## NRR-DMPSPEm Resource

**From:** Sayoc, Emmanuel
**Sent:** Wednesday, December 13, 2017 1:58 PM
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**Cc:** RidsNