Entergy

Entergy Operations, Inc.
River Bend Station
5485 U.S. Highway 61N
St. Francisville, LA 70775
Tel 225-381-4374

William F. Maguire
Site Vice President
River Bend Station

RBG-47860

May 10, 2018

Attn: Document Control Desk
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: Response to License Renewal Application NRC Request for Supplemental Information
River Bend Station, Unit 1
Docket No. 50-458
License No. NPF-47

References: 1) Entergy Letter: License Renewal Application (RBG-47735 dated May 25, 2017)

2) NRC email: River Bend Station, Unit 1, Request for Additional Information from April 10, 2018, Public Phone Call – RBS License Renewal Application – dated May 9, 2018 (ADAMS Accession No. ML18120A135)

Dear Sir or Madam:

In Reference 1, Entergy Operations, Inc (Entergy) submitted an application for renewal of the operating license for River Bend Station (RBS) for an additional 20 years beyond the current expiration date. In an email dated May 9, 2018, (Reference 2) the NRC staff requested that Entergy supplement previous responses to various requests for information (RAIs) needed to complete the license renewal application review. An additional supplemental RAI response beyond those requested in Reference 2 is also included in this submittal. Enclosure 1 provides the supplemental responses and specific references to the supplemental information requested. Commitments are included in Enclosure 2.

If you require additional information, please contact Mr. Tim Schenk at (225)-381-4177 or tschenk@entergy.com.

In accordance with 10 CFR 50.91(b)(1), Entergy is notifying the State of Louisiana and the State of Texas by transmitting a copy of this letter to the designated State Official.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 10, 2018.

Sincerely,

WFM/RMC/dp

Enclosure 1: Supplemental Responses – River Bend Station
Enclosure 2: Commitments – River Bend Station

cc: (with Enclosure)

U. S. Nuclear Regulatory Commission
Attn: Emmanuel Sayoc
11555 Rockville Pike
Rockville, MD 20852

cc: (w/o Enclosure)

U. S. Nuclear Regulatory Commission
Attn: Lisa Regner
11555 Rockville Pike
Rockville, MD 20852

U.S. Nuclear Regulatory Commission
Region IV
1600 East Lamar Blvd.
Arlington, TX 76011-4511

NRC Resident Inspector
PO Box 1050
St. Francisville, LA 70775

Central Records Clerk
Public Utility Commission of Texas
1701 N. Congress Ave.
Austin, TX 78711-3326

Department of Environmental Quality
Office of Environmental Compliance
Radiological Emergency Planning and Response Section
Ji Young Wiley
P.O. Box 4312
Baton Rouge, LA 70821-4312

RBF1-18-0093

RBG-47860

Enclosure 1

Supplemental Responses

REQUEST FOR ADDITIONAL INFORMATION
LICENSE RENEWAL APPLICATION
RIVER BEND STATION, UNIT 1 – Supplemental Responses
DOCKET NO.: 50-458
CAC NO.: MF9757
Office of Nuclear Reactor Regulation
Division of Materials and License Renewal

Question
RAI B.1.15-1 Supplemental Information (RAI Set 4 Fuel Oil Chemistry)

References
Set 4 responses submitted on January 24, 2018 (ML18025B544) and March 27, 2018 (ML18087A087)

Background
SRP-LR Table 3.0-1, "FSAR Supplement for Aging Management of Applicable Systems," summary description provides an acceptable program description for the GALL Report AMP XI.M30, "Fuel Oil Chemistry," as per 10 CFR 54.21(d). The FSAR Supplement includes the specific ASTM Standards used for monitoring and control of fuel oil contamination to maintain fuel oil quality.

Issue
LRA Section A.1.15, "Diesel Fuel Monitoring," USAR supplement does not appear to include the specific industry standards used for the program. The current licensing basis will not be consistent with the staff-issued guidance document during the period of extended operation if the industry standards recommended by the GALL Report are not used.

Request
Justify the apparent absence of the above mentioned industry standards in the USAR supplement for the Diesel Fuel Monitoring program. Alternatively, state the changes to the USAR supplement necessary to include the GALL Report recommended industry standards that will be used for the program.

Response

River Bend Station (RBS) previously responded to RAI B.1.15-1 by letters dated January 24, 2018 (RBG-47812) and March 27, 2018 (RGB-47849). The following is the response to RAI B.1.15-1 revised to include additional information requested by the NRC during a public telephone conference call held on April 10, 2018. The revised response supersedes the previous responses. The locations of changes to the previous response of March 27 are marked with revision bars.

Changes are provided to the USAR supplement to identify ASTM standards used in the monitoring and control of diesel fuel, specifically, ASTM D4057, D2274, D2276, and D2709. Diesel fuel monitoring program procedures will be revised to include sampling for water and sediment in accordance with ASTM D2709.

The changes to LRA Sections A.1.15 and B.1.15 follow with additions underlined.

A.1.15 Diesel Fuel Monitoring

The Diesel Fuel Monitoring Program manages loss of material in piping, tanks and other components in an environment of diesel fuel oil by verifying the quality of the fuel oil source. This is performed by receipt inspection, sampling, and limiting the quantities of contaminants before allowing it to enter the fuel oil storage tanks. Parameters monitored include water and sediment content, total particulates, and levels of microbiological organisms in the fuel oil. Monitoring and control are performed in accordance with ASTM standards D4057, D2274, D2276, and D2709. The program includes multi-level sampling of fuel oil storage tanks. Where multi-level sampling cannot be performed due to design, a representative sample is taken from the lowest part of the tank. A stabilizer/biocide is added to new fuel.

The Diesel Fuel Monitoring Program will be enhanced as follows.

- Revise Diesel Fuel Monitoring Program procedures to specify sampling for water and sediment in accordance with ASTM Standard D2709.

B.1.15 Diesel Fuel Monitoring

Program Description

The Diesel Fuel Monitoring Program manages loss of material in piping, tanks and other components in an environment of diesel fuel oil by verifying the quality of the fuel oil source. This is performed by receipt inspection, sampling, and limiting the quantities of contaminants before allowing it to enter the fuel oil storage tanks. Parameters monitored include water and sediment content, total particulates, and levels of microbiological organisms in the fuel oil. Monitoring and control are performed in accordance with ASTM standards D4057, D2274, D2276, and D2709. The program includes multi-level sampling of fuel oil storage tanks. Where multi-level sampling cannot be performed due to design, a representative sample is taken from the lowest part of the tank. A stabilizer/biocide is added to new fuel.

The following enhancements will be implemented prior to the period of extended operation.

Element Affected	Enhancement
5. Monitoring and Trending	Revise Diesel Fuel Monitoring Program procedures to specify sampling for water and sediment in accordance with ASTM Standard D2709.

Question
B.1.17-1 Supplemental Information (RAI Set 9 External Surfaces Monitoring)

Reference
Set 9 response submitted on March 8, 2018 (ML18067A437)

Background
During its onsite audit, the staff walked down portions of the diesel generator building and noted that the air intake plenums, under normal operating conditions, draw outside air directly into the diesel generator rooms, without any conditioning of the ambient air. This is also represented on LRA Drawing PID-22-07A, "HVAC Diesel Generators."

LRA Table 3.0-1, "Service Environments for Mechanical Aging Management Reviews," states that the River Bend environment of "air-indoor" corresponds to "air-indoor uncontrolled" in the GALL Report. GALL Report Section IX.D, "Environments," defines "air-indoor uncontrolled" as an environment with temperatures higher than dew point (i.e., condensation can occur, but only rarely) and "air –outdoor" as an environment consisting of moist, possibly salt laden atmospheric air, ambient temperatures and humidity, and exposure to weather, including precipitation.

NRC Standard Review Plan for License Renewal Applications (SRP-LR), Sections 3.2.2.2.3.2, 3.2.2.2.6, 3.3.2.2.3, 3.3.2.2.5, 3.4.2.2.2, and 3.4.2.2.3 discuss the possibility of aging effects extending to stainless steel components exposed to air "which has recently been introduced into buildings (i.e., components near intake vents)." The corresponding LRA sections state that there are no indoor stainless steel components located near unducted air intakes in engineered safety features, auxiliary, or steam and power conversion systems.

Issue
For in scope components in the diesel generator building (e.g., items in LRA Tables 3.3.2 10, "Standby Diesel Generator," 3.3.2 11, "HPCS Diesel Generator," 3.3.2 18 12, "Standby Diesel Generator System Nonsafety Related Components Affecting Safety Related Systems," 3.3.2 18 13, "HPCS Diesel Generator System Nonsafety Related Components Affecting Safety Related Systems," 3.3.2 17, "Fuel Oil System"), it is unclear to the staff why the air environment in this building is considered "air indoor" given that, under normal operating conditions, outdoor air is drawn directly into the diesel generator rooms. Other than being protected from exposure to weather, components in these systems appear to be exposed to an environment where condensation from humid air can occur relatively frequently, contaminants from cooling tower treatment chemicals may be present, and chlorides from atmospheric air may be present. The staff notes that some materials exposed to air-indoor will have no aging effects requiring management whereas these materials will have aging effects requiring management (e.g., loss of material for stainless steel, aluminum; cracking for stainless steel) for exposure to air which has recently been introduced into buildings.

In addition, based on the staff's walkdown of the diesel generator building during its onsite audit, it is unclear to the staff how the applicant determined that the indoor stainless steel components are not located near unducted air intakes as stated in LRA Sections 3.2.2.2.3.2, 3.2.2.2.6, 3.3.2.2.3, 3.3.2.2.5, 3.4.2.2.2, and 3.4.2.2.3. It is also unclear to the staff if there are ducted air intakes which could result in stainless steel components located inside buildings being exposed to outdoor air.

Request
1. Provide information that establishes the "air-indoor" environment cited for components inside the diesel generator building for the LRA tables discussed above. Include information that addresses normal operating conditions, where outdoor air is drawn directly into the diesel generator rooms and its impact on whether condensation occurs on components more than rarely, as described in the corresponding definition of the GALL Report.

2. In light of the staff's observation during its walkdown of the diesel generator building, provide information that establishes there are no indoor stainless steel components located near ducted or unducted air intakes in engineered safety features, auxiliary, or steam and power conversion systems. Include information that addresses the associated sections of SRP-LR regarding components exposed to air that has been recently introduced into buildings.

Response

A previous response to RAI B.1.17-1 was submitted by letter RBG-47834, dated March 8, 2018. Due to subsequent discussion between NRC and Entergy personnel, the response is revised, superseding in its entirety the previous response submitted by letter RBG-47834.

1. The external surfaces of stainless steel components within the diesel generator building are exposed to air recently introduced into the building. Outdoor air travels upward through horizontally mounted screens before entering ventilation air intake plenums through vertically mounted dampers. The dampers include 0.5-inch wire mesh screens. Air then enters the diesel rooms through horizontal openings in the bottom of the intake plenum. Exposure to precipitation is the primary difference between air-indoor and air-outdoor environments. The intake air path precludes precipitation from affecting components in the building.

   Condensation is an external environment conservatively cited in the LRA for service water components (carbon steel) within the diesel generator building because those components can operate at temperature below the dew point. However, condensation has rarely been observed on components in the building. Based on this operating experience, Entergy concludes that the introduction of outdoor air into the building has minimal, if any, effect on the degree of condensation.

   Because condensation is rarely expected, precluding significant loss of material of stainless steel and aluminum components and cracking of stainless steel components, and because the path that air must travel to enter the diesel generator building precludes precipitation from affecting components in the building, an indoor air environment is appropriate.

2. LRA Sections 3.2.2.2.3, 3.2.2.2.6, 3.3.2.2.3, 3.3.2.2.5, 3.4.2.2.2, and 3.4.2.2.3 are revised to conservatively delete the statement that no stainless steel components are located near unducted air intakes.

   Numerous stainless steel components included in the LRA are exposed to outdoor air, including accumulators, filter housings, flow elements, piping, tubing, and valves, among others. These components are included in auxiliary systems and steam and power conversion systems with cracking as an applicable aging effect; however, after being in service for over 30 years, cracking has not been observed. Operating experience review did not reveal failures or concerns related to stress corrosion cracking (SCC) of stainless steel components due to contaminants in outdoor air within auxiliary systems or steam and power conversion systems. (Engineered safety features systems have no components exposed to outdoor air.)

   As described in NUREG-1800, Rev. 2, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants (SRP-LR)*, applicable air environments that could initiate SCC or loss of material due to pitting and crevice corrosion in stainless steel components include, but are not limited to, those within approximately 5 miles of a saltwater coastline, those within 1/2 mile of a highway which is treated with salt in the wintertime, those areas in which the soil contains more than trace chlorides, those plants having cooling towers where the water is treated with chlorine or chlorine compounds, and those areas subject to chloride contamination from other agricultural or industrial sources. Although most of the criteria cited in the SRP-LR do not apply to River Bend Station, sufficient data is not available to determine based solely on the environment that SCC will not occur during the period of extended operation.

The possibility exists for SCC and loss of material due to pitting and crevice corrosion of stainless steel components exposed to air recently introduced into a building, as opposed to air within air-conditioned buildings, where these aging effects are not experienced. However, it is reasonable to conclude that stainless steel components located indoors are less susceptible to aging effects than those exposed to an outdoor environment. Consequently, a surface examination will be performed in accordance with the One-Time Inspection Program on stainless steel components externally exposed to outdoor air to verify SCC is not occurring on stainless steel components exposed to indoor air, even if the air has been recently introduced into a building. In addition, a visual examination will be performed in accordance with the One-Time Inspection Program on stainless steel components externally exposed to outdoor air to verify loss of material is not occurring on stainless steel components exposed to indoor air, even if the air has been recently introduced into a building.

A one-time visual inspection of components exposed to outdoor air will also include aluminum components. This will confirm that loss of material is not occurring on aluminum components exposed to indoor air, even if the air is recently introduced into a building.

Stainless steel and aluminum components exposed to indoor air are not identified in the LRA as having aging effects requiring management, which is consistent with NUREG-1801, Revision 2. For stainless steel and aluminum components such as those in the diesel generator building, indoor air is the appropriate external environment as described above. Assigning an outdoor air environment to components located indoors is not deemed appropriate because they do not experience the harsher environment of outdoor components, and attributing the aging effects of cracking and loss of material to stainless steel components or loss of material to aluminum components exposed to indoor air would be inconsistent with NUREG-1801. Rather than identifying aging effects inconsistent with NUREG-1801 in the Section 3 LRA tables, the potential for SCC and loss of material for stainless steel components and for loss of material for aluminum components exposed to outdoor air recently introduced into a building will be assessed through a one-time inspection of outdoor components in accordance with the One-Time Inspection Program.

Changes to the LRA follow with additions underlined and deletions lined through.

3.2.2.2.3 Loss of Material due to Pitting and Crevice Corrosion

1. This paragraph in NUREG-1800 pertains to loss of material due to pitting and crevice corrosion in partially encased stainless steel tanks exposed to raw water due to cracking of the perimeter seal from weathering. Although this paragraph is referenced only by a PWR table line (V.D1.E-01) in NUREG-1801, it could also apply to BWR plants. However, the ESF systems at RBS do not include partially encased stainless steel tanks exposed to this environment. Therefore, this paragraph is not applicable.

2. Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air, including air which has recently been introduced into buildings, such as near intake vents. Chloride contamination of components exposed to outdoor air may occur. However, at RBS there are no ESF system components exposed to outdoor air in the scope of license renewal. ~~At RBS, there are no stainless steel ESF system components located indoors near unducted air intakes.~~ The One-Time Inspection Program uses visual examinations of aluminum and stainless steel components externally exposed to outdoor air to verify loss of material of aluminum and stainless steel components exposed to air recently introduced into a building is not occurring.

3.2.2.2.6 Cracking due to Stress Corrosion Cracking

Cracking due to stress corrosion cracking could occur for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air, including air which has recently been introduced into buildings, such as near intake vents. Water in the RBS cooling towers is treated with chlorine compounds. Chloride contamination of components exposed to outdoor air may occur. However, at RBS there are no ESF system components exposed to outdoor air in the scope of license renewal. ~~At RBS, there are no stainless steel ESF system components located indoors near unducted air intakes.~~ The One-Time Inspection Program uses NDE surface examinations of stainless steel components externally exposed to outdoor air to verify cracking of stainless steel components exposed to air recently introduced into a building is not occurring.

3.3.2.2.3 Cracking due to Stress Corrosion Cracking

Cracking due to stress corrosion cracking could occur for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air, including air which has recently been introduced into buildings, such as near intake vents. Water in the RBS cooling towers is treated with chlorine compounds. Chloride contamination of components exposed to outdoor air may occur. Consistent with NUREG-1801 for outdoor air with a potential source of chloride contamination, cracking of stainless steel components directly exposed to outdoor air is identified as an aging effect requiring management and is managed by the External Surfaces Monitoring Program. ~~There are no stainless steel auxiliary systems components in the scope of license renewal that are located indoors near unducted air intakes.~~The One-Time Inspection Program uses NDE surface examinations of stainless steel components externally exposed to outdoor air to verify cracking of stainless steel components exposed to air recently introduced into a building is not occurring.

3.3.2.2.5 Loss of Material due to Pitting and Crevice Corrosion

Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air, including air which has recently been introduced into buildings, such as near intake vents. Water in the RBS cooling towers is treated with chlorine compounds. Chloride contamination of components exposed to outdoor air may occur. Consistent with NUREG-1801, loss of material for stainless steel components exposed to outdoor air is identified as an aging effect requiring management and is managed by the External Surfaces Monitoring Program. ~~There are no stainless steel auxiliary systems components in the scope of license renewal that are located indoors near unducted air intakes.~~ The One-Time Inspection Program uses visual examinations of aluminum and stainless steel components externally exposed to outdoor air to verify loss of material of aluminum and stainless steel components exposed to air recently introduced into a building is not occurring.

3.4.2.2.2 Cracking due to Stress Corrosion Cracking (SCC)

Cracking due to stress corrosion cracking could occur for stainless steel piping, piping components, piping elements and tanks exposed to outdoor air, including air which has recently been introduced into buildings, such as near intake vents. Water in the RBS cooling towers is treated with chlorine compounds. Chloride contamination of components exposed to outdoor air may occur. Consistent with NUREG-1801 for outdoor air with a potential source of chloride contamination, cracking of stainless steel components directly exposed to outdoor air is identified as an aging effect requiring management and is managed by the External Surfaces Monitoring Program. ~~There are no stainless steel steam and power conversion system components in the scope of license renewal that are located indoors near unducted air intakes.~~ The One-Time Inspection program uses NDE surface examinations of components externally exposed to outdoor air to confirm that cracking of stainless steel components exposed to air recently introduced into a building is not occurring.

3.4.2.2.3 Loss of Material Due to Pitting and Crevice Corrosion

Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, piping elements, and tanks exposed to outdoor air, including air which has recently been introduced into buildings, such as near intake vents. Water in the RBS cooling towers is treated with chlorine compounds. Chloride contamination of components exposed to outdoor air may occur. Consistent with NUREG-1801, loss of material for stainless steel components exposed to outdoor air is identified as an aging effect requiring management and is managed by the External Surfaces Monitoring Program. ~~There are no stainless steel steam and power conversion system components in the scope of license renewal that are located indoors near unducted air intakes.~~ The One-Time Inspection Program uses visual examinations of stainless steel components externally exposed to outdoor air to verify loss of material of stainless steel components exposed to air recently introduced into a building is not occurring. There are no aluminum components exposed to indoor air in steam and power conversion systems.

A.1.32 One-Time Inspection

The program will include activities to verify effectiveness of aging management programs and activities to confirm the insignificance of aging effects as described below.

A representative sample of internal and external surfaces of RCIC piping passing through the waterline region of the suppression pool	One-time inspection activity will confirm that loss of material is not occurring or is occurring so slowly that the aging effect will not affect the component intended function during the period of extended operation.
A representative sample of stainless steel component external surfaces exposed to outdoor air	A one-time surface examination will confirm that cracking of components externally exposed to air recently introduced into a building is not occurring.
A representative sample of stainless steel component external surfaces exposed to outdoor air	A one-time visual examination will confirm that loss of material of components externally exposed to air recently introduced into a building is not occurring.
A representative sample of aluminum component external surfaces exposed to outdoor air	A one-time visual examination will confirm that loss of material of components externally exposed to air recently introduced into a building is not occurring.

B.1.32 ONE-TIME INSPECTION

Program Description

The program will include activities to verify effectiveness of aging management programs and activities to confirm the insignificance of aging effects as described below.

A representative sample of internal and external surfaces of RCIC piping passing through the waterline region of the suppression pool	One-time inspection activity will confirm that loss of material is not occurring or is occurring so slowly that the aging effect will not affect the component intended function during the period of extended operation.
A representative sample of stainless steel component external surfaces exposed to outdoor air	A one-time surface examination will confirm that cracking of components externally exposed to air recently introduced into a building is not occurring.
A representative sample of stainless steel component external surfaces exposed to outdoor air	A one-time visual examination will confirm that loss of material of components externally exposed to air recently introduced into a building is not occurring.
A representative sample of aluminum component external surfaces exposed to outdoor air	A one-time visual examination will confirm that loss of material of components externally exposed to air recently introduced into a building is not occurring.

Question
B.1.25-1 Supplemental Information (RAI Set 10 Internal Surfaces in Miscellaneous Piping and Ducting Components)

Reference
Set 10 response submitted on March 26, 2018 (ML18087A188)

Background
GALL Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," as modified by LR ISG 2012 02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation," states parameters monitored or inspected include visible evidence of loss of material in metallic components.

LRA Section B.1.25, "Internal Surfaces in Miscellaneous Piping and Ducting Components," states "[f]or metallic components, visual inspection will be used to detect evidence of loss of material and reduction of heat transfer" and that this new program will be consistent with GALL Report AMP XI.M38, as modified by LR ISG 2012 02.

The LRA (e.g., Table 3.3.2 9, "Combustible Gas Control") states that metallic components will be managed for cracking and reduction of heat transfer using the Internal Surfaces in Miscellaneous Piping and Ducting Components program.

Issue
It is not clear to the staff that the new Internal Surfaces in Miscellaneous Piping and Ducting Components program will be consistent with GALL Report AMP XI.M38 because GALL Report AMP XI.M38 does not include reduction of heat transfer or cracking in metallic components as aging effects. As a result of these apparent inconsistencies, it appears that the LRA has not included sufficient information with regard to various aging management program elements (e.g., "parameters monitored or inspected," "detection of aging effects," "acceptance criteria") to demonstrate that the reduction of heat transfer and cracking for metallic components will be adequately managed by the new Internal Surfaces in Miscellaneous Piping and Ducting Components program.

Request
Clarify whether the new Internal Surfaces in Miscellaneous Piping and Ducting Components program either:

a) will be consistent with the GALL Report AMP XI.M38 and then provide an alternate aging management program to manage reduction of heat transfer and cracking of metallic components, or
b) will not be consistent with the GALL Report AMP XI.M38 and then provide the additional information for changes to applicable program elements that demonstrate reduction of heat transfer and cracking of metallic components will be adequately managed

Response

A previous response to RAI B.1.25-1 was submitted by letter RBG-47835, dated March 26, 2018. The following response compared to the previously submitted response in letter RBG-47835 is unchanged with the exception of a deleted line item in LRA Table 3.3.2-12. The deleted line item addressed stainless steel manifolds managed for cracking using the Internal Surfaces in Miscellaneous Piping and Ducting Components Program. This line item was previously deleted in response to RAI B.1.17-2 by letter RBG-47834, dated March 8, 2018 and was inadvertently included in the original response to this RAI. The following response supersedes the previous response submitted by letter RBG-47835.

The River Bend Station (RBS) Internal Surfaces in Miscellaneous Piping and Ducting Components (ISMPDC) Program will be consistent with the GALL Report AMP XI.M38 as stated in LRA Section B.1.25. Line items in LRA Section 3 tables specifying aging effects of reduction of heat transfer and cracking of metallic components managed by the ISPMDC program are changed to specify that aging effects will be managed by the Periodic

Surveillance and Preventive Maintenance Program described in LRA Section B.1.34. In addition, LRA Section A.1.25 and Section B.1.25 are revised to remove reduction of heat transfer and cracking as applicable aging effects for the ISMPDC program.

Changes to LRA Section 3 and Appendix A and B programs follow with additions underlined and deletions lined through.

3.3.2.1.7 Fire Protection – Water System

Aging Management Programs

The following aging management programs manage the aging effects for the fire protection – water system components.

- Bolting Integrity
- Buried and Underground Piping and Tanks Inspection
- Coating Integrity
- Diesel Fuel Monitoring
- External Surfaces Monitoring
- Fire Water System
- Internal Surfaces in Miscellaneous Piping and Ducting Components
- One-Time Inspection
- <u>Periodic Surveillance and Preventive Maintenance</u>
- Selective Leaching
- Water Chemistry Control – Closed Treated Water Systems

3.3.2.1.9 Combustible Gas Control System

Aging Management Programs

The following aging management programs manage the aging effects for the combustible gas control system components.

- Bolting Integrity
- External Surfaces Monitoring
- Internal Surfaces in Miscellaneous Piping and Ducting Components
- <u>Periodic Surveillance and Preventive Maintenance</u>

3.3.2.1.11 HPCS Diesel Generator System

Aging Management Programs

The following aging management programs manage the aging effects for the HPCS diesel generator system components.

- Bolting Integrity
- External Surfaces Monitoring
- Internal Surfaces in Miscellaneous Piping and Ducting Components

- Oil Analysis
- One-Time Inspection
- Periodic Surveillance and Preventive Maintenance
- Selective Leaching
- Water Chemistry Control – Closed Treated Water Systems

3.3.2.1.12 Control Building HVAC System

Aging Management Programs

The following aging management programs manage the aging effects for the control building HVAC system components.

- Bolting Integrity
- Buried and Underground Piping and Tanks Inspection
- External Surfaces Monitoring
- Internal Surfaces in Miscellaneous Piping and Ducting Components
- Periodic Surveillance and Preventive Maintenance

Water Chemistry Control – Closed Treated Water Systems

3.3.2.1.13 Miscellaneous HVAC Systems

Aging Management Programs

The following aging management programs manage the aging effects for the miscellaneous HVAC systems components.

- Bolting Integrity
- External Surfaces Monitoring
- Internal Surfaces in Miscellaneous Piping and Ducting Components
- Periodic Surveillance and Preventive Maintenance
- Service Water Integrity
- Water Chemistry Control – Closed Treated Water Systems

Table 3.3.1
Summary of Aging Management Programs for the Auxiliary Systems Evaluated in Chapter VII of NUREG-1801

Table 3.3.1: Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-42	Copper alloy, titanium, stainless steel heat exchanger tubes exposed to raw water	Reduction of heat transfer due to fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	The heat exchangers of the RBS service water system covered by NRC GL 89-13 use closed cycle cooling water rather than raw water. Reduction of heat transfer for stainless steel and copper alloy heat exchanger tubes in the fire protection system and stainless steel heat exchanger plates in portionsof the service water system not covered by NRC GL 89-13 is managed by the Internal Surfaces in Miscellaneous Piping and Ducting ComponentsPeriodic Surveillance and Preventive Maintenance Program. There are no titanium heat exchanger tubes exposed to raw water in the auxiliary systems in the scope of license renewal.
3.3.1-83	Stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Cracking due to stress corrosion cracking	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. Cracking of stainless steel diesel engine exhaust components is managed by the Internal Surfaces in Miscellaneous Piping and Ducting ComponentsPeriodic Surveillance and Preventive Maintenance Program.

Table 3.3.2-3
Service Water System
Summary of Aging Management Evaluation

Table 3.3.2-3: Service Water System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Heat exchanger (plates)	Heat transfer	Stainless steel	Raw water (int)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	VII.C1.AP-187	3.3.1-42	E

Table 3.3.2-7
Fire Protection – Water System
Summary of Aging Management Evaluation

Table 3.3.2-7: Fire Protection – Water System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Heat exchanger (tubes)	Heat transfer	Copper alloy	Raw water (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	VII.C1.A-72	3.3.1-42	E

Table 3.3.2-9
Combustible Gas Control System
Summary of Aging Management Evaluation

Table 3.3.2-9: Combustible Gas Control System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Coil	Heat transfer	Stainless steel	Air – indoor (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Piping	Pressure boundary	Stainless steel	Condensation (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	H
Tubing	Pressure boundary	Stainless steel	Condensation (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	H
Valve body	Pressure boundary	Stainless steel	Condensation (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	H

Table 3.3.2-10
Standby Diesel Generator System
Summary of Aging Management Evaluation

Table 3.3.2-10: Standby Diesel Generator System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Expansion joint	Pressure boundary	Stainless steel	Exhaust gas (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	VII.H2.AP-128	3.3.1-83	~~A~~E
Heat exchanger (tubes)	Heat transfer	Copper alloy	Air – indoor (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Piping	Pressure boundary	Stainless steel	Exhaust gas (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	VII.H2.AP-128	3.3.1-83	~~A~~E

Table 3.3.2-11
HPCS Diesel Generator System
Summary of Aging Management Evaluation

Table 3.3.2-11: HPCS Diesel Generator System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Expansion joint	Pressure boundary	Stainless steel	Exhaust gas (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	VII.H2.AP-128	3.3.1-83	~~A~~ E
Heat exchanger (fins)	Heat transfer	Aluminum	Air – indoor (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Heat exchanger (tubes)	Heat transfer	Copper alloy	Air – indoor (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Piping	Pressure boundary	Stainless steel	Exhaust gas (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	VII.H2.AP-128	3.3.1-83	~~A~~ E

Table 3.3.2-12
Control Building HVAC System
Summary of Aging Management Evaluation

Table 3.3.2-12: Control Building HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Accumulator	Pressure boundary	Stainless steel	Air – outdoor (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Filter housing	Pressure boundary	Stainless steel	Air – outdoor (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Flex hose	Pressure boundary	Stainless steel	Air – outdoor (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G

Table 3.3.2-12: Control Building HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Heat exchanger (fins)	Heat transfer	Aluminum	Condensation (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Heat exchanger (tubes)	Heat transfer	Copper alloy	Condensation (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Sight glass	Pressure boundary	Stainless steel	Air – outdoor (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Tubing	Pressure boundary	Stainless steel	Air – outdoor (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G

Table 3.3.2-12: Control Building HVAC System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Valve body	Pressure boundary	Stainless steel	Air – outdoor (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G

Table 3.3.2-13
Miscellaneous HVAC System
Summary of Aging Management Evaluation

Table 3.3.2-13: Miscellaneous HVAC Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Heat exchanger (fins)	Heat transfer	Aluminum	Air – outdoor (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	H
Heat exchanger (fins)	Heat transfer	Aluminum	Condensation (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G

Table 3.3.2-13: Miscellaneous HVAC Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Heat exchanger (tubes)	Heat transfer	Copper alloy	Air – outdoor (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Heat exchanger (tubes)	Heat transfer	Copper alloy	Condensation (ext)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G
Heat exchanger (tubes)	Heat transfer	Stainless steel	Air – indoor (int)	Reduction of heat transfer	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	G

Table 3.3.2-16
Plant Drains
Summary of Aging Management Evaluation

Table 3.3.2-16: Plant Drains

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Piping	Pressure boundary	Stainless steel	Waste water (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	H
Valve body	Pressure boundary	Stainless steel	Waste water (int)	Cracking	~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Periodic Surveillance and Preventive Maintenance	--	--	H

A.1.25 Internal Surfaces in Miscellaneous Piping and Ducting Components
The Internal Surfaces in Miscellaneous Piping and Ducting Components Program manages ~~cracking,~~ loss of material~~, reduction of heat transfer,~~ and change in material properties using representative sampling and opportunistic visual inspections of the internal surfaces of metallic and elastomeric components in environments of air – indoor, air – outdoor, condensation, exhaust gas, raw water, and waste water. Internal inspections will be performed during periodic system and component surveillances or during the performance of maintenance activities when the surfaces are accessible for visual inspection.

Where practical, the inspections will focus on the bounding or leading components most susceptible to aging because of time in service and severity of operating conditions. At a minimum, in each 10-year period during the period of extended operation, a representative sample of 20 percent of the population (defined as components having the same combination of material, environment, and aging effect) or a maximum of 25 components per population will be inspected. Opportunistic inspections will continue in each period even if the minimum sample size has been inspected.

For metallic components, visual inspection will be used to detect evidence of loss of material~~ and reduction of heat transfer~~. For non-metallic components, visual inspections will be used to detect surface irregularities. Visual examinations of elastomeric components will be accompanied by physical manipulation or pressurization such that changes in material properties are readily observable. The sample size for physical manipulation will be at least 10 percent of accessible surface area.

A.1.34 Periodic Surveillance and Preventive Maintenance
Credit for program activities has been taken in the aging management review for the following components.

- Inspect the internal surfaces of abandoned equipment in the following nonsafety-related systems affecting safety-related systems to manage loss of material:
  - Leak detection system (system code 207)
  - Makeup water system (system code 659)
  - Fuel pool cooling system (system code 602)
  - Reactor water cleanup system (system code 601)
  - Standby service water system (system code 256)
  - Process radiation monitoring system (system code 511)
  - Floor and equipment drains system (system code 609)
- <u>For metallic components, visually inspect components in the following systems to detect evidence of reduction of heat transfer.</u>
  - <u>Service water system</u>
  - <u>Fire protection – water system</u>

- Combustible gas control system
- Standby diesel generator system
- HPCS diesel generator system
- Control building HVAC system
- Miscellaneous HVAC systems

- For metallic components, visually inspect components in the following systems, and when appropriate, perform surface examinations, to detect evidence of cracking.
  - Combustible gas control system
  - Standby diesel generator system
  - HPCS diesel generator system
  - Control building HVAC system
  - Plant drains system

B.1.25 Internal Surfaces in Miscellaneous Piping and Ducting Components

Program Description

The Internal Surfaces in Miscellaneous Piping and Ducting Components Program is a new program that will manage ~~cracking,~~ loss of material~~, reduction of heat transfer,~~ and change in material properties using representative sampling and opportunistic visual inspections of the internal surfaces of metallic and elastomeric components in environments of air – indoor, air – outdoor, condensation, exhaust gas, raw water, and waste water. Internal inspections will be performed during periodic system and component surveillances or during the performance of maintenance activities when the surfaces are accessible for visual inspection.

Where practical, the inspections will focus on the bounding or leading components most susceptible to aging because of time in service and severity of operating conditions. At a minimum, in each 10-year period during the period of extended operation, a representative sample of 20 percent of the population (defined as components having the same combination of material, environment, and aging effect) or a maximum of 25 components per population will be inspected. Opportunistic inspections will continue in each period even if the minimum sample size has been inspected.

For metallic components, visual inspection will be used to detect evidence of loss of material~~ and reduction of heat transfer~~. For non-metallic components, visual inspections will be used to detect surface irregularities. Visual examinations of elastomeric components will be accompanied by physical manipulation or pressurization such that changes in material properties are readily observable. The sample size for physical manipulation will be at least 10 percent of accessible surface area.

B.1.34 PERIODIC SURVEILLANCE AND PREVENTIVE MAINTENANCE

Credit for program activities has been taken in the aging management review for the following systems and structures.

Nonsafety-related systems affecting safety-related systems (continued)	Visually inspect the internal surfaces of floor and equipment drains system (system code 609) abandoned piping components to manage loss of material.
• Service water system • Fire protection – water system • Combustible gas control system • Standby diesel generator system • HPCS diesel generator system • Control building HVAC system • Miscellaneous HVAC systems	For metallic components, visually inspect components to detect evidence of reduction of heat transfer.
• Combustible gas control system • Standby diesel generator system • HPCS diesel generator system • Control building HVAC system • Plant drains system	For metallic components, visually inspect components, and when appropriate, perform surface examinations, to detect evidence of cracking.

Evaluation

4. Detection of Aging Effects

Periodic surveillances and preventive maintenance activities provide for component inspections to detect aging effects. Inspection intervals provide timely detection of degradation prior to loss of intended functions. Established inspection methods to detect aging effects of loss of material, ~~and~~ cracking, and reduction of heat transfer include visual inspections, and when appropriate, surface examinations for metallic components. Inspection of elastomeric materials to detect cracking and change in material properties includes visual inspections while manually flexing the component. Manipulation of any specific elastomeric component includes at least 10 percent of available surface area, including visually identified suspect areas.

<u>Question</u>
B.1.21-1 Supplemental Information (RAI Set 9 Flow Accelerated Corrosion)

Reference
Set 9 response submitted on March 8, 2018 (ML18067A437)

<u>Background</u>
In support of its integrated plant assessment, River Bend Station (RBS) prepared report RBS-EP-15-00007, Revision 0, "Aging Management Program Evaluation Results – Non-Class 1 Mechanical," to demonstrate that the programs credited in the license renewal aging management review reports are adequate to support license renewal. The RBS report states that it identifies the applicable program procedures and controlling documentation and describes the program elements required to support the RBS license renewal application. For the "scope of program" program element, RBS-EP-15-00007 Section 4.8, "Flow-Accelerated Corrosion," states that the program uses the guidance described in EPRI NSAC-202L, Revision 4, "Recommendations for an Effective Flow-Accelerated Corrosion Program," and cites program procedures SEP-FAC-RBS-001, "Flow-Accelerated Corrosion," and EN-DC-315, "Flow-Accelerated Corrosion Program." In addition, RBS-EP-15-00007 states that, for this aspect, the Flow-Accelerated Corrosion program is consistent with GALL Report AMP XI.M17, "Flow-Accelerated Corrosion."

<u>Issue</u>
RBS-EP-15-00007 states that the program uses the guidance from NSAC 202L, Revision 4; however, implementing procedures SEP-FAC-RBS-001, and EN-DC-315 state that the program uses guidance from NSAC-202L, Revision 3. In addition, GALL Report AMP XI.M17 states that the program uses the guidance in NSAC-202L, Revision 2 or Revision 3. Consequently, it is unclear to the staff whether the program will use guidance in Revision 4 of NSAC-202L, as stated in RBS-EP-15-00007, or whether the program will use the guidance in Revision 3 of NSAC-202L, as stated in the associated implementing procedures SEP-FAC-RBS-001 and EN-DC-315, and in GALL Report AMP XI.M17.

<u>Request</u>
Clarify which revision of NSAC 202L is used for guidance in the RBS Flow-Accelerated Corrosion program. If inconsistencies are identified between the applicable revision of NSAC 202L referenced in the integrated plant assessment and the program's implementing procedures or the GALL Report AMP XI.M17, address how these inconsistencies will be resolved.

<u>Response</u>

A previous response to RAI B.1.21-1 was submitted in letter RBG-47834, dated March 8, 2018. The following response is the same as the response in letter RBG-47834 except a sentence has been added regarding reference to NSAC-202L, Revision 3, in site procedures. The following response supersedes the previous response submitted in letter RBG-47834.

NSAC-202L, Revision 4, is used for guidance in the RBS Flow-Accelerated Corrosion Program.

Revisions have been initiated for procedures EN-DC-315 and SEP-FAC-RBS-001 to remove reference to Revision 3 of NSAC-202L.

EPRI periodically revises NSAC-202L to update flow-accelerated corrosion program recommendations with the experience of members of the CHECWORKS Users Group (CHUG), and recent developments in detection, modeling, and mitigation technology. These recommendations refine and enhance those of earlier versions and ensure the continuity of existing flow-accelerated corrosion programs. The technical changes in NSAC-202L-R4 represent improvements in the management of flow-accelerated corrosion and ensure that the main objective of flow-accelerated corrosion programs, which is to manage wall thinning, is maintained. Use of NSAC-202L-R4 for Flow-Accelerated Corrosion program guidance has been deemed acceptable in NUREG-2205, *"Safety Evaluation Report Related to the License Renewal of LaSalle County Station Units 1 and 2,"* and in NUREG-2191, *"Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report."*

Because NUREG-1801, Section XI.M17 states that the program uses the guidance in NSAC-202L, Revision 2 or Revision 3, an exception is added to the RBS Flow-Accelerated Corrosion Program description.

The changes to LRA Table B-3 and Section B.1.21 follow with additions underlined and deletions lined through.

Table B-3
RBS Program Consistency with NUREG-1801

Program Name	Plant-Specific	NUREG-1801 Comparison	
		Program has Enhancements	Program has Exceptions to NUREG-1801
Flow-Accelerated Corrosion [B.1.21]		X	X

B.1.21 Flow-Accelerated Corrosion

Exceptions to NUREG-1801

None

The Flow-Accelerated Corrosion Program has the following exception.

Element Affected	Exception
1. Scope of Program 4. Detection of Aging Effects 5. Monitoring and Trending 6. Acceptance Criteria	The Flow-Accelerated Corrosion Program described in Section XI.M17 of NUREG-1801 relies on implementation of the Electric Power Research Institute (EPRI) guidelines in Nuclear Safety Analysis Center (NSAC)-202L-R2 or -R3 for an effective flow-accelerated corrosion program. The RBS Flow-Accelerated Corrosion Program is based on NSAC-202L-R4.[1]

Basis for Exception

1. EPRI periodically revises NSAC-202L to update flow-accelerated corrosion program recommendations with the experience of members of the CHECWORKS Users Group (CHUG), and recent developments in detection, modeling, and mitigation technology. These recommendations refine and enhance those of earlier versions and ensure the continuity of existing flow-accelerated corrosion programs. The technical changes in NSAC-202L-R4 represent improvements in the management of flow-accelerated corrosion and ensure that the main objective of flow-accelerated corrosion programs, which is to manage wall thinning, is maintained. Use of NSAC-202L-R4 for Flow-Accelerated Corrosion Program guidance has been deemed acceptable in NUREG-2205, "Safety Evaluation Report Related to the License Renewal of LaSalle County Station Units 1 and 2," and in NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report."

<u>Question</u>
B.1.21-2 Supplemental Information (RAI Set 9 Flow Accelerated Corrosion)

Reference
Set 9 response submitted on March 8, 2018 (ML18067A437)

<u>Background</u>
For the "detection of aging effects" program element, Section 4.8 of RBS EP 15 00007 cites procedure EN-DC-315, "Flow-Accelerated Corrosion [FAC] Program," as the basis for being consistent with the GALL Report AMP XI.M17. Procedure EN-DC-315 states that specific software programs (i.e., "CHECWORKS" and "FAC Manager Web Edition") shall be used in determining the remaining component life. Based on discussions during the AMP Audit breakout session, both software programs are classified as Level C, which does not require verification/validation activities. GALL Report AMP XI.M17 states that the FAC program is described in NSAC-202L and that components are suitable for continued service if the predicted wall thickness at the next scheduled inspection is greater than or equal to the minimum allowable wall thickness. NSAC-202L, Section 2, "Elements of an Effective FAC Program," provides recommendations for ensuring that appropriate quality assurance is applied, including properly documenting work. Entergy report EC-0000072133, "RF-19 Post-Outage Report," includes a signed output sheet from FAC Manager, which contains wall thickness data and the measured wear rate from each inspection.

<u>Issue</u>
For safety-related components, it is not clear to the staff that the remaining component life is being properly determined because the wear rate values are taken from Level C software (i.e., "CHECWORKS" and "FAC Manager Web Edition"), which does not require validation and verification activities. Although the FAC Manager output sheets are signed as prepared and verified, the determination of the wear rate values cannot be independently verified based on the information provided.

<u>Request</u>
Provide additional information to show that appropriate quality assurance has been applied to the calculated wear rates used in the determination of the schedule for inspection of safety-related components.

<u>Response</u>

A previous response to RAI B.1.21-2 was submitted in letter RBG-47834, dated March 8, 2018. The following response is the same as the response in letter RBG-47834 except additional information regarding software verification testing, validation, and error reporting has been provided. The following response supersedes the previous response submitted in letter RBG-47834. The locations of changes are indicated by revision bars.

CHECWORKS and FAC Manager Web Edition (FMWE) are Level C software which is used for day-to-day support activities and whose loss or failure would not affect the immediate ability to operate the plant but could threaten the plant's long-term ability to operate. The Level C classification is appropriate because the software is not embedded in or integral to a safety-related (SR) structure, system or component (SSC), is not utilized in the design process of SR SSCs, is not embedded in or an integral part of a non-safety related (NSR) SSC used to support or maintain an important to safety SSC (e.g. surveillance, calibration, post-maintenance test), is not used to determine Technical Specification, NRC regulation/commitments or 10CFR50 compliance, and is not used to calibrate or maintain maintenance and test equipment (M&TE) used on safety-related or Technical Specification SSCs.

The Entergy software quality control procedure, EN-IT-104, requires software testing for new or revised Level C software to ensure that a software product is correct. For purchased software, the vendor is typically responsible for performing this verification testing, which *"shall be thorough enough to verify the new software or revision, and to ensure existing software requirements have not been adversely affected."* The CHECWORKS code was developed and is maintained in accordance with the quality assurance policies of EPRI, which require a formal software plan and detailed program documentation. These policies also mandate that a list of program bugs be maintained. The FMWE code was developed and is maintained in accordance with the quality assurance policies of Altran, which also require a formal testing plan, detailed program documentation, and a list of program bugs.

