storage tanks for the SDG and diesel fire pump are inspected to meet Element 4.
Section A1.16	Clarifies how component sampling will be determined for the One-Time Inspection Program.
Section B2.1.16	Same as for Section A1.16.
Section A1.17	Clarified that the Selective Leaching of Materials Program is no longer applied to the Open-Cycle Cooling Water System or the Closed-Cycle Cooling Water Systems. Fire main flow testing is credited for management of selective leaching of the buried cast iron valves in the fire protection system.
Section B2.1.17	Same as Section A1.17.
Section A1.18	Buried Piping and Tank Inspection Program is completely rewritten.
Section B2.1.18	Same as for Section A1.18.
Section A1.19	Adjusted the sample population to at least ten percent of the socket welds in each unit up to a maximum of 25 for the one-time inspection of ASME Code Class 1 small-bore piping. Changed that the inspections will be completed and evaluated within six years prior to the period of extended operation.
Section B2.1.19	Same as Section A1.19. In addition, one editorial change is made to the Operating Experience discussion.
Section A1.25	Increased Inaccessible Medium Voltage Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management scope to include inaccessible low voltage cables. Inspection intervals and cable testing frequency are changed. Methods of testing are clarified.
Section B2.1.25	Same as Section A1.25.
Section A1.37	Clarified the program description for aging management of the Selective Leaching of Aluminum Bronze piping.
Section B2.1.37	Same as Section A1.37.

Affected LRA Sections/Tables	Reason for Change
Table A4-1 item 5	Revised LRA Commitment.
Table A4-1 item 9	Revised LRA Commitment.
Table A4-1 item 13	Revised LRA Commitment.
Table A4-1 item 14	Revised LRA Commitment.
Table A4-1 item 20	Revised LRA Commitment.

Section 2.1.2.2

2.1.2.2 10 CFR 54.4(a)(2) – Nonsafety-Related Affecting Safety-Related

Nonsafety-Related SSCs Directly Connected to Safety-Related SSCs

Nonsafety-related SSCs that are directly connected to safety-related SSCs were included within the scope of license renewal to ensure structural integrity of the safety-related SSC up to the first seismic anchor or equivalent anchor past the safety/nonsafety interface.

Seismic anchors and equivalent anchors were identified following the guidance of NEI 95-10, Appendix F as discussed below:

- A seismic anchor that ensures that forces and moments are restrained in three orthogonal directions.
- An equivalent anchor that is defined in the CLB.
- An equivalent anchor that consists of a large piece of plant equipment or a series of supports that are part of a plant-specific piping design analysis. The large piece of equipment that serves as the anchor is in the scope of license renewal or the nonsafety-related piping up to the last orthogonal support is in the scope of license renewal.
- An equivalent anchor that is composed of a combination of restraints or supports attached to the nonsafety-related piping that encompasses at least two supports in each of the three orthogonal directions. The nonsafety-related piping up to the last orthogonal support is in the scope of license renewal.

In cases where seismic or equivalent anchors were not available to serve as the license renewal boundary, the following methods as provided for in NEI 95-10, Appendix F, were utilized to establish the license renewal boundary:

- A base-mounted component (e.g., pump, heat exchanger, tank, etc.) that is a rugged component and is designed not to impose loads on connecting piping was included in scope as it has a support function for the safety-related piping. The base-mounted equipment that serves as the equivalent anchor is in the scope of license renewal.
- A flexible connection that was considered a pipe stress analysis model end point, when the flexible connection effectively decouples the piping system (i.e., does not support loads or transfer loads across it to connected piping).
- A free end of nonsafety-related piping, such as a drain pipe that ends at an open floor drain.
- Nonsafety-related piping runs that are connected at both ends to safety-related piping. The entire run of nonsafety-related piping between the safety-related piping is in the scope of license renewal if no seismic anchors or equivalent anchors are available.

- A point where buried piping exits the ground. The buried portion of the piping is included in the scope of license renewal.

- A smaller branch line where the moment of inertia ratio of the larger piping to the smaller piping is such that the smaller branch line does not impose loads on the larger piping and does not support the larger piping.

There are several cases of nonsafety-related piping directly connected to the auxiliary feedwater storage tank (AFST) that do not fit into the criteria listed above. The pipe nozzles on the upper portion of the AFST have pipe extensions which are encased in the concrete surrounding the stainless steel AFST tank liner. These piping extensions have nonsafety-related piping attached to the pipe extension flanges. The tank nozzle pipe extensions are securely braced within the concrete that surrounds the tank and are analyzed as seismic equivalent anchors. In addition, the tank penetrations are above the tank minimum required water level to support the tank's license renewal intended function, and the tank penetrations are not associated with tank venting. The NSR piping attached to the AFST has not been included in-scope for structural integrity attached, based on the nozzle pipe extensions being analyzed as seismic equivalent anchors and the tank penetrations being above the tank minimum required water level. Since the attached NSR piping does not have a structural integrity attached function, and also since it does not have spatial interactions with safety-related components, the piping is not within the scope of license renewal based on criterion 10 CFR 54.4(a)(2).

Table 2.3.1-4

Table 2.3.1-4 Steam Generators

Component Type	Intended Function
SG Divider Plate	Direct Flow
SG Primary Head ~~and Divider Plate~~	Pressure Boundary Structural Support
SG Primary Manway Covers	Pressure Boundary ~~Structural Support~~
SG Tubesheet	Pressure Boundary

Table 3.1.2-4

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Divider Plate	DF	Nickel Alloys	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2)	IV.D1-6	3.1.1.81	A, 4
~~SG Primary Head and Divider Plate~~	~~PB~~	~~Carbon Steel~~	~~Secondary Water (Ext)~~	~~Loss of material~~	~~Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)~~	~~IV.D1-9~~	~~3.1.1.76~~	~~C~~
SG Primary Head	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.D1-3	3.1.1.58	A
SG Primary Head ~~and Divider Plate~~	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.D1-3	3.1.1.58	A
SG Primary Head ~~and Divider Plate~~	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.D1-1	3.1.1.68	A
SG Primary Head ~~and Divider Plate~~	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.D1-8	3.1.1.10	A
~~SG Primary Head and Divider Plate~~	~~PB~~	~~Nickel Alloys~~	~~Reactor Coolant (Ext)~~	~~Cracking~~	~~Water Chemistry (B2.1.2)~~	~~IV.D1-6~~	~~3.1.1.81~~	~~A, 2~~

SG Primary Manway Covers	PB~~, SS~~	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.D1-3	3.1.1.58	A
SG Primary Manway Covers	PB	Stainless Steel	Reactor Coolant (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.D1-1	3.1.1.68	A, 3

SG Secondary Side Access Covers	PB	Nickel Alloys	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	C, 5
SG Secondary Side Access Covers	PB	Nickel Alloys	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	C, 5

SG Tubesheet	PB	Carbon Steel	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-9	3.1.1.76	C, 2
SG Tubesheet	PB	Nickel Alloys	Reactor Coolant (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-18	3.1.1.73	C, 2

Plant Specific Notes:

1 The inspection requirements of ASME Code Case N-722 do not apply to components with pressure retaining welds fabricated with Alloy 600/82/182 that have been mitigated by weld overlay.

2 The tubesheets in the replacement steam generators installed at STP are made of carbon steel clad with Alloy 690. The tube-tubesheet welds are flush fusion welds with cladding.

3 The replacement steam generator primary manway is equipped with stainless steel gasket insert.

~~2~~ 4 The divider plates in the replacement steam generators installed at STP are made of Alloy 690 with the associated Alloy 52/152 weld materials.

5 The replacement steam generator secondary manway, handhole and inspection ports are equipped with nickel alloy gasket inserts.

Table 3.3.2-4

Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Cooling Water and ECW Screen Wash System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Copper Alloy (Aluminum > 8%)	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	None	None	G
Piping	PB	Copper Alloy (Aluminum > 8%)	Buried (Ext)	Loss of material	Selective Leaching of Aluminum Bronze (B2.1.37)	None	None	G, 4
Piping	SIA	Ductile Iron	Buried (Ext)	Loss of material	~~Selective Leaching of Materials (B2.1.17)~~ Buried Piping and Tanks Inspection (B2.1.18)	VII.C1-~~12~~ 18	3.3.1.~~85~~ 19	B
Piping	SIA	Ductile Iron	Raw Water (Int)	Loss of material	~~Selective Leaching of Materials (B2.1.17)~~ Open Cycle Cooling Water System (B2.1.9)	VII.C1-~~11~~ 19	3.3.1.~~85~~ 76	B

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 Carbon steel clad with copper-nickel is not a material addressed in NUREG-1801. The External Surfaces Monitoring Program (B2.1.20) manages the aging of the exterior carbon steel surfaces of this material that are exposed to Plant Indoor Air (External). The Open-Cycle Cooling Water program (B2.1.9) manages the aging of the copper-nickel clad surfaces of this material that are exposed to raw water.

3 Loss of material by selective leaching is managed by the Selective Leaching of Aluminum Bronze program (B2.1.37) instead of the Selective Leaching of Materials program (B2.1.17) for components made of aluminum bronze (copper alloy > 8 percent aluminum).

4 The buried copper alloy piping in the EW system at STP is SB169 (which has a maximum of 0.2% zinc and 7% nominal aluminum content with an allowable range of aluminum of 6-8%). The weld material used in this piping has an aluminum content of between 8.5-11%. This aging evaluation is applicable for the welds in the buried EW piping which have the potential for greater than 8% aluminum and thus are considered susceptible to selective leaching.

Table 3.3.2-9

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Chilled Water HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
~~Pump~~	~~LBS~~	~~Cast Iron~~	~~Closed Cycle Cooling Water (Int)~~	~~Loss of material~~	~~Selective Leaching of Materials (B2.1.17)~~	~~VII.C2-8~~	~~3.3.1.85~~	~~B~~

Table 3.3.2-18

Table 3.3.2-18 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Fuel Oil Storage and Transfer System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
~~Piping~~	~~LBS, SIA~~	~~Carbon Steel~~	~~Buried (Ext)~~	~~Loss of material~~	~~Buried Piping and Tanks Inspection (B2.1.18)~~	~~VII.H1-9~~	~~3.3.1.19~~	~~B~~

Table 3.4.2-4

Table 3.4.2-4 Steam and Power Conversion System – Summary of Aging Management Evaluation – Demineralized Water (Make-up) System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
~~Piping~~	~~SIA~~	~~Stainless Steel~~	~~Buried (Ext)~~	~~Loss of material~~	~~Buried Piping and Tanks Inspection (B2.1.18)~~	~~VIII.E-28~~	~~3.4.1.17~~	~~E~~

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

~~E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.~~

G Environment not in NUREG-1801 for this component and material.

H Aging effect not in NUREG-1801 for this component, material and environment combination.

Table 3.4.2-6

Table 3.4.2-6 Steam and Power Conversion System – Summary of Aging Management Evaluation - Auxiliary Feedwater System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB, SIA	Stainless Steel	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VIII.G-31	3.4.1.17	E
Piping	SIA	Stainless Steel	Encased in Concrete (Ext)	None	None	VIII.I-11	3.4.1-43	A
~~Valve~~	~~PB, SIA~~	~~Carbon Steel~~	~~Atmosphere/ Weather (Ext)~~	~~Loss of material~~	~~External Surfaces Monitoring Program (B2.1.20)~~	~~VIII.H-8~~	~~3.4.1.28~~	B
Valve	PB~~, SIA~~	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-38	3.4.1.04	A
Valve	PB~~, SIA~~	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Valve	PB~~, SIA~~	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	A

3.3.2.1.4 Essential Cooling Water and ECW Screen Wash System

Aging Management Programs

The following aging management programs manage the aging effects for the essential cooling water and ECW screen wash system component types:

- Bolting Integrity (B2.1.7)
- Buried Piping and Tanks Inspection (B2.1.18)
- External Surfaces Monitoring Program (B2.1.20)
- Open-Cycle Cooling Water System (B2.1.9)
- Selective Leaching of Aluminum Bronze (B2.1.37)
- ~~Selective Leaching of Materials (B2.1.17)~~

3.3.2.1.18 Standby Diesel Generator Fuel Oil Storage and Transfer System

Environment

The standby diesel generator fuel oil storage and transfer system component types are exposed to the following environments:

- Atmosphere/ Weather
- ~~Buried~~
- Fuel Oil
- Plant Indoor Air

Aging Management Programs

The following aging management programs manage the aging effects for the standby diesel generator fuel oil storage and transfer system component types:

- Bolting Integrity (B2.1.7)
- ~~Buried Piping and Tanks Inspection (B2.1.18)~~
- External Surfaces Monitoring Program (B2.1.20)
- Fuel Oil Chemistry (B2.1.14)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- One-Time Inspection (B2.1.16)

3.4.2.1.4 Demineralizer Water (Make-up) System

Environment

The demineralized water (make-up) system components are exposed to the following environments:

- Atmosphere/ Weather
- ~~Buried~~
- Demineralized Water
- Plant Indoor Air

Aging Management Programs

The following aging management programs manage the aging effects for the demineralized water (make-up) system component types:

- Bolting Integrity (B2.1.7)
- ~~Buried Piping and Tanks Inspection (B2.1.18)~~
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)
- External Surfaces Monitoring Program (B2.1.20)

B2.1.10 Closed-Cycle Cooling Water System

Enhancements

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

Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6), and Corrective Actions (Element 7)

Procedures will be enhanced to include visual inspection of the interior of the piping that is attached to the excess letdown heat exchanger CCW return second check valves. This periodic internal inspection will detect loss of material and fouling and serve as a leading indicator of the condition of the interior of piping components otherwise inaccessible for visual inspection. The procedures will also be enhanced to include acceptance criteria.

~~*Preventive Actions (Element 2), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6), and Corrective Actions (Element 7):*~~

~~Procedures will be enhanced to monitor chemistry parameters consistent with EPRI guideline recommendations for the glycol-based formulations used for the BOP and fire pump diesel jacket water cooling systems. EPRI TR-107396, Revision 1, Tables 5-8 and 5-9 (blended glycol formulations), recommend periodically monitoring control parameters, and EPRI Tables 5-8 and 5-9 recommend periodically monitoring diagnostic parameters.~~

Operating Experience

The Closed-Cycle Cooling Water System program is based on the guidance contained in EPRI TR-107396, Revision 1, which itself is based on industry-wide operating experience. The guideline is periodically updated and approved by the industry. STP operating experience is evaluated and corrective actions are implemented for chemical concentrations, monitoring and testing to ensure adherence to EPRI TR-107396, Revision 1. Industry operating experience and independent audits provide additional input to ensure that program operability is maintained at an optimum level.

Based on a review of STP operating experience, there is no history of chemistry related corrosion or fouling issues for the component cooling water system, ESF DG jacket water system, essential chilled water, RCB chilled water, MAB chilled water and BTRS chilled water systems. Past inspections of component cooling water system and ESF DG jacket water piping have indicated a clean and tight adherent passive oxide layer.

In 1999, Sure-Cool residue buildup was observed on the outside of a carbon steel flange in the component cooling water system return piping from the spent fuel pool heat exchanger. Investigation revealed a through-wall crack in the weld neck flange about 1.1-in. from the flange to pipe weld. The flange was weld repaired. The cracked ~~weld~~ showed no signs of loss of material, verified by ultrasonic test.

In 2003, a leak occurred in a coil to header joint of a reactor containment fan cooler. Initial observations of the leak detected no indications of corrosion. The attempt to repair the leak, by brazing, melted the coil tubing. The damage prohibited further examination and determination of the actual cause of the leak. An evaluation of the event determined the cause of the leak was not attributed to an aging effect.

The BOP diesel jacket water system radiator has been replaced due to corrosion. The FPD jacket water system cores have been changed due to corrosion prior to using the current corrosion inhibitor.

MIC (Microbiologically-Influenced Corrosion) has not been observed in the in-scope CCCW systems.

Based on a review of 10 years of STP operating experience, any chemistry parameters outside of established limits have been identified and the appropriate actions taken. Corrective actions have included increasing sampling frequencies, chemical addition, feed and bleeds, system cleaning and fixing leaks.

A1.14 FUEL OIL CHEMISTRY

The Fuel Oil Chemistry program manages loss of material on the internal surface of components in the standby diesel generator (SDG) fuel oil storage and transfer system, diesel fire pump fuel oil system and balance of plant (BOP) fuel oil system. The program includes (a) surveillance and monitoring procedures for maintaining fuel oil quality by controlling contaminants in accordance with the Technical Specifications and applicable ASTM Standards, (b) periodic draining of water from fuel oil tanks, (c) visual inspection of internal surfaces during periodic draining and cleaning, (d) ultrasonic wall thickness measurement or pulsed eddy current wall thickness measurement of fuel oil tank bottoms during periodic draining and cleaning, and (e) inspections of new fuel oil before it is introduced into the fuel oil tanks~~, and (f) one time inspection of a representative sample of components in systems that contain fuel oil by the One-Time Inspection program (A1.16)~~.

The effectiveness of the program is verified under the One-Time Inspection program (A1.16).

B2.1.14 Fuel Oil Chemistry

Program Description

The Fuel Oil Chemistry program manages loss of material on the internal surface of components in the standby diesel generator (SDG) fuel oil storage and transfer system, diesel fire pump fuel oil system and balance of plant (BOP) fuel oil system. The program includes (a) surveillance and monitoring procedures for maintaining fuel oil quality by controlling contaminants in accordance with the Technical Specifications and applicable ASTM Standards, (b) periodic draining of water from fuel oil tanks, (c) visual inspection of internal surfaces during periodic draining and cleaning, (d) ultrasonic wall thickness measurement or pulsed eddy current wall thickness measurement of fuel oil tank bottoms during periodic draining and cleaning, and (e) inspection of new fuel oil before it is introduced into the fuel oil tanks~~, and (f) one-time inspection of a representative sample of component in systems that contain fuel oil by the One-Time Inspection program (B2.1.16)~~.

Fuel oil quality is maintained by monitoring and controlling fuel oil contaminants in accordance with the Technical Specifications and applicable ASTM Standards. This is accomplished by periodic sampling and chemical analysis of the fuel oil inventory at the plant, and sampling, testing, and analysis of new fuel oil prior to introduction into the fuel oil storage tanks. Initial samples of new fuel oil are inspected for water and entrained foreign material as precautions during the delivery process to avoid introducing contaminants. If a sample appears unsatisfactory, delivery is discontinued or not allowed.

The One-Time Inspection program (B2.1.16) is used to verify the effectiveness of the Fuel Oil Chemistry program.

Enhancements

Parameters Monitored or Inspected (Element 3), Monitoring and Trending (Element 5), and Acceptance Criteria (Element 6)

Procedures will be enhanced to require analysis for water, biological activity, sediment, and particulate contamination of the diesel fire pump fuel oil storage tanks and the BOP diesel generator fuel oil day tanks on a quarterly basis.

Detection of Aging Effects (Element 4)

Procedures will be enhanced to conduct ultrasonic testing or pulsed eddy current thickness examination to detect corrosion-related wall thinning once on the tank bottoms for the SDG and diesel fire pump fuel oil storage tanks, and the BOP diesel generator fuel oil day tanks.

A.1.16 ONE-TIME INSPECTION

The One-Time Inspection program conducts one-time inspections of plant system piping and components to verify the effectiveness of the Water Chemistry program (A1.2), Fuel Oil Chemistry program (A1.14), and Lubricating Oil Analysis program (A1.23). The aging effects to be evaluated by the One-Time Inspection program are loss of material, cracking, and reduction of heat transfer. The One Time Inspection program determines sample sizes based on the number of components in a group sharing the same material, environment and aging effects. The components making up the sample are those determined to be most susceptible to degradation based on a review of environment, condition and operating experience. Inspections performed by other activities may be used if they satisfy the requirements of the OTI program. ~~The One-Time Inspection program determines non-destructive examination (NDE) sample size for each material-environment group using established statistical methodologies and selects piping/component inspection locations within the sample that are based on service period, operating conditions, and design margins.~~ The One-Time Inspection program specifies corrective actions ~~and increased sampling of components~~ if aging effects are found.

This new program will be implemented and completed within the 10 year interval prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

B.2.1.16 One-Time Inspection

Program Description

The One-Time Inspection program manages loss of material, cracking, and reduction of heat transfer. The One-Time Inspection program conducts one-time inspections of plant system piping and components to verify the effectiveness of the Water Chemistry program (B2.1.2), Fuel Oil Chemistry program (B2.1.14), and Lubricating Oil Analysis program (B2.1.23).

The One-Time Inspection program will be implemented by STP prior to the period of extended operation. Plant system piping and components identified in the one-time inspection procedure will be subject to one-time inspections on a sampling basis, using qualified inspection personnel, following established ASME Code Section V Non-Destructive Examination techniques appropriate to each inspection. Inspection sample sizes are based on the number of components in a group sharing the same material, environment and aging effects. The components making up the sample are those determined to be most susceptible to degradation based on a review of environment, condition and operating experience. Inspections performed by other activities may be used if they satisfy the requirements of the OTI program. ~~Inspection sample sizes will be determined using a methodology that is based on 90 percent confidence that 90 percent of the population of components will not experience aging effects in the period of extended operation.~~ The One-Time Inspection program specifies corrective actions and increased sampling of piping/components if aging effects are found during material/environment combination inspections.

A1.17 SELECTIVE LEACHING OF MATERIALS

The Selective Leaching of Materials program manages loss of material due to selective leaching for copper alloys with greater than 15 percent zinc and gray cast iron components exposed to treated water, ~~and~~ raw water, and groundwater (buried) within the scope of license renewal. ~~The Selective Leaching of Materials program is applied in addition to the Open-Cycle Cooling Water program (A1.9) and the Closed-Cycle Cooling Water program (A1.10).~~

The Selective Leaching of Materials program will be implemented during the 10 years prior to the period of extended operation. The procedure will include a one-time inspection of a sample of components made from gray cast iron and copper alloys with greater than 15 percent zinc. This procedure will provide for visual and mechanical inspections for each system/material/environment combination, with exception of buried fire water piping ~~and for follow-up~~ an engineering evaluation is performed if ~~in the event that~~ graphitization of gray cast iron or dezincification of copper alloys with greater than 15 percent zinc components is detected. ~~The plant-specific Selective Leaching of Aluminum Bronze program (A1.37) covers aluminum bronze components.~~

Flow testing of the fire mains, consistent with NFPA 25, is credited for management of selective leaching of the buried cast iron valves in the fire protection system.

B2.1.17 Selective Leaching of Materials

Program Description

The Selective Leaching of Materials program manages the loss of material due to selective leaching for copper alloys with greater than 15 percent zinc and gray cast iron components exposed to treated water, ~~and~~ raw water, and groundwater (buried) within the scope of license renewal.

The Selective Leaching of Materials program is a new program which includes a one-time inspection of a sample of components made from gray cast iron and copper alloys with greater than 15 percent zinc. The program procedure provides for visual and mechanical inspections for each system/material/environment combination and for follow-up engineering evaluation in the event that graphitization of gray cast iron or dezincification of copper alloys with greater than 15 percent zinc components is detected. Sample sizes for selective leaching are based on 20 percent of the material/environment group population to a maximum of 25 components. The plant-specific Selective Leaching of Aluminum Bronze program (B2.1.37) covers aluminum bronze components. Inspection of buried components subject to selective leaching is covered in Buried Piping and Tanks Inspection (B2.1.18).

Flow testing of the fire mains, consistent with NFPA 25, is credited for management of selective leaching of the buried cast iron valves in the fire protection system. This is consistent with the strategy in the Buried Piping and Tanks Inspection program (B2.1.18) for managing loss of material in buried fire protection system piping.

The Selective Leaching of Materials program will be implemented during the 10 years prior to the period of extended operation.

NUREG-1801 Consistency

The Selective Leaching of Materials program is a new program that, when implemented, will be consistent, with exception, to NUREG-1801, Section XI.M33, Selective Leaching of Materials.

Exceptions to NUREG-1801

Program Elements Affected:

Scope of Program (Element 1)

NUREG-1801, Section XI.M33 states that the Selective Leaching of Materials program should include bronze or aluminum bronze components that may be exposed to a raw water, treated water, or groundwater environment. Aluminum bronze is not managed by the Selective Leaching of Materials program at STP. STP currently has a plant specific Selective Leaching of Aluminum Bronze program (B2.1.37), which covers these aluminum bronze components. ~~This existing program better describes the ongoing efforts to manage the de-alloying of aluminum bronze components. This plant-specific program will utilize the requirements of NUREG-1801 to address aluminum bronze components susceptible to selective leaching (de-alloying).~~

Scope of Program (Element 1), Parameters Monitored or Inspected (Element 3), and Detection of Aging Effects (Element 4)

NUREG-1801, Section XI.M33 recommends hardness testing of sample components in addition to visual inspections. However, a qualitative determination of selective leaching is used in lieu of Brinell hardness testing for components within the scope of the STP Selective Leaching of Materials program. The exception involves the use of examinations, other than Brinell hardness testing, identified in NUREG-1801 to identify the presence of selective leaching of materials. The exception is justified; because (1) hardness testing may not be feasible for most components due to form and configuration and (2) other mechanical means (e.g., scraping, or chipping) provide an equally valid means of identification.

Additionally, hardness testing only provides definitive results if baseline values are available for comparison purposes. Specific material contents for copper alloys may not be known and gray cast irons may not have published hardness numbers. Without specific numbers for comparison, hardness testing would yield unusable results. In lieu of hardness testing, visual and mechanical inspections will be performed on a sampling of components constructed of copper alloys with greater than 15 percent zinc and gray cast iron from various station system environments. Follow-up examinations or evaluations are performed on component material samples where indications of dezincification, de-alloying, or graphitization are visually detected and additional analysis, as part of the engineering evaluation, is required. The engineering evaluation may require confirmation with a metallurgical evaluation (which may include a microstructure examination).

NUREG-1801, Section XI.M33 requires visual inspection and hardness measurement of materials susceptible to selective leaching. However, flow testing of the fire mains, consistent with NFPA 25, is credited for management of selective leaching of the buried cast iron valves in the fire protection system. This is consistent with the strategy in the Buried Piping and Tanks Inspection program (B2.1.18) for managing loss of material in buried fire protection system piping.

A1.18 BURIED PIPING AND TANKS INSPECTION

~~The Buried Piping and Tanks Inspection program manages the loss of material on external surfaces of buried, underground, and limited-access components. Opportunistic visual inspections monitor the condition of protective coatings and wrappings found on steel, stainless steel and copper alloy components. Gray cast iron, which is included under the definition of steel, is also subject to a loss of material due to selective leaching, which is an aging effect managed by the Selective Leaching of Materials program (A1.17). Any evidence of damaged wrapping or coating defects is an indicator of possible corrosion damage to the external surface of the components.~~

~~The Buried Piping and Tanks Inspection program performs opportunistic inspections whenever pipes are excavated or exposed for any reason. If an opportunistic inspection has not been performed within the 10 year period prior to entering the period of extended operation, a planned inspection will be performed. Upon entering the period of extended operation, a planned inspection will be required within 10 years, unless an opportunistic inspection has occurred within this 10 year period.~~

<u>The Buried Piping and Tanks Inspection program manages the loss of material on external surfaces of buried and underground limited-access components. Preventive and mitigative measures, including verification of coatings quality, backfill requirements, and cathodic protection, are employed to manage aging of buried components. Underground components have been protectively coated where required. The cathodic protection system is monitored to ensure that protection is being provided. Opportunistic and directed visual inspections will monitor the condition of external surfaces, protective coatings and wrappings found on steel, stainless steel and copper alloy components. Any evidence of damaged wrapping or coating defects will be an indicator of possible corrosion damage to the external surface of the components.</u>

B2.1.18 Buried Piping and Tanks Inspection

Program Description

The Buried Piping and Tanks Inspection program manages the loss of material on external surfaces of buried and underground limited access components. Preventive and mitigative actions are taken to ensure the pipe is coated, backfilled and cathodically protected. The buried steel and copper alloy piping managed by this program is cathodically protected, and the cathodic protection system is monitored to ensure it is providing protection. Opportunistic and directed inspections monitor the condition of the external surfaces, backfill, protective coatings and wrappings of steel, stainless steel and copper alloy buried and underground components. There are no components fabricated with polymeric, cementitious, or concrete materials within the scope of license renewal that credit this program for aging management. Any evidence of aging effects, such as loss of material, cracking or changes in material properties, requires initiation of corrective actions.

The cathodic protection system is surveyed annually to ensure that it is supplying adequate protection to buried piping. The program includes visual inspection of external surfaces supplemented by surface and/or volumetric non-destructive testing of the internal or external surface during opportunistic or planned inspections. Hydrotesting may be performed in lieu of directed inspections.

Aging management of the internal surfaces of buried and underground piping is accomplished through the use of the Open-Cycle Cooling Water System program (B2.1.9), Closed-Cycle Cooling Water System program (B2.1.10), Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22), Fuel Oil Chemistry program (B2.1.14), Fire Water System program (B2.1.13) and Water Chemistry program (B2.1.2). Selective leaching of buried or underground components is managed by the Selective Leaching of Materials program (B2.1.17) or the Selective Leaching of Aluminum Bronze program (B2.1.37).

~~The Buried Piping and Tanks Inspection program manages the loss of material on external surfaces of buried, underground, and limited-access components. Opportunistic visual inspections monitor the condition of protective coatings and wrappings found on steel, stainless steel and copper alloy components. Gray cast iron, which is included under the definition of steel, is also subject to a loss of material due to selective leaching, which is an aging effect managed by the Selective Leaching of Materials program (B2.1.17). Any evidence of damaged wrapping or coating defects is an indicator of possible corrosion damage to the external surface of the components.~~

~~The Buried Piping and Tanks Inspection program performs opportunistic inspections whenever pipes are excavated or exposed for any reason. There are no buried tanks at STP. If an opportunistic inspection has not been performed within the 10 year period prior to entering the period of extended operation, a planned inspection will be performed. Upon entering the period of extended operation, a planned inspection will be required within 10 years, unless an opportunistic inspection has occurred within this 10 year period.~~

~~The need to enhance the STP buried piping program was initially identified as a result of an INPO identified area for improvement. Since that time involvement with the industry to address several areas has identified areas for program enhancement. The enhancement of the program is ongoing utilizing guidance from NEI 09-14, Revision 1, *Guideline for the Management of Buried Piping Integrity*, and industry operating experience. STP is also assessing guidance provided in the preliminary NUREG-1801, *Generic Aging Lessons Learned*, Revision 2.~~

~~Any inspection that indicates a potentially degraded condition results in the initiation of corrective actions for further engineering evaluation in accordance with the STP condition reporting process. The engineering evaluation may specify additional inspection techniques to evaluate the degree and extent of degradation. The engineering evaluation determines the acceptability of the component for continued service and the frequency of continued monitoring.~~

NUREG-1801 Consistency

The Buried Piping and Tanks Inspection program is an existing program that, following enhancement, will be consistent with exception to NUREG-1801, ~~Section X1.M34~~ Revision 2, Section XI.M41, Buried and Underground Piping and Tanks ~~Inspection~~.

Exceptions to NUREG-1801

Program Elements Affected:

~~*Scope of Program (Element 1) and Parameters Monitored or Inspected (Element 3)*~~

~~The NUREG-1801, Section XI.M34, Buried Piping and Tanks Inspection program scope includes buried steel piping and components. There are copper alloy and stainless steel materials in buried components within the scope of license renewal. Therefore, the scope of the program has been expanded to manage the buried surfaces of the copper alloy and stainless steel components.~~

Preventive Actions (Element 2)

Section XI.M41 Table 2a of NUREG-1801 Revision 2, requires the backfill to be consistent with NACE SP0169 Section 5.2.3. NACE SP0169 Section 5.2.3.5 states that pipe should be lowered carefully into the ditch to avoid external coating damage. The original installation specification does not include this practice. However the subgrade of the trench was prepared by removing all debris and unsuitable material, and the subgrade consists of fine clay and sand that makes up the natural soil or backfill. The backfill used is consistent with the ASTM D 448-08 size 67 standard. The subgrade preparation, and small grain size backfill used in the original installation, which provide soft bedding for piping set into the trench, are not expected to have damaged the coating of the piping. Plant procedures will be enhanced to ensure that the piping is lowered carefully into a trench to avoid damage to the external coatings.

Section XI.M41 Table 2a of NUREG-1801 Revision 2, requires that backfill be consistent with NACE SP0169 Section 5.2.3. NACE SP0169 Section 5.2.3.6 states that care should be taken during backfilling so that rocks and debris do not strike and damage the pipe coating. The original installation specification for backfilling piping does not include this practice, with the exception of the ECW piping. However a fine grain size backfill was used that met the ASTM D 448-08 size 67 standard. The use of this backfill during backfilling is not expected to damage the pipe coating. Plant procedures will be enhanced so that, during backfill repair or replacement, care is taken to avoid damage to pipe coatings while backfilling the trench.

Section XI.M41 Table 2a of NUREG-1801 Revision 2, requires coating of pipe in accordance with NACE SP0169-2007, Table 1. Table 1 recommends that coal tar coatings are in accordance with AWWA C-203, and that prefabricated films are in accordance with AWWA C-214 or C-209. These standards were not referenced in STP installation specifications. However, the coatings were applied in accordance with plant-defined specifications. Plant specifications are consistent with the intent of the AWWA coating standards called out in NACE SP 0169-2007. Installation specifications ensure that any defects in the coatings were repaired prior to backfilling over the pipe.

Enhancements

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

Preventive Actions (Element 2)

Plant specifications will be enhanced to include the following:

- Indicate that pipe should be lowered carefully into the ditch to avoid external coating damage.
- Proper storage and handling must be used to prevent damage to pipe coating prior to installation. These practices include padded storage, use of proper slings for installation and ultraviolet light-resistant topcoats.
- Over-excavate trenches and use qualified backfill for bedding piping. Take care during backfilling to prevent rocks and debris from striking and damaging the pipe coating.
- Include the coating used for copper alloy buried piping in the coating database. The coating system must be in accordance with NACE SP0169-2007, Table 1, and will be used for repair or for new coatings of the buried copper alloy piping in the essential cooling water system.
- Indicate that the portion of the essential cooling water system copper alloy piping directly embedded in backfill or directly encased in concrete must be coated, extending the coating 2 feet or more above grade.

Plant procedures will be enhanced to include the following:

- Backfill that is located within 6 inches of the pipe that is consistent with ASTM D 448-08 size number 67 is considered acceptable. Backfill quality is determined through examination during the inspections conducted by this program. Backfill that does not meet the ASTM criteria during the initial and subsequent inspections of this program is considered acceptable if the inspections of buried piping do not reveal evidence of mechanical damage to the pipe coatings due to the backfill.

- The cathodic protection system engineer is responsible for ensuring the cathodic protection system survey is performed annually, and the rectifier current is checked and recorded every 2 months.

- Monitor cathodic protection system rectifier output every 2 months. The measured current at each rectifier is recorded and compared against a target value. Following completion of the plant yard cathodic protection system annual survey, record the current of the rectifier used to achieve an acceptable pipe/soil potential. That current will be the target current for the rectifier. If the current measured at the rectifier during the bimonthly monitoring deviates significantly from the target value, a condition report should be created. The rectifier current should be adjusted to an acceptable value. The results of the survey will be documented and trended to identify degrading conditions. When degraded rectifier performance is identified, corrective actions are required to be initiated. The system should not be operated outside of established acceptable limits for longer than 90 days.

- During the plant yard cathodic protection system annual survey, evaluate the effectiveness of isolating fittings, continuity bonds and casing isolation. This may be accomplished through electrical measurements (NACE SP016-2007, Section 10.4.4).

- The performance technicians for the plant yard cathodic protection system annual survey must be NACE-certified, certified by a site-approved training procedure consistent with the NACE requirements, or supervised by a NACE-certified inspector.

Parameters Monitored/Inspected (Element 3) and Detection of Aging Effects (Element 4)

- Plant procedures will be enhanced to indicate that piping in this program is inspected using visual inspections and, if significant indications of degradation are observed, the visual inspections are supplemented by surface and/or volumetric non-destructive testing.

Detection of Aging Effects (Element 4)

Plant procedures will be enhanced to include the following:

- The inspections of this program are conducted every 10 years, beginning in the 10 year interval prior to the beginning of the period of extended operation.

- Buried and underground piping inspection locations are to be selected based on risk, considering susceptibility to degradation and consequences of failure.

- The risk ranking for buried piping should consider characteristics such as coating type, coating condition, cathodic protection efficacy, backfill characteristics, soil resistivity, pipe contents, and pipe function.

- The risk ranking for underground piping should consider characteristics such as coating type, coating condition, exact external environment, pipe contents, pipe function, and flow characteristics within the pipe.

- The risk ranking should generally give piping systems that are backfilled using compacted aggregate a higher inspection priority than comparable systems that are completely backfilled using controlled low strength material.

- External Corrosion Direct Assessment, as described in NACE Standard Practice SP0502-2010, is recommended for use in identifying inspection locations. It has been demonstrated to be an effective method for identification of pipe locations that merit further inspection.

- Opportunistic examinations of non-leaking pipes may be credited toward the required examinations, if they meet the risk-ranking selection criteria.

- Guided wave ultrasonic techniques or other advanced inspection techniques should be used, if practical, for determining piping locations that should be inspected. However, these inspections may not be used as substitutes for inspections required by this program.

- An inspection of piping shared between Units 1 and 2 may only be credited toward the required inspections of one unit.

- Any piping, valves, or closure bolting exposed during inspections should be examined. Examine bolting for loss of material and loose or missing fasteners.

- There are two alternatives to directed inspections of the buried or underground piping that is safety-related, hazmat or both. The first alternative is a hydrostatic test of 25 percent of the subject piping in accordance with 49 CFR 195 subpart E on an interval not to exceed 5 years. The second is an internal inspection of 25 percent of the subject piping by a method capable of accurately determining pipe wall thickness. The inspection must also include methods capable of detecting both general and pitting corrosion, and must be qualified by the plant, and approved by the NRC. Guided wave inspection does not currently satisfy these inspection technique requirements. If this inspection is performed, consideration should be given to NACE SP0169-2007 Sections 6.1.2 and 6.3.3.

- In lieu of visual inspection of the fire protection system, this program relies on flow testing of the fire mains as described in Section 7.3 of NFPA 25 to detect degradation of the buried pipe.

- Define "hazmat pipe" as pipe that, during normal operation, contains fluids that if released, would be detrimental to the environment. This includes chemical substances such as diesel fuel and radioisotopes. To be considered hazmat, the concentration of radioisotopes within the pipe during normal operation must exceed established standards such as the EPA drinking water standard. In the absence of such standards, the concentration of the radioisotope must exceed the greater of background or reliable level of detection. For tritium, the EPA drinking water standard of (20,000 pCi/L) is used.

- Indicate that adverse indications discovered during the monitoring of the cathodic protection system may warrant increased monitoring of the cathodic protection system and/or additional inspections.

- Include examples of adverse indications discovered during piping inspections including leaks, material thickness less than minimum, and general or local degradation of coatings that exposes the base material. The presence of coarse backfill within 6 inches of a coated pipe or tank, with accompanying coating degradation, is considered an adverse condition.

- Adverse indications that fail to meet the acceptance criteria described in this program require corrective actions for the repair or replacement of the affected component.

- An analysis may be conducted to determine the potential extent of the degradation observed. Expansion of sample size may be limited to the piping or tanks subject to the observed degradation mechanism.

- If adverse indications are detected in safety related or hazmat piping, inspection sample sizes within the affected piping categories are doubled. If adverse indications are found in the expanded sample, the inspection sample size is again doubled. This doubling of the inspection sample size continues until no more adverse conditions are found. If adverse conditions are extensive, inspections may be halted in an area of concern that is planned for replacement, provided continued operation does not pose a significant hazard.

- Define the scope of inspection for buried piping using the criteria in Section XI.M41 Table 4a of NUREG-1801, Revision 2. The scope of inspection is based on the condition of cathodic protection, backfill and coating of the piping. Ensure the scope of inspection increases when the cathodic protection system does not meet operability requirements or the backfill does not meet the backfill acceptance criteria, as specified in Section XI.M41 Table 4a of NUREG-1801, Revision 2.

- Each inspection of buried piping will examine at least 10 feet of piping. If the entire length of piping is less than 10 feet, inspect the entire length. Piping of each material type must be inspected. Regardless of the inspection scope prescribed by Section XI.M41 Table 4a of NUREG-1801, Revision 2, the inspections may be limited to 10 percent of the piping under consideration.

- Regardless of the condition of the backfill and coatings, only one inspection is required of all buried stainless steel safety-related piping during each 10 year inspection interval.

- The safety-related underground stainless steel pipe in the auxiliary feedwater system must be inspected once every ten years.

- During the inspection of buried piping, observe for brittle failure at flanges, connections, and joints due to frost heaving, soil stresses, or ground water effects.

Monitoring and Trending (Element 5)

- Plant procedures will be enhanced to direct the cathodic protection system engineer to trend results of the plant yard cathodic protection system annual surveys, so that changes in the effectiveness of the cathodic protection system and coating of buried piping can be verified.

Acceptance Criteria (Element 6)

Plant procedures will be enhanced to include the following:

- For coated piping, there should be no evidence of coating degradation. If coating degradation is present, it may be considered acceptable if it is determined to be insignificant by an individual possessing a NACE operator qualification, or otherwise meeting the qualifications to evaluate coatings as described in 49 CFR 192 and 195.

- Backfill is acceptable if it is consistent with SP0169-2007 Section 5.2.3. Backfill that is located within 6 inches of steel pipe that meets ASTM D 448-08 size number 67 is consistent with the objectives of SP0169-2007.

- For any hydrostatic tests credited by this program, the condition "without leakage", as required by 49 CFR 195.302, may be met by demonstrating that the test pressure, as adjusted for temperature, does not vary during the test.

Detection of Aging Effects (Element 4) and Acceptance Criteria (Element 6)

- List the systems with buried or underground piping within the scope of this program. The list should contain whether the pipe is safety-related or hazmat for each piping material and system within the scope of this program. Indicate whether or not the coating, backfill and cathodic protection of this piping are in compliance with NACE SP0169-2007 and the other requirements of Section XI.M41, Table 2a of NUREG-1801, Revision 2.

~~*Detection of Aging Effects (Element 4)*~~
~~Procedures will be enhanced to specify the following requirements: Opportunistic inspections are performed whenever pipes are excavated or exposed for any reason. If an opportunistic inspection has not been performed within the 10 year period prior to entering the period of extended operation, a planned inspection will be performed. Upon entering the period of extended operation, a planned inspection will be required within 10 years, unless an opportunistic inspection has occurred within this 10 year period.~~

Operating Experience

A 10-year review of plant operating experience shows 30 events which were associated with buried piping. Nine of these events were related to systems or components in scope of license renewal. All of these events were leaks shown to not be a result of corrosion of materials, making them not relevant to this program. The program includes availability, reliability, maintainability, and capacity measurement analyses, published in bi-annual Health Reports. The events described in the Health Reports are all attributed to causes other than corrosion due to contact with an aggressive environment (most leaks were associated with mechanical joints).

The need to enhance the STP Buried Piping program was initially identified by INPO as an area for improvement. Since that time, involvement with the industry has identified areas for program enhancement. Enhancement of the program is ongoing, utilizing guidance from NEI 09-14 Revision 1, *Guideline for the Management of Buried Piping Integrity*, and industry operating experience.

The following industry operating experience was reviewed to identify aging effects applicable to STP.

In February 2005, a leak was detected in a 4-inch condensate storage supply line. The cause of the leak was microbiologically influenced corrosion (MIC) or under deposit corrosion. MIC and under deposit corrosion are typically internal corrosion, and managed by the Water Chemistry program (B2.1.2) and verified with the One-Time Inspection program (B2.1.16).

In September 2005, a service water leak was discovered in a buried service water header. The header had been in service for 38 years. The cause of the leak was either failure of the external coating or damage caused by improper backfill. STP has a very fine grain of the natural soil, and the installation specifications for backfilling require a backfill that is consistent with ASTM D-448 08 size number 67. Considering this, there is a low probability that pipe coatings have sustained damage due to backfill. The cathodic protection system is operated in accordance with NACE SP0169 and will assure that the piping has a low probability of corrosion, even in the event of coating degradation or failure.

In October 2007, degradation of essential service water piping was reported. The riser pipe leak was caused by a loss of pipe wall thickness due to external corrosion induced by the wet environment surrounding the unprotected carbon steel pipe. This degradation is not expected at STP, as all steel and copper alloy piping managed by this program are coated and cathodically protected.

In February 2009, a leak was discovered on the return line to the condensate storage tank. The cause of the leak was coating degradation, probably due to the installation specification not containing restrictions on the type of backfill, allowing rocks in the backfill. STP has a very fine grain of the natural soil, and the installation specifications for backfilling require a backfill that is consistent with ASTM D-448 08 size number 67. Considering this, there is a low probability hat pipe coatings have sustained damage due to backfill. Plant specifications will be enhanced to prevent rocks and debris from striking the pipe coatings during the backfill of piping. The cathodic protection system is operated in accordance with NACE SP0169 and will assure that the piping has a low probability of corrosion, even in the event of coating degradation or failure.

In April 2009, a leak was discovered in an aluminum pipe where it went through a concrete wall. This leak is not relevant to STP, as the plant has no buried aluminum piping that requires management by this program.

In June 2009, an active leak was discovered in buried piping associated with the condensate storage tank. The leak was discovered because elevated levels of tritium were detected. The cause of the through-wall leak was determined to be degradation of the protective moisture barrier wrap, which allowed moisture to come in contact with the piping, resulting in external corrosion. STP inspected pipe coatings during installation, and verified an acceptable condition of wrap as it was installed. The cathodic protection system is operated in accordance with NACE SP0169 and will assure that the piping has a low probability of corrosion, even in the event of coating degradation or failure. The inspection of high risk piping by this program can be used to verify that this degradation is unlikely at STP.

The Buried Piping and Tanks Inspection program requires review of plant and industry operating experiences for impacts to the program. This program ensures long-term strategies to address Buried Piping and Tank Inspection are developed and implemented.

~~A 10-year review of plant operating experience shows 30 events which were initially associated with buried piping. Nine of these events were related to systems or components in scope of license renewal. All of these were leaks shown to not be a result of corrosion or leaching of materials, making them not relevant to aging management. The Buried Piping and Tanks Inspection program (developed in 2009) has shown no evidence of corrosion in buried piping and includes availability, reliability, maintainability, and capacity measurement analyses published in bi-annual Health Reports. The system deficiencies described in the Health Reports created so far are all attributed to causes other than corrosion or leaching due to contact with the soil environment (most leaks were associated with mechanical joints).~~

~~The Buried Piping and Tanks Inspection program requires review of plant and industry operating experiences for impacts to the program. This program ensures long-term strategies to address Buried Piping and Tanks Inspection are developed and implemented.~~

Conclusion

The continued implementation of the Buried Piping and Tanks Inspection program provides reasonable assurance that aging effects are 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.

~~The continued implementation of the Buried Piping and Tanks Inspection 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.~~

A1.19 ONE-TIME INSPECTION OF ASME CODE CLASS 1 SMALL-BORE PIPING

The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program manages cracking of ASME Code Class 1 piping less than or equal to four inches nominal pipe size (NPS 4). This program is implemented as part of the fourth interval of the STP Inservice Inspection (ISI) program.

For ASME Code Class 1 small-bore piping, the ISI program requires volumetric examinations on selected butt weld locations to detect cracking. Weld locations are selected based on the guidelines provided In EPRI TR-112657, *Revised Risk-Informed Inservice Inspection Evaluation Procedure.* Volumetric examinations of butt welds are conducted in accordance with ASME Section XI with acceptance criteria from Paragraph IWB-3000 and IWB-2430. If no socket welds are in the sample population, then at least ~~five~~ ten percent of the socket welds in each unit will be selected up to a maximum of 25.

Socket welds that fall within the weld examination sample will be examined following ASME Section XI Code requirements. If a qualified volumetric examination procedure for socket welds endorsed by the industry and the NRC is available and incorporated into the ASME Section XI Code at the time of STP small-bore socket weld inspections, then this will be used for the volumetric examinations. If no volumetric examination procedure for ASME Code Class 1 small bore socket welds has been endorsed by the industry and the NRC and incorporated into ASME Section XI at the time STP performs inspections of small-bore piping, a plant procedure for volumetric examination of ASME Code Class 1 small-bore piping with socket welds will be used.

The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program is a new program and inspections will be completed and evaluated within ~~10~~ six years prior to the period of extended operation.

B2.1.19 One-Time Inspection of ASME Code Class 1 Small-Bore Piping

Program Description

The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program manages cracking of ASME Code Class 1 piping less than or equal to four inches nominal pipe size (NPS 4). This piping is ASME examination category B-J. This program is implemented as part of the fourth interval of the ISI Program.

For ASME Code Class 1 small-bore piping, the ISI Program requires volumetric examinations (by ultrasonic testing) on selected butt weld locations to detect cracking. Weld locations are selected based on the guidelines provided in EPRI TR-112657, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*. Ultrasonic examinations are conducted in accordance with ASME Section XI with acceptance criteria from paragraph IWB-3000 and IWB-2430 for butt welds. If no socket welds are in the sample population, then at least ~~five~~ ten percent of the socket welds in each unit will be selected up to a maximum of 25.

Socket welds that fall within the weld examination sample will be examined following ASME Section XI Code requirements. If a qualified volumetric examination procedure for socket welds endorsed by the industry and the NRC is available and incorporated into the ASME Section XI Code at the time of STP small-bore socket weld inspections, then this will be used for the volumetric examinations. If no volumetric examination procedure for ASME Code Class 1 small-bore socket welds has been endorsed by the industry and the NRC and incorporated into ASME Section XI at the time STP performs inspections of small-bore piping, a plant procedure for volumetric examination of ASME Code Class 1 small-bore piping with socket welds will be used.

The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program inspections will be completed and evaluated within ~~10~~ six years prior to the period of extended operation.

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 of the ASME 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 10 year interval prior to the period of extended operation (fourth interval) and during the period of extended operation.

Operating Experience

In order to estimate the extent of cracking in Class 1 piping socket welds, NEI conducted a review of Licensee Event Reports (LER). Of 141 LERs reviewed, 48 were determined to be associated with failures of Class 1 socket welds. For the 46 LERs where a cause was identified, 42 of the failures were due to either vibration-induced high cycle fatigue or improper installation and are not age-related. Of the four remaining failures, one was due to randomly applied loads during maintenance and not age-related, and three were related to aging: two due to insulation contamination on the outside surface, and one associated with IGSCC, although there were other contributing factors not associated with aging (poor weld fit up, weld repair, nearby missing support, etc.).

The NEI review indicates that there have been a relatively small number of Class 1 socket weld failures of which only three were related to aging.

A review of plant-specific operating experience indicates that no cracking has been observed for ASME Code Class 1 small-bore pipe welds less than or equal to NPS 4.

Based on a review of operating experience, cracking of ASME Code Class 1 small-bore pipe welds less than or equal to NPS 4 has not been observed. This provides confidence that the One-Time Inspection of ASME Code Class 1 Small-Bore Piping program is adequate to manage cracking in ASME Code Class 1 small-bore piping ~~is not occurring~~.

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.

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 ~~which~~ that lasts more than a few days) ~~simultaneously with significant voltage (energized greater than 25% of the time),~~ not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49, and within the scope of license renewal.

All ~~cable~~ 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 ~~every two years~~ annually.

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 ~~ten~~ six years, a ~~polarization index test as described in EPRI TR-103834-P1-2~~ 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 ~~which~~ that last~~s~~ more than a few days) ~~simultaneously with significant voltage, (energized greater than 25 percent of the time)~~ 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 ~~cable~~ manholes and trenches that contain 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 ~~every two years~~ 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 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 ~~test as described in EPRI TR-103834-P1-2, *Effects of Moisture on the Life of Power Plant Cables*~~, line resonance analysis, or other testing that is state-of-the-art at the time of the testing is performed at least once every ~~10~~ 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 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 cable manholes be inspected for water collection based on plant experience. The enhancement requires that ~~the~~ 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 ~~every two years~~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.

Parameters Monitored or Inspected (Element 3)

Procedures will be enhanced to require 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 ~~simultaneously with significant voltage~~ be tested to provide an indication of the conductor insulation condition.

Acceptance Criteria (Element 6)

Procedures will be enhanced to 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.

Corrective Actions (Element 7)

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

Operating Experience

Industry operating experience has shown that ~~cross linked polyethylene or high molecular weight polyethylene~~ insulation materials~~,~~ ~~exposed to significant moisture and voltage,~~ 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 ~~medium voltage~~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*~~, and preliminary NUREG-1801, *Generic Aging Lessons Learned*, Revision 2~~.

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.

A1.37 SELECTIVE LEACHING OF ALUMINUM BRONZE

The Selective Leaching of Aluminum Bronze program manages loss of material due to selective leaching of aluminum bronze (copper alloy with greater than eight percent aluminum) components exposed to ~~treated and~~ raw water within the scope of license renewal. The Selective Leaching of Aluminum Bronze program is an existing program that is implemented by STP procedure. The procedure directs that every six months (not to exceed nine months), an inspection of all aluminum bronze components be completed. ~~In addition, there is a significant amount of buried aluminum bronze piping. The piping is a copper alloy~~ STP has buried piping with less than eight percent aluminum content, ~~and~~ that is not susceptible to dealloying. However, there are welds in which the filler metal is a copper alloy with greater than eight percent aluminum material. Therefore, the procedure directs that a yard walkdown be performed above the buried piping with aluminum bronze welds ~~buried piping~~ from the intake structure to the unit and from the unit to the discharge structure to look for changes in ground conditions that would indicate leakage. Aluminum bronze (copper alloy with greater than 8 percent aluminum) components which are found to have indications of through-wall de-alloying are evaluated, and scheduled for replacement by the corrective action program. Components with indications of through-wall de-alloying, associated with piping greater than one inch in diameter, will be replaced by the end of the next refueling outage.

~~The Selective Leaching of Aluminum Bronze program is applied in addition to the Open-Cycle Cooling Water System program (A1.9).~~

B2.1.37 Selective Leaching of Aluminum Bronze

Program Description

The Selective Leaching of Aluminum Bronze program manages loss of material due to selective leaching for aluminum bronze (copper alloy with greater than eight percent aluminum) components exposed to ~~treated and~~ raw water within the scope of license renewal. This plant-specific program will use requirements of the Selective Leaching of Materials program (B2.1.17) specifically relating to aluminum bronze components. The selective leaching of aluminum bronze is applied in addition to the Open-Cycle Cooling Water program (B2.1.9).

The Selective Leaching of Aluminum Bronze program is an existing program that is implemented by plant procedure. This procedure directs that every six months (not to exceed nine months), an inspection of aluminum bronze (copper alloy with greater than eight percent aluminum) components be completed. ~~In addition, there is a significant amount of buried aluminum bronze piping. The piping itself has~~ STP has buried copper piping with less than eight percent aluminum content~~, and~~ that is not susceptible to de-alloying. However, there are welds in which the filler metal is copper alloy with greater than eight percent aluminum material. Therefore, the procedure directs that a yard walkdown be performed above the buried piping with aluminum bronze welds~~, buried piping~~ from the intake structure to the unit and from the unit to the discharge structure to look for changes in ground conditions that ~~would~~ indicate leakage. Aluminum bronze (copper alloy with greater than 8 percent aluminum) components which are found to have indications of through-wall de-alloying are evaluated, and scheduled for replacement by the corrective action program. Components with indications of through-wall de-alloying, greater than one inch, will be replaced by the end of the next refueling outage.

Aging Management Program Elements

The results of an evaluation of each element against the 10 elements described in Appendix A of NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants* are provided below.

Scope of Program (Element 1)

The Selective Leaching of Aluminum Bronze program manages loss of material due to selective leaching for aluminum bronze (copper alloy with greater than eight percent aluminum) pumps, piping welds and valve bodies exposed to raw water within the scope of license renewal. These aluminum bronze (copper alloy with greater than eight percent aluminum) components with raw water internal environments are susceptible to loss of material due to selective leaching (de-alloying).

STP has analyzed the effects of de--alloying and found that the degradation is slow so that rapid or catastrophic failure is not a consideration. STP has determined that the leakage can be detected before the flaw reaches a limiting size that would affect the intended functions of the essential cooling water and essential cooling water screen wash system. The prudent course of action is to continue monitoring and replace components when needed.

This procedure directs that every six months (not to exceed nine months), an inspection of all susceptible aluminum bronze (copper alloy with greater than eight percent aluminum) components be completed and any components that show evidence of de-alloying will be replaced by the end of the next refueling outage. ~~In addition, there is a significant amount of buried aluminum bronze piping. The piping has an aluminum content of~~ STP has buried copper alloy piping with less than eight percent aluminum that ~~and~~ is not susceptible to de-alloying. However, there are welds in which the filler metal is copper alloy with greater than eight percent aluminum material. Therefore, the procedure directs that a yard walkdown be performed above the buried piping aluminum bronze welds ~~buried piping~~ from the intake structure to the unit and from the unit to the discharge structure to look for changes in ground conditions that ~~would~~ indicate leakage. Aluminum bronze (copper alloy with greater than 8 percent aluminum) components which are found to have indications of through-wall de-alloying are evaluated, and scheduled for replacement by the corrective action program.

Components, greater than one inch, will be replaced by the end of the next refueling outage.

Preventive Actions (Element 2)

The Selective Leaching of Aluminum Bronze program does not prevent degradation due to aging effects but provides for inspections to detect aging degradation prior to the loss of intended functions.

The Open-Cycle Cooling Water program (B2.1.9) uses an oxidizing biocide treatment (sodium hypochlorite and sodium bromide) to reduce the potential for microbiologically influenced corrosion.

Parameters Monitored or Inspected (Element 3)

The Selective Leaching of Aluminum Bronze program includes visual inspections every six months (not to exceed nine months) for de-alloying in all susceptible aluminum bronze (copper alloy with greater than eight percent aluminum) components. During these inspections, if evidence of through-wall de-alloying is discovered, the components are evaluated and scheduled for replacement by the corrective action program. Components, greater than one inch, will be replaced by the end of the next refueling outage.

During the walkdown of the buried essential cooling water system piping, the ground is observed for conditions that would indicate leakage due to selective leaching.

Detection of Aging Effects (Element 4)

The Selective Leaching of Aluminum Bronze program includes visual inspection of aluminum bronze (copper alloy with greater than eight percent aluminum) components to determine if selective leaching of these components is occurring. Every 6 months, walkdown is performed above the buried essential cooling water system piping containing copper alloy welds with an aluminum content greater than 8 percent. During the walkdown, the soil is observed to identify conditions that may be an indication of leakage due to selective leaching. Whenever aluminum-bronze materials are exposed during inspection of the buried essential cooling water system piping, the components are examined for indications of selective leaching.

Aluminum-bronze (copper alloy with greater than 8 percent aluminum) components which are found to have indications of through-wall de-alloying are evaluated, and scheduled for replacement by the corrective action program. Components greater than one inch in diameter will be replaced by the end of the next refueling outage.

Operating Experience (Element 10)

A review of the STP plant-specific operating experience indicates that macro-fouling, general corrosion, erosion-corrosion, and through-wall de-alloying have been observed in aluminum bronze components. STP has analyzed the effects of the through-wall de-alloying and found that the degradation is slow, so that rapid or catastrophic failure is not a consideration~~, and~~. STP has determined that the leakage can be detected before the flaw reaches a limiting size that would affect the intended functions of the essential cooling water and essential cooling water screen wash system. A long range improvement plan and engineering evaluation were developed to deal with the de-alloying of aluminum bronze components when de-alloying has been identified. Based on these analyses, the approach has been to evaluate components, and schedule replacement by the corrective action program. Components with indications of through wall de-alloying, associated with piping greater than one inch in diameter, will be replaced by the end of the next refueling outage. A monitoring and inspection program provides confidence in the ability to detect the leakage.

List of Revised Licensing Commitments

List of Revised Licensing 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.

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
5	Enhance the Closed-Cycle Cooling Water System program procedures to: • ~~to~~ include visual inspection of the interior of the piping that is attached to the excess letdown heat exchanger CCW return second check valves. This periodic internal inspection will detect loss of material and fouling and serve as a leading indicator of the condition of the interior of piping components otherwise inaccessible for visual inspection.~~,~~ • include acceptance criteria.~~, and~~ • ~~monitor chemistry parameters consistent with EPRI guideline recommendations for the glycol-based formulations used for the BOP and fire pump diesel jacket water cooling systems.~~	B2.1.10	Prior to the period of extended operation

9	Enhance the Fuel Oil Chemistry program procedures to: • extend the scope of the program to include the SDG fuel oil drain tanks, • check and remove the accumulated water from the fuel oil drain tanks, day tanks, and storage tanks associated with the SDG, BOP, and fire water pump diesel generators. A minimum frequency of water removal from the fuel oil tanks will be included in the procedure, • include 10-year periodic draining, cleaning, and inspection for corrosion of the SDG fuel oil drain tanks and diesel fire pump fuel oil storage tanks, • inspect the BOP diesel generator fuel oil day tanks for internal corrosion, • require periodic testing of the SDG and diesel fire pump fuel oil storage tanks for microbiological organisms, • require analysis for water, biological activity, sediment, and particulate contamination of the diesel fire pump fuel oil storage tanks and the BOP diesel generator fuel oil day tanks on a quarterly basis, • conduct ultrasonic testing or pulsed eddy current thickness examination to detect corrosion-related wall thinning once on the tank bottoms for the SDG and diesel fire pump, and the BOP diesel generator fuel oil day tanks, and • incorporate the sampling and testing of the diesel fire pump fuel oil storage tanks for particulate contamination and water and to incorporate the trending of water, particulate contamination, and microbiological activity in the SDG and diesel fire pump fuel oil storage tanks, and the BOP diesel generator fuel oil day tanks.	B2.1.14	Prior to the period of extended operation

13	Enhance the Buried Piping and Tanks Inspection program ~~procedures~~ specifications to: • Lower coated piping carefully into a trench to avoid external coating damage. • Use proper storage and handling practices to prevent damage to pipe coating prior to installation. These practices include padded storage, use of proper slings for installation and ultraviolet light resistant topcoats. • Over excavate trenches and use qualified backfill for bedding piping. Take care during backfilling to prevent rocks and debris from striking and damaging the pipe coating. • Include the coating used for copper alloy buried piping in the coating database. The coating system must be in accordance with NACE SP0169-2007, and will be used for repair or for new coatings of the buried copper alloy piping in the essential cooling water system. • Coat the portion of the essential cooling water system copper alloy piping directly embedded in backfill or directly encased in concrete, extending the coating 2 feet or more above grade. Enhance the Buried Piping and Tanks Inspection program procedures to:	B2.1.18	Prior to the period of extended operation.

	• Consider backfill located within 6 inches of the pipe, and consistent with ASTM D 448-08 size number 67, acceptable. Backfill quality is determined through examination during the inspections conducted by the program. Backfill that does not meet the ASTM criteria, during the initial and subsequent inspections of the program, is considered acceptable if the inspections of buried piping do not reveal evidence of mechanical damage to the pipe coatings due to the backfill. • Ensure the cathodic protection system survey is performed annually. • Monitor the output of the cathodic protection system rectifiers every 2 months. The measured current at each rectifier is recorded and compared against a target value. Following the completion of the plant yard cathodic protection system annual survey, record the current of the rectifier used to achieve an acceptable pipe/soil potential. That current will be the target current for the rectifier until the next annual survey. If the current measured at the rectifier during the bimonthly monitoring deviates significantly from the target value, a condition report should be created. The rectifier current should be adjusted to an acceptable value. The results of the survey will be documented and trended to identify degrading conditions. When degraded rectifier performance is identified, documentation is required in accordance with the corrective action program. The system should not be operated outside of established acceptable limits for longer than 90 days. • Recommend increased monitoring of the cathodic protection system and/or additional inspections if adverse indications are discovered during the monitoring of the cathodic protection system. • Evaluate the effectiveness of isolating fittings, continuity bonds and casing isolation, during the plant yard cathodic protection system annual survey. This may be accomplished through electrical measurements. • Visually inspect buried piping and, if significant indications of degradation are observed, the visual inspections are supplemented by surface and/or volumetric non-destructive testing. • Define the inspection interval for the program directed inspections as every 10 years, beginning the 10 year interval prior to the beginning of the period of extended operation. • Select the buried and underground piping inspection locations based on risk, considering susceptibility to degradation and consequences of failure. • External Corrosion Direct Assessment, as described in NACE Standard Practice SP0502-2010, will be considered for use in identifying inspection locations. • Credit opportunistic examinations of non-leaking pipes toward required examinations, only if they meet the risk ranking selection criteria. • Guided wave ultrasonic, or other advanced inspection techniques should be used, if		

	practical, for the purpose of determining piping locations that should be inspected. These inspections may not be used as substitutes for inspections required by the program. • Credit an inspection of piping shared between Units 1 and 2 toward the required inspections of only one unit. • Examine any piping, valves and closure bolting exposed during inspections. • Examine bolting for loss of material and loose or missing fasteners. • Include two alternatives to directed inspections of the buried or underground piping that is safety-related, hazmat or both. The first alternative is to hydrostatically test 25 percent of the subject piping on an interval not to exceed 5 years. The second is an internal inspection of 25 percent of the subject piping by a method capable of accurately determining pipe wall thickness. • Flow testing of the fire mains, as described in NFPA 25, to detect degradation of the buried pipe in lieu of visual inspections of the fire protection system buried and underground piping. • Define "hazmat pipe" as pipe that, during normal operation, contains fluids that, if released, would be detrimental to the environment. • Include examples of adverse indications discovered during piping inspections. • Repair or replacement of the affected component when adverse indications failing to meet the acceptance criteria described in the program are discovered. • Indicate that an analysis may be conducted to determine the potential extent of the degradation, when it is observed. • Double inspection sample sizes within the affected piping categories, when adverse indications are detected during inspection of safety related or hazmat buried pipe. If adverse indications are found in the expanded sample, the inspection sample size is again doubled. This doubling of the inspection sample size continues until no more adverse conditions are found. If adverse conditions are extensive, inspections may be halted in an area of concern that is planned for replacement, provided continued operation does not pose a significant hazard. Expansion of sample size may be limited to the piping subject to the observed degradation mechanism. • Define the scope of inspection for buried piping using the criteria in NUREG-1801. The scope of inspection will be based on the condition of cathodic protection, backfill and coating of the piping. Ensure the scope of inspection increases when the cathodic protection system does not meet operability requirements, or when backfill is examined and does not meet the backfill acceptance criteria. • Examine at least 10 feet of piping during each inspection of buried piping. If the entire length piping is less than 10 feet, inspect the entire length of piping. • Indicate that the inspections may be limited to 10 percent of the piping under		

	consideration, per inspection interval, regardless of the inspection scope prescribed in the NUREG-1801 guidance. • Perform one inspection of all buried stainless steel safety-related piping per inspection interval. • Examine at least 10 feet of piping during each inspection of underground piping. If the entire length of piping is less than 10 feet, inspect the entire length. • Inspect the underground stainless steel pipe in the auxiliary feedwater system once each inspection interval. • Observe for brittle failure at flanges, connections, and joints due to frost heaving, soil stresses, or ground water effects during inspection of buried piping. • Indicate that for coated piping, there should be no evidence of coating degradation. If coating degradation is present, it may be considered acceptable if it is determined to be insignificant by an individual possessing a NACE operator qualification, or otherwise meeting the qualifications to evaluate coatings as described in 49 CFR 192 and 195. • Indicate that for any hydrostatic tests credited by the program, the condition "without leakage" may be met by demonstrating that the test pressure does not change significantly during the test. ~~specify the following requirements: Opportunistic inspections are performed whenever pipes or tanks are excavated or exposed for any reason. If an opportunistic inspection has not been performed within the 10 year period prior to entering the period of extended operation, a planned inspection will be performed. Upon entering the period of extended operation, a planned inspection will be required within 10 years, unless an opportunistic inspection has occurred within this 10 year period.~~		
14	Implement the One-Time Inspection of ASME Code Class 1 Small-Bore Piping program as described in LRA Section B2.1.19.	B2.1.19	During the ~~10~~ six years prior to the period of extended operation.

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 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 ~~every two years~~ 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 (>400 volts) power cables exposed to significant moisture ~~simultaneously with significant voltage~~ be tested to provide an indication of the conductor insulation condition, • 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.	B2.1.25	Prior to the period of extended operation