EN-IT-104 also requires Entergy to perform validation for Level C software. Validation is the final testing activity and ensures that the software installation and integration into the production environment is successful. The installation is performed in accordance with a documented plan or vendor instructions which may include sample program inputs and outputs for use in verifying installation. In accordance with the EN-IT-104, each time CHECWORKS is revised, FAC personnel validate the revised software using test cases and test databases before the software is placed in production mode. The validation tests provide the appropriate quality assurance to ensure that component wear, wear rate, predicted thickness, and remaining service life are calculated consistently with NSAC-202L. Because FMWE is a web-based application, Entergy has a contract with the supplier (Altran) for validation and verification. Under this contract, test plans, scripts, and results are created, performed and recorded for every release. Prior to completion, all items associated with the release are independently prepared, verified, and approved via the test plans. Under the Altran 10 CFR 50 Appendix B quality assurance program, independent results verification is performed for all work. The Altran validation and verification provide the appropriate quality assurance to ensure that component wear, wear rate, predicted thickness, and remaining service life are calculated consistently with NSAC-202L.

An enhancement is added to the FAC program to revise procedures to ensure that error reporting, while not specified for Level C software, continues to be performed for RBS FAC software during the period of extended operation.

Predictive model CHECWORKS is just one of the tools used to determine inspection eligibility and priority. Selection of inspection locations for an outage is based on the following factors.

- previous inspection results
- CHECWORKS susceptibility ranking
- industry and plant-specific operating experience
- components selected to calibrate CHECWORKS
- components subject to off normal flow conditions, such as caused by a leaking valve
- susceptible non-modeled small bore piping that has not been inspected

Measurement of actual wall thickness during inspections is the primary tool used in the FAC Program to determine component wear. The measured wall thickness is used to determine wear rates, predicted thickness, and remaining service life in FAC Manager Web Edition (FMWE) according to the following steps.

- Initial thickness of a component is determined by ultrasonic inspection prior to the component being placed in service or in the first ultrasonic inspection during its service life. If an examination has not previously been performed on the component, the initial thickness is determined by reviewing the initial ultrasonic data for that component. The area of maximum wall thickness within the same region as the worn area is identified. If the thickness is greater than the nominal component wall thickness, the maximum wall thickness within the relevant area is used as the initial thickness. If that thickness is less than the nominal wall thickness, the nominal wall thickness is used as the initial thickness.
- The projected wear rate is calculated by dividing the wear by the time between measurements or the time between when the component was placed in service and the time of the measurement. Wear is the amount of material removed or lost from a components wall thickness since baseline or subsequent to being placed in service and time is the actual plant operating hours, although calendar hours may be used for conservatism.
- The remaining service life (RSL) is determined by subtracting the minimum acceptable wall thickness from the actual measured wall thickness, then dividing by the wear rate times a safety factor of 1.1.
- If the RSL of a component is greater than or equal to the number of hours in the next operating cycle, the component may be returned to service. If the component's RSL is greater than the number of hours in the next operating cycle but is less than the number of hours in the next two operating cycles, the component should be considered for re-inspection, repair or replacement during the next scheduled outage. If the component is acceptable for continued service, it shall be re-examined before, or during the cycle during which it is projected to wear to the minimum acceptable wall thickness.

Evaluation of wear rates, predicted thickness, and remaining service life is documented and reviewed by qualified FAC personnel or designated personnel qualified in accordance with the engineering calculation process. Therefore, appropriate quality assurance is applied to the calculated wear rates used in the determination of the schedule for inspection of safety-related components.

Changes to LRA Appendix A and Appendix B are identified below, with additions underlined.

A.1.21 Flow-Accelerated Corrosion

The FAC Program will be enhanced as follows.

- Revise FAC Program procedures to manage wall thinning due to erosion mechanisms such as cavitation, flashing, liquid droplet impingement, and solid particle impingement.

- Revise FAC Program procedures to include susceptible locations based on the extent-of-condition reviews in response to plant-specific or industry operating experience.

- Revise FAC Program procedures to (1) evaluate wall thinning due to erosion from cavitation, flashing, liquid droplet impingement, and solid particle impingement when determining a replacement type of material, and (2) ensure piping and components replaced with FAC-resistant material and subject to erosive conditions are not excluded from inspections until effectiveness of piping replacement or other corrective action has been confirmed.

- Revise procedures to ensure that error reporting continues to be performed for RBS FAC software during the period of extended operation.

B.1.21 Flow-Accelerated Corrosion

The following enhancements will be implemented prior to the period of extended operation.

Element Affected	Enhancement
1. Scope of Program	Revise FAC Program procedures to manage wall thinning due to erosion mechanisms such as cavitation, flashing, liquid droplet impingement, and solid particle impingement.
4. Detection of Aging Effects	Revise FAC Program procedures to include susceptible locations based on the extent-of-condition reviews in response to plant-specific or industry operating experience.
4. Detection of Aging Effects	Revise procedures to ensure that error reporting continues to be performed for RBS FAC software during the period of extended operation.
7. Corrective Actions	Revise FAC Program procedures to (1) evaluate wall thinning due to erosion from cavitation, flashing, liquid droplet impingement, and solid particle impingement when determining a replacement type of material, and (2) ensure piping and components replaced with FAC-resistant material and subject to erosive conditions are not excluded from inspections until effectiveness of piping replacement or other corrective action has been confirmed.

Question
B.1.40-2 Supplemental Information (RAI Set 9 Service Water)

Reference
Set 9 response submitted on March 8, 2018 (ML18067A437)

Background
For the "preventive actions" program element, Section 4.11 of RBS-EP-15-00007 states that corrosion products are insignificant due to the water treatment for the normal service water system; therefore, periodic flushing was not identified as part of RBS' response to GL 89-13 and is not performed by the Service Water Integrity program. RBS' initial response, dated February 2, 1990, for GL 89-13 Action Item I discusses the need to verify flow in portions of infrequently used cooling loops in the service water system.

Several plant-specific condition reports (e.g., CR-RBS-2008-03885, CR-RBS-2011-03700, CR-RBS-2011-08119, CR-RBS-2012-01217, CR-RBS-2014-05562, and CR-RBS-2017-01659) document high differential pressures across the normal service water inlet strainers to the service water cooling heat exchangers. CR-RBS-2012-01217 states that the preventive maintenance frequency to clean the strainers needs to be updated to prevent excessive clogging and that the debris found in the strainer appears to be mostly rust particles.

Issue
Based on the plant-specific condition reports over several years, periodic high differential pressures across strainers, with the debris in some instances consisting mostly of rust particles, indicates that more than a minimal amount of corrosion products exist in the system. In addition, the existence of a preventive maintenance activity to clean the strainer indicates that some level of fouling is ongoing in the system. It is not clear to the staff that corrosion products are insignificant due to the water treatment in the normal service water system. Consequently, flushing of infrequently used cooling loops may be warranted.

Request
Provide additional information to support the current Service Water Integrity program's lack of preventive actions, such as periodic flushing, based on the plant-specific condition reports over several years with high differential pressures across strainers in the system.

Response

A previous response to RAI B.1.40-2 was submitted by letter RBG-47834, dated March 8, 2018. Due to subsequent discussion between NRC and Entergy personnel, the response is revised, superseding the previous response in letter RBG-47834. The locations of changes are indicated with revision bars.

Generic Letter 89-13 required for open-loop service water systems that sites implement and maintain an ongoing program of surveillance and control techniques to significantly reduce the incidence of flow blockage problems as a result of biofouling. The RBS normal service water system was originally an open-loop system using raw water. This configuration was modified to a closed-loop system using demineralized water in the early 1990s, which eliminated the biofouling and greatly reduced the corrosion rates of components in the normal service water system.

Because the normal service water system is in service during plant operation, the service water cooling heat exchanger inlet strainers screen a large volume of water. The strainers have small 3/32-inch diameter holes. Rust in the strainer debris may have been formed during operation prior to modification of the system configuration. Small amounts of this rust can occasionally be dislodged by flow and be collected as designed in the strainers. The strainers are routinely monitored for differential pressure, and operators back flush them as needed. The back flushing activity may not eliminate all trapped material, so the full margin to the alarm setpoint is sometimes not restored until the strainer is disassembled and cleaned. The discussion of strainer performance in the corrective actions of CR-RBS-2012-01217 stated that the strainer last required removal and cleaning in 2000. The buildup was gradual enough that the differential pressure across the strainers could be monitored and cleaning scheduled before there was an adverse impact on system performance. The gradual increase in strainer differential pressure documented in these condition reports does not represent a concern with the water chemistry control that would indicate a need for periodic flushing of infrequently used cooling loops.

RBS has had experience with normal service water drain lines that were plugged when draining was performed. When chemically cleaning the system following its conversion to a closed-loop system, many drains were not flushed because the drain flow path is required only to support maintenance. Therefore, the drain plugging that was identified in the operating experience does not indicate a concern with the normal service water quality.

The water quality of the closed-loop normal service water system is controlled to minimize scaling, corrosion, and biological fouling. This is accomplished by injecting chemicals, including corrosion inhibitors and a biocide, into the system. Water treatment with dispersants maintains solids in solution, eliminating deposition onto metal surfaces. The service water surge tank has a nitrogen overpressure to prevent oxygen ingress. Biofouling organisms, corrosion products, debris and silt are insignificant due to the water treatment used in the system. The normal service water system is equipped with a corrosion coupon rack to monitor and trend corrosion rates of various system materials. The corrosion coupon rack is designed to simulate various piping and components in the system, operating at various flow rates and temperatures. The corrosion coupon monitoring results are all well within the limits established for the service water system and indicate good control of closed cooling water system chemistry. Therefore, periodic flushing of infrequently used cooling loops of this demineralized water system was not included in the RBS response to NRC GL 89-13 and is not necessary to manage the effects of aging on the RBS service water system.

Operation of the RBS normal service water system is consistent with the conditions evaluated in NUREG-1801, Section XI.M21A. Program Element 3, Parameters Monitored/Inspected, states, "For closed-cycle cooling water systems as defined by Generic Letter 89-13, EPRI 1007820 is used." Section 2 of EPRI 1007820, "Closed Cooling Water Chemistry Guideline," includes this definition of a closed loop: "A closed system has also been defined as 'one in which the water is circulated in a closed loop with negligible evaporation or exposure to the atmosphere.'" Section 2 also identifies in the following statement that the RBS system operating mode is one that was considered in developing the guideline.

> There is also at least one nuclear plant with a hybrid design that operates as a closed loop only during normal operation. Under emergency or shutdown conditions, the flow is diverted through an open recirculating cooling tower.

The RBS system operation is consistent with this closed cooling water operation described in the EPRI report to which NUREG-1801, Section XI.M21A, refers for program guidance. The RBS update to the GL 89-13 response, dated October 28, 1998, identified that the normal service water system was converted to a closed-loop system. The RBS normal service water is operated in its closed-loop mode greater than approximately 99 percent of the time. The use of raw water from the standby service water basin during outages does not represent a significant contamination source because the standby cooling tower basin is treated, monitored and periodically cleaned. The makeup source for the basin is water from a deep well; not raw water from a lake or river. Also, the vacuum breaker solenoids on the service water system are opened for less than one minute to introduce air into the system only during testing of the standby service water system during refueling outages. Following this refueling outage testing, corrosion inhibitor chemistry concentrations are normally returned to within specifications in less than 24 hours.

In response to discussions with inspectors during the NRC regional inspection, RBS is adding ongoing inspections of service water heat exchangers to license renewal commitments. The LRA changes identified below will add these inspections to the Periodic Surveillance and Preventive Maintenance Program. These additions include the safety-related service water heat exchangers that credit the Water Chemistry Control – Closed Loop Cooling Water Program. The inspections will check for fouling that could cause flow blockage. Even though the RBS system operation is consistent with the operating modes considered in development of the EPRI guidelines discussed above, the added heat exchanger inspections provide additional assurance that fouling that could cause flow blockage is not occurring in the RBS normal service water system.

The changes to LRA Section 3.3.2.1.14, Table 3.3.1, Table 3.3.2-10, Table 3.3.2-11, Table 3.3.2-14, and Sections A.1.34 and B.1.34 follow with additions underlined.

Add to **Section 3.3.2.1.14, Chilled Water System**:

Aging Management Programs

The following aging management programs manage the aging effects for the chilled water system components.

- Bolting Integrity
- Coating Integrity
- External Surfaces Monitoring
- Internal Surfaces in Miscellaneous Piping and Ducting Components
- Oil Analysis
- One-Time Inspection
- <u>Periodic Surveillance and Preventive Maintenance</u>
- Water Chemistry Control – Closed Treated Water Systems

Revise LRA Table 3.3.1 as follows:

Table 3.3.1: Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-50	Stainless steel, copper alloy, steel heat exchanger tubes exposed to closed-cycle cooling water	Reduction of heat transfer due to fouling	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801 for most components. Reduction of heat transfer of stainless steel and copper alloy heat exchanger tubes exposed to closed-cycle cooling water is managed by the Water Chemistry Control – Closed Treated Water Systems Program and the Periodic Surveillance and Preventive Maintenance Program. In the portions of the RBS service water system covered by NRC GL 89-13, reduction of heat transfer is managed by the Service Water Integrity Program. There are no steel heat exchanger tubes exposed to closed-cycle cooling water in the scope of license renewal.

Add new row to LRA Table 3.3.2-10 as follows:

Table 3.3.2-10: Standby Diesel Generator System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Heat exchanger (tubes)	Heat transfer	Copper alloy	Treated water (int)	Reduction of heat transfer	Periodic Surveillance and Preventive Maintenance	VII.C2.AP-205	3.3.1-50	E

Add new row to LRA Table 3.3.2-11 as follows:

Table 3.3.2-11: HPCS Diesel Generator System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Heat exchanger (tubes)	Heat transfer	Copper alloy > 15% zinc (inhibited)	Treated water (int)	Reduction of heat transfer	Periodic Surveillance and Preventive Maintenance	VII.C2.AP-205	3.3.1-50	E

Add new row to LRA Table 3.3.2-14 as follows:

Table 3.3.2-14: Chilled Water System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Heat exchanger (tubes)	Heat transfer	Copper alloy	Treated water (int)	Reduction of heat transfer	Periodic Surveillance and Preventive Maintenance	VII.C2.AP-205	3.3.1-50	E

Revise LRA **Appendix A.1.34, Periodic Surveillance and Preventive Maintenance Program**, to add the following to the end of the list:

- Inspect the following heat exchanger surfaces exposed to normal service water for fouling and flow blockage:
  - EGT-E1A, B standby diesel generator jacket water coolers, at a frequency of once per ten years.
  - E22-ES001, HPCS diesel generator system, at a frequency of once per twelve years.
  - HVK-CHL1A, B, C. D, control building chillers, at a frequency of once per six years.

Add the following to the end of existing table in LRA **Section B.1.34, Periodic Surveillance and Preventive Maintenance Program**:

EGT-E1A, B standby diesel generator jacket water coolers	At a frequency of once per ten years, inspect the heat exchanger surfaces exposed to service water for fouling and flow blockage.
E22-ES001 high pressure core spray diesel generator heat exchanger	At a frequency of once per twelve years, inspect the heat exchanger surfaces exposed to service water for fouling and flow blockage.
HVK-CHL1A, B, C. D control building chillers	At a frequency of once per six years, inspect the heat exchanger surfaces exposed to service water for fouling and flow blockage.

Revise **LRA Section B.1.34, Section 4, "Detection of Aging Effects,"** as follows:

This program is credited with managing cracking, loss of material, reduction of heat transfer, and change in material properties for components fabricated from aluminum, stainless steel, carbon steel, copper alloy, and elastomers in environments of treated water (closed loop system), exhaust gas, lube oil, raw water, and waste water.

Question
B.1.40-5 Supplemental Information (RAI Set 9 Service Water)

Reference
Set 9 response submitted on March 8, 2018 (ML18067A437)

Background
LRA Table 3.5.2-2, "Water-Control Structures," indicates that the cooling tower tile fill for both the standby service water and the service water cooling systems do not have aging affects requiring management and, consequently, do not need an aging management program. Plant-specific operating experience report CR-RBS-2008-05043 discusses broken pieces of cooling tower fill material in the collector pots of the circulating water system. During the aging management program audit, RBS personnel stated that the circulating water system cooling tower fill is similar to the standby service water fill material in LRA Table 3.5.2-2. In addition, CR-RBS-2006-03376 discusses the failure of the fill material support members in the service water cooling system cooling tower Cell D that resulted in approximately 30 percent of the fill material falling into the associated cooling tower basin. According to the condition report, a contributing factor of the failure was an overload condition caused by fouling of the fill material. Several corrective actions from this condition report included the development of a periodic fill inspection program.

Issue
Based on plant-specific operating experience reports CR-RBS-2006-03376 and CR-RBS-2008-05043, documenting degradation of the fill material (either cracking or fouling that leads to an increase in weight), it is not clear to the staff why there are no aging effects requiring management for the fill material in the cooling towers for the standby service water and service water cooling systems.

Request
Given the plant-specific operating experience described in CR-RBS-2006-03376 and CR-RBS-2008-05043, associated with the fill material in the cooling towers, state the basis for why there are no applicable aging effects. Alternatively, state how the LRA will be revised to address the applicable aging effects.

Response
RBS previously responded to RAI B.1.40-5 by letter dated March 8, 2018 (RBG-47834). The response to RAI B.1.40-5 is supplemented to include additional clarifications discussed with the NRC during public telephone conference calls held on April 10, 2018 and May 3, 2018. The locations of changes to the previous response of March 8 are marked with revision bars.

The cooling tower fill material identified in CR-RBS-2008-05043 is associated with the circulating water cooling towers, which are not subject to aging management review.

During the aging management program audit, Entergy personnel stated that the circulating water system (CWS) cooling tower fill is similar to the standby service water (SSW) cooling tower fill. This was based on information provided in license renewal application (LRA) line items from Table 3.5.2-2. However, after additional review, it was determined that the SSW fill material is not similar to that of the CWS fill material and that the response was intended to state that the CWS tower fill material was similar to the service water cooling (SWC) tower fill material. Entergy has modified the line items for cooling tower fill in LRA Table 3.5.2-2 to indicate the different fill materials of the two cooling towers that are subject to aging management review for license renewal.

The service water cooling (SWC) tower fill material is the subject of condition report CR-RBS-2006-03376. The cause of the fill material failure was not the effects of aging, but was a less than adequate design of the fill support systems. The failure was not in the fill material. According to the apparent cause evaluation, the fill fell due to failure of the fiber-reinforced plastic (FRP) bearing plate supporting the fill support beam. This bearing plate design has been replaced with a stainless steel design. Additionally, a thicker FRP support beam design was incorporated into the fill support system.

A contributing cause identified in the evaluation under CR-RBS-2006-03376 was an increase in the weight of the fill material due to fouling. However, the increased weight would not have caused the failure if the fill support system design had been adequate. Nevertheless, River Bend Station license renewal application Section 3.5.2.1.2 and Table 3.5.2-2 are revised to show fouling as an aging effect for fill material and to indicate that the Structures Monitoring Program will manage the aging effect.

The cause for the fill material being in the CWS tower basin was not identified in the condition report. Because the CWS cooling tower fill degradation was not deemed significant, corrective action program procedures did not require a cause determination for the as-found condition. As such, the cause for the material being found in the CWS tower basin cannot be determined. However, no additional fill material has been found in the CWS tower basin. In addition, review of inspection results for the SWC tower did not identify degradation of fill material. Inspection results for the SWC tower have shown that the SWC tower fill material remains acceptable. RBS operating experience has not indicated additional aging effects requiring management for the SWC tower fill material identified in LRA Table 3.5.2-2.

The following additional requests were discussed with the NRC staff during public telephone conference calls held on April 10, 2018 and May 3, 2018.

<u>Request</u>

1) Provide information to establish that the aging effects identified for the fill material in the circulating water cooling tower fill are not applicable to the fill material in the standby service water cooling tower.

2) Clarify how the visual inspections conducted by the Structures Monitoring Program will adequately manage the increase in weight due to fouling of the cooling tower fill material. Include information to establish that the related conditions and operating experience at the plant are bounded by the conditions and operating experience for which the Structures Monitoring Program was evaluated.

<u>Response</u>

1. River Bend Station (RBS) has determined through review of site documentation (e.g., specifications, drawings) that the conditions identified in RBS condition report CR-RBS-2008-05043 for the circulating water system (CWS) cooling tower fill material are not applicable to the standby service water (SSW) cooling tower fill material and its support system. The design of the SSW cooling tower fill support system is not the same as the design of the fill support system of the CWS cooling tower. The fill material of the SSW cooling tower is vitrified clay tile with fill support lintels made from cast iron material. Additionally, these components are seismically supported on reinforced concrete beams and columns. The CWS tower fill material is polyvinyl chloride (PVC) supported on concrete fill beams that are adequately sized and spaced to prevent sagging of the fill material. It is not designed to withstand a seismic event. The design of the SSW cooling tower fill support system is robust and the tower operates for only approximately 1% or less of the time for normal operational testing during refueling outages. Improved water chemistry controls have also been instituted, which reduces the potential for fouling.

2. The RBS license renewal application (LRA) program A.1.41 “Structures Monitoring Program” (SMP) will be revised to include periodic visual examinations that can identify fouling, if any, of the fill material. The SMP will be enhanced to include ongoing monitoring activities for the SWC tower fill material. This additional monitoring includes periodic visual examination of a sample coupon of similar material placed in the SWC cooling tower in an area that is subject to the same environment as the fill material. The SMP will assess the condition of the sample material to determine if fouling of the fill material is occurring. The acceptance criteria will be the absence of fouling due to biological growth on the surface of the fill material.

Visual examination results that identify fouling will be entered into the corrective action program. RBS personnel will evaluate the as-found condition and determine the need for additional corrective actions, if any. Supplemental visual examination or analysis of fouling will be conducted, as necessary, to determine if the fouling could degrade the fill support system.

Monitoring the SWC cooling tower fill through inspection of the sample coupon will be performed at a frequency of once every five years, as defined above and in the enhancement. Based upon the redesign of the SWC cooling tower fill material support system and improved water chemistry, failure of the fill material due to fouling is not expected. The Structures Monitoring Program with enhancements will adequately manage fouling by visual inspection of the SWC cooling tower fill material such that it can be identified and corrected prior to a loss of function.

LRA revisions follow. Additions are underlined and deletions are lined through.

3.5.2.1.2 Water-Control Structures

Aging Effects Requiring Management

The following aging effects associated with water-control structure components require management.

- Cracking
- Cracking and distortion
- Fouling
- Increase in porosity and permeability
- Loss of bond
- Loss of material
- Loss of strength

Table 3.5.2-2: Water-Control Structures

Structure and/or Component or Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Cooling tower tile fill (SSW ~~and SWC~~ cooling tower)	HS, SNS	Ceramic and clay tile	Exposed to fluid environment	~~None~~ Fouling	~~None~~ Structures Monitoring	--	--	J
Cooling tower tile fill (~~SSW and~~ SWC cooling tower)	HS, SNS	Polyvinyl chloride	Exposed to fluid environment	~~None~~ Fouling	~~None~~ Structures Monitoring	--	--	J

A.1.41 Structures Monitoring

The Structures Monitoring Program will be enhanced as follows.

- Revise plant procedures to include inspections of the service water cooling system cooling tower fill material. A sample coupon of similar material shall be provided that will indicate potential fouling. The periodic visual inspection at a frequency of once every five years is intended to detect whether fouling is occurring.
- Acceptance criteria for the inspection of cooling tower fill will be the absence of fouling.
- Conditions of cooling tower fill that do not meet the acceptance criteria will be entered into the corrective action program for evaluation.

B.1.41 Structures Monitoring

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Element Affected	Enhancement
4. Detection of Aging Effects	Revise plant procedures to include the following: • Visual inspection of elastomeric material should be supplemented by feel or touch to detect hardening if the intended function of the elastomeric material is suspect. Include instructions to augment the visual examination of elastomeric material with physical manipulation of at least 10 percent of available surface area. • Inspection of submerged structures at the same inspection interval and limitations as the other structures in the program. • Sampling and chemical analysis of ground water at least once every five years. The program owner will review the results and evaluate any anomalies and perform trending of the results. • Revise plant procedures to include inspections of the service water cooling system cooling tower fill material. A sample coupon of similar material shall be provided that will indicate potential fouling. The periodic visual inspection at a frequency of once every five years is intended to detect whether fouling is occurring.

Element Affected	Enhancement
6. Acceptance Criteria	Acceptance criteria for the inspections of cooling tower fill will be the absence of fouling.
7. Corrective Actions	Conditions of cooling tower fill that do not meet the acceptance criteria will be entered into the corrective action program for evaluation.

Question
B.1.43-2 Supplemental Information (RAI Set 9 Closed Treated Water Systems)

Reference
Set 9 response submitted on March 8, 2018 (ML18067A437)

Background
For the "detection of aging effects" program element, Section 4.13 of RBS-EP-15-00007 states that the Water Chemistry – Closed Treated Water Systems program manages the effects of aging in an environment of treated water. For the vacuum release accumulators in LRA Table 3.3.2-3 (TK1A and TK1B on drawing PID-09-10F), the internal environment is listed as treated water with the aging management program listed as Water Chemistry Control – Closed Treated Water Systems.

Issue
Based on the information shown on drawing PID-09-10F, "System 118 Service Water Normal," the accumulators and portions of the associated piping do not appear to have an internal environment of treated water because these components are supplied by the compressed air system. It is not clear to the staff whether these components have a treated water internal environment and whether the aging affects for these components will be managed by the Water Chemistry Control – Closed Treated Water Systems program as listed in LRA Table 3.3.2-3.

In addition, based on information in Standby Service Water Quarterly Valve Operability Test procedures (STP-256-6305 and STP-256-6306 for valves SOV-522A, B, C, D and SOV-523A, B, C, D), air is periodically introduced into portions of the piping as part of the vacuum release solenoid valve function verification. Based on the piping configurations in various isometric drawings, it appears that air cannot be vented in some portions of the associated piping, between the check valves and the treated water source. Consequently, there will be an air water interface in a portion of the pipe, with the air being periodically replenished, similar to the situation in NRC Information Notice 2013 06, "Corrosion in Fire Protection Piping Due to Air and Water Interaction." It is not clear to the staff that the Water Chemistry Control – Closed Treated Water Systems program activities account for this situation.

Request
1. Clarify the information provided in LRA Table 3.3.2-3 (TK1A and TK1B on drawing PID-09-10F), with regard to the internal environment of the vacuum release accumulators and portions of the associated piping, and whether aging effects of these components will be managed by the Water Chemistry Control – Closed Treated Water Systems program.
2. Provide additional information to show that the activities in the Water Chemistry Control – Closed Treated Water Systems adequately account for the potential air-water interface in the portions of the piping that cannot be vented between the check valves and the treated water source (associated with SOV-522A, B, C, D, and SOV 523A, B, C, D).

Response

A previous response to RAI B.1.43-2 was submitted in letter RBG-47834, dated March 8, 2018. The following response is the same as the response in letter RBG-47834 except additional information has been provided regarding auxiliary building vacuum release components exposed to an indoor air internal environment. The SWP prefix was also added to valve numbers where appropriate. The following response supersedes the previous response submitted in letter RBG-47834. The locations of changes to the previous response are marked with revision bars.

1. LRA Table 3.3.2-3 vacuum release accumulators (TK1A and TK1B on drawing PID-09-10F) contain instrument air. The LRA is revised to identify that the Compressed Air Monitoring Program manages the aging effects for the internal surfaces of the vacuum release accumulators and associated piping.

2. Normally closed valves SWP-SOV-522A, B, C, and D are located downstream of the two instrument air accumulators. If necessary, the service water system in the containment relies on this instrument air to release a vacuum in the system piping.

   Normally closed valves SWP-SOV-523A, B, C, and D are not associated with accumulators containing instrument air. If necessary to release system vacuum, the valves open to admit air from the auxiliary building into the service water system.

   The RAI Issue discussion refers to NRC Information Notice 2013-06, "Corrosion in Fire Protection Piping Due to Air and Water Interaction". This information notice discusses fire water systems which may contain highly oxygenated, raw, untreated water. The RBS service water system contains demineralized water treated with sodium nitrite and molybdate as corrosion inhibitors. Because of this piping internal environment, significant corrosion is not expected.

   To confirm the insignificance of corrosion in the subject piping, inspections will verify that unacceptable degradation is not occurring. For the portions of the containment piping that cannot be vented between the check valves and the treated water source, the One-Time Inspection Program will perform a volumetric inspection of a piping segment associated with SWP-SOV-522A, B, C, or D.

   For the portions of the auxiliary building piping that cannot be vented between the check valves and the treated water source, the One-Time Inspection Program will perform a volumetric inspection of a piping segment associated with SWP-SOV-523A, B, C, or D.

   In addition, auxiliary building piping and valves on the outboard side of the check valves include safety-related and nonsafety-related components. Normally closed safety-related valves SWP-SOV-523A, B, C, and D have stainless steel valve bodies. A line item is added to LRA Table 3.3.2-3 for the stainless steel valve bodies exposed to an air-indoor internal environment. In addition, a line item is added for the safety-related carbon steel piping between the solenoid and check valves, which is exposed to an air-indoor internal environment. The associated aging management program is the Internal Surfaces in Miscellaneous Piping and Ducting Components Program.

   The nonsafety-related carbon steel piping outboard of valves SWP-SOV-523A, B, C, and D is evaluated in LRA Section 2.3.3.18, "Auxiliary Systems in Scope for 10 CFR 54.4(a)(2)." A line item is added to Table 3.3.2-18-11, "Service Water – Standby System, Nonsafety-Related Components Affecting Safety-Related Systems," to provide aging management review results for this piping.

The changes to LRA Table 3.3.1, the associated notes, Table 3.3.2-3, Table 3.3.2-18-11, and Sections A.1.32 and B.1.32 follow with additions underlined.

Table 3.3.1: Auxiliary Systems					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-45	Steel piping, piping components, and piping elements; tanks exposed to closed-cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801. Loss of material for steel components exposed to closed-cycle cooling water is managed by the Water Chemistry Control – Closed Treated Water Systems Program. <u>The One-Time Inspection Program will confirm the insignificance of corrosion for service water system containment and auxiliary building vacuum release piping that may have an air/water interface. The One-Time Inspection Program will use NDE techniques to inspect this piping for loss of material.</u>

Notes for Tables 3.3.2-1 through 3.3.2-18-26

Plant-Specific Notes

309. The One-Time Inspection Program will confirm the insignificance of corrosion for service water system containment and auxiliary building vacuum release piping that may have an air/water interface. The One-Time Inspection Program will use NDE techniques to inspect this piping for loss of material.

Table 3.3.2-3: Service Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Accumulator	Pressure boundary	Carbon steel	Condensation (int)	Loss of material	Compressed Air Monitoring	VII.D.A-26	3.3.1-55	B
Piping	Pressure boundary	Carbon steel	Condensation (int)	Loss of material	Compressed Air Monitoring	VII.D.A-26	3.3.1-55	B
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	One-Time Inspection	VII.C2.AP-202	3.3.1-45	A, 309
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	Internal Surfaces in Miscellaneous Piping and Ducting Components	V.B.E-25	3.2.1-44	C
Valve body	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	VII.J.AP-123	3.3.1.120	A

Table 3.3.2-18-11: Service Water – Standby System, Nonsafety-Related Components Affecting Safety-Related Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External Surfaces Monitoring	V.D2.E-29	3.2.1-44	E

A.1.32 One-Time Inspection

The program will include activities to verify effectiveness of aging management programs and activities to confirm the insignificance of aging effects as described below.

A representative sample of service water system containment and auxiliary building vacuum release piping that cannot be vented between the check valves and the treated water source.	One-time inspection will confirm that loss of material is not occurring or is occurring so slowly that the aging effect will not affect the component intended function during the period of extended operation.

Inspections will be performed within the 10 years prior to the period of extended operation.

B.1.32 ONE-TIME INSPECTION

The program will include activities to verify effectiveness of aging management programs and activities to confirm the insignificance of aging effects as described below.

A representative sample of service water system containment and auxiliary building vacuum release piping that cannot be vented between the check valves and the treated water source.	One-time inspection will confirm that loss of material is not occurring or is occurring so slowly that the aging effect will not affect the component intended function during the period of extended operation.

Inspections will be performed within the 10 years prior to the period of extended operation.

Question

B.1.4-1 Supplemental Information (RAI Set 5 Buried Pipe and Tanks)

Reference

Set 5 Supplemental response submitted on April 4, 2018 (ML18094A137)

Background

The "preventive actions" program element of GALL Report AMP XI.M41, "Buried and Underground Piping and Tanks," as modified by LR-ISG-2015-01, "Changes to Buried and Underground Piping and Tank Recommendations," includes the following recommendations:

For buried stainless steel piping or tanks, coatings are provided based on the environmental conditions (e.g., stainless steel in chloride containing environments). Applicants provide justification when coatings are not provided.

Coatings are in accordance with Table 1 of NACE SP0169-2007 or Section 3.4 of NACE RP0285-2002 as well as the following coating types: asphalt/coal tar enamel, concrete, elastomeric polychloroprene, mastic (asphaltic), epoxy polyethylene, polypropylene, polyurethane, and zinc.

For buried steel, copper alloy, and aluminum alloy piping and tanks and underground steel and copper alloy piping and tanks, coatings are in accordance with Table 1 of NACE SP0169-2007 or Section 3.4 of NACE RP0285-2002.

GALL Report AMP XI.M41, as modified by LR-ISG-2015-01, Table XI.M41-2, "Inspection of Buried and Underground Piping and Tanks," recommends the following:

- In regard to the inspection quantities in Table XI.M41-2, the "detection of aging effects" program element states, "[a]dditional inspections, beyond those in Table XI.M41-2 may be appropriate if exceptions are taken to program element 2, "preventive actions," or in response to plant-specific operating experience."
- One inspection per 10-year interval for stainless steel piping (reference Table XI.M41-2).
- Use of Preventive Action Category F, the highest number of inspections category, for those portions of in-scope buried steel piping which cannot be classified as Category C, D, or E.

Issue

During the audit, the staff reviewed condition reports and plant-specific documents related to buried steel and stainless steel piping. The staff concluded the following:

- It is unclear whether all in-scope steel piping is coated.
- For at least portions of the stainless steel condensate makeup, storage, and transfer system piping, no coating was installed.
- Based on the availability of soil sample parameter results, it is not clear that the soil is noncorrosive because redox potential values and soil drainage assessments were not available, and based on the presence of sulfides, a significant corrosivity penalty is applied. In addition, particularly in regard to stainless steel piping, chloride values were not available.

Request

1. For steel piping:

a. State what type and whether coatings were specified to be applied to all in-scope steel buried piping. If the types of coatings are not consistent with the recommended coating types in AMP XI.M41, state the basis for their effectiveness at preventing aging effects for buried steel piping.

b. If coatings were not specified to be applied to all in-scope steel buried piping (in essence, an exception to AMP XI.M41 preventive actions), state which Preventive Action Category will be used for those portions of in-scope buried steel piping that were not specified to be coated. If Preventive Action Category F will not be used for those portions of in-scope buried steel piping that were not specified to be coated, state the basis for why additional inspections, beyond those in Table XI.M41-2, are not required to provide reasonable assurance that the piping will meet its intended function during the period of extended operation.

c. Provide sufficient data to demonstrate that for where in-scope steel piping is buried, the soil is not corrosive.

d. If the soil is corrosive or cannot be demonstrated to be noncorrosive; state which Preventive Action Category will be used for portions of the in-scope buried steel piping where the cathodic protection system is not meeting performance goals (i.e., operational time period, effectiveness). If Preventive Action Category F will not be used for those portions of in-scope buried steel piping where the cathodic protection system is not meeting performance goals, state the basis for why additional inspections, beyond those in Table XI.M41-2, are not required to provide reasonable assurance that the piping will meet its intended function during the period of extended operation.

2. For stainless steel piping:

a. State what type and whether coatings were specified to be applied to all in-scope stainless steel buried piping. If the types of coatings are not consistent with the recommended coating types in AMP XI.M41, state the basis for their effectiveness at preventing aging effects for buried stainless steel piping.

b. For portions of the in-scope buried stainless steel piping that are not coated (by design configuration or as detected during inspections), state how many inspections will be conducted per 10-year period and the basis for why the number of inspections will be adequate to manage associated aging effects.

<u>Response</u>

River Bend Station (RBS) previously responded to RAI B.1.4-1 by letters dated January 24, 2018 (RBG 47813) and April 4, 2018 (RBG-47850). The following is the response to RAI B.1.4-1 revised to include additional information requested by the NRC during a telephone conference call held on April 25, 2018. This revised response supersedes the previous response. The locations of changes to the previous response of April 4 are indicated with revision bars.

1.a. RBS design documents specify the application of coal tar epoxy coating to the buried steel piping in the systems that are within the scope of license renewal. A substitute coating of Tnemec HS 104 epoxy, which is a cycloaliphatic amine epoxy, is allowed by the specification for field-installed piping. Entergy believes that applications of the Tnemec coating are few, if any. While not included in the recommended coating types of AMP XI.M41, the Tnemec HS 104 does conform to the recommendations of American Water Works Association (AWWA) C210 "Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings" when installed in underground and underwater applications. It protects in immersion, salt spray and chemical exposures, and is applied in two coats at a minimum 6 mil dry film thickness each. It has superior abrasion resistance. As such it is an appropriate coating for preventing aging effects on steel piping.

b. Coatings were specified to be applied to all in-scope buried steel piping, and as such no further response is necessary for this question. A 2013 condition report documented one instance of buried steel piping that was discovered without protective coating. That piping ran from a drip pan under condensate transfer pumps to the condensate storage tank sump. The piping, which performs no license renewal intended function, had been installed in a 1986 plant modification that included inadequate directions for coating application. This condition is considered an isolated event and the modification process has been improved since 1986 to provide more specific installation instructions.

c. Site documentation is not adequate to demonstrate that the soil at the site is noncorrosive in accordance with the guidance in Table XI.M41-2.

d. Because the soil at the site has not been demonstrated noncorrosive, Preventive Action Category F of Appendix B of License Renewal Interim Staff Guidance LR-ISG-2015-01 will be used to determine the number of inspections for portions of the in-scope buried steel piping where the cathodic protection system is not meeting performance goals (i.e., operational time period, effectiveness) or where the piping is not protected by a cathodic protection system unless all the requirements for moving to another preventive action category are met. This provision is added to Appendix A, Section A.1.4 and Appendix B, Section B.1.4.

2.a. Site documentation specifies that buried stainless steel piping is coated with coal tar epoxy, consistent with the recommended coating types in AMP XI.M41, or a silicone-based material. The silicone material is specified as Thurmalox 70 or Carboline 4674 and is applied in two coats. These silicone-based coating materials are rated for use in high-temperature applications and provide an additional layer of protection from the soil environment. The Thurmalox coating provides protection from chloride-induced stress corrosion cracking by preventing chlorides in the environment from coming in contact with the surface. This includes buried stainless steel piping that is subject to aging management review for license renewal. LR-ISG-2015-01 recommends one inspection of stainless steel piping during each 10-year period commencing 10 years prior to the period of extended operation. In order to ensure the adequate management of the effects of aging on buried stainless steel piping with silicone-based coatings, RBS will perform an additional inspection of the stainless steel piping during each 10-year period unless the soil is demonstrated non-corrosive and the backfill is in accordance with the recommendations of LR-ISG-2015-01. The additional inspection will be performed on piping with a silicon-based coating. Inspections performed in 2012 and 2013 did not identify any corrosion of stainless steel piping with silicon-based coating after 30 years of service. This operating experience provides the basis for concluding that adding the additional inspection is appropriate for the conditions at RBS.

b. The stainless steel piping in a soil environment is specified to be coated. Entergy has identified no buried stainless steel piping subject to aging management review that was not coated prior to installation.

The changes to LRA Sections A.1.4 and B.1.4 follow with additions underlined and deletions lined through.

[The following revised LRA sections also reflect changes to the RAI response submitted on April 4, 2018.]

A.1.4 <u>Buried and Underground Piping and Tanks Inspection</u>

The Buried and Underground Piping and Tanks Inspection Program manages the effects of aging on external surfaces of buried piping components and tanks subject to aging management review. Components included in the program are fabricated from metallic materials. The program will manage loss of material and cracking through preventive and mitigative features (e.g., coatings, backfill quality, and cathodic protection) and periodic inspection activities during opportunistic and directed excavations. The number of inspections is based on the availability and effectiveness of preventive and mitigative actions as specified in Appendix B of License Renewal Interim Staff Guidance LR-ISG-2015-01. <u>In addition to the buried stainless steel piping inspection recommended by LR-ISG-2015-01, one additional inspection of buried stainless steel piping with silicon-based coating will be conducted during each 10-year period unless the soil is demonstrated non-corrosive and the backfill is in accordance with the recommendations of LR-ISG-2015-01.</u> Preventive Action Category F <u>of LR-ISG-2015-01</u> will be used in determining the number of inspections for portions of the in-scope buried steel piping where the cathodic protection system is not meeting performance goals (i.e., operational time period, effectiveness) or where the piping is not protected by a cathodic protection system unless <u>all</u> the <u>requirements for moving to another preventive action category are met</u> ~~soil is demonstrated to be noncorrosive~~. Annual cathodic protection surveys are conducted. For steel components, where the acceptance criteria for effectiveness of cathodic protection is other than -850 millivolts (mV) instant off, loss of material rates are measured.

B.1.4 BURIED AND UNDERGROUND PIPING AND TANKS INSPECTION

Program Description

The Buried and Underground Piping and Tanks Inspection Program is a new program that will manage the effects of aging on external surfaces of buried piping components and tanks subject to aging management review. Components included in the program are fabricated from metallic materials. The program will manage loss of material and cracking through preventive and mitigative features (e.g., coatings, backfill quality, and cathodic protection) and periodic inspection activities during opportunistic and directed excavations. The number of inspections is based on the availability and effectiveness of preventive and mitigative actions as specified in Appendix B of License Renewal Interim Staff Guidance LR-ISG-2015-01. In addition to the buried stainless steel piping inspection recommended by LR-ISG-2015-01, one additional inspection of buried stainless steel piping with silicon-based coating will be conducted during each 10-year period unless the soil is demonstrated non-corrosive and the backfill is in accordance with the recommendations of LR-ISG-2015-01. Preventive Action Category F of LR-ISG-2015-01 will be used in determining the number of inspections for portions of the in-scope buried steel piping where the cathodic protection system is not meeting performance goals (i.e., operational time period, effectiveness) or where the piping is not protected by a cathodic protection system unless all the requirements for moving to another preventive action category are met ~~soil is demonstrated to be noncorrosive~~. Annual cathodic protection surveys are conducted. For steel components, where the acceptance criteria for effectiveness of cathodic protection is other than -850 mV instant off, loss of material rates are measured.

RBG-47860

Enclosure 2

Commitments

This table identifies actions discussed in this letter that Entergy commits to perform. Any other actions discussed in this submittal are described for the NRC's information and are **not** commitments.

Changes to LRA Section A.4 follow with additions underlined.

A.4 LICENSE RENEWAL COMMITMENT LIST

No.	Program or Activity	Commitment	Implementation Schedule	Source (Letter Number)
4	Buried and Underground Piping and Tanks Inspection	Implement the Buried and Underground Piping and Tanks Inspection Program as described in LRA Section A.1.4.	Prior to February 28, 2025, or the end of the last refueling outage prior to August 29, 2025, whichever is later.	RBG-47735 RBG-47860
9	Diesel Fuel Monitoring	Enhance the Diesel Fuel Monitoring Program as described in LRA Section A.1.15.	Prior to February 28, 2025, or the end of the last refueling outage prior to August 29, 2025, whichever is later.	RBG-47735 RBG-47860
13	Flow-Accelerated Corrosion	Enhance the Flow-Accelerated Corrosion Program as described in LRA Section A.1.21.	Prior to February 28, 2025.	RBG-47735 RBG-47860
16	Internal Surfaces in Miscellaneous Piping and Ducting Components	Implement the Internal Surfaces in Miscellaneous Piping and Ducting Components Program as described in LRA Section A.1.25.	Prior to February 28, 2025.	RBG-47735 RBG-47860
22	One-Time Inspection	Implement the One-Time Inspection Program as described in LRA Section A.1.32.	Prior to February 28, 2025, or the end of the last refueling outage prior to August 29, 2025, whichever is later.	RBG-47735 RBG-47860
24	Periodic Surveillance and Preventive Maintenance	Enhance the PSPM Program as described in LRA Section A.1.34.	Prior to February 28, 2025, or the end of the last refueling outage prior to August 29, 2025, whichever is later.	RBG-47735 RBG-47846 RBG-47860
28	Structures Monitoring	Enhance the Structures Monitoring Program as described in LRA Section A.1.41.	Prior to February 28, 2025, or the end of the last refueling outage prior to August 29, 2025, whichever is later.	RBG-47735 RBG-47842 RBG-47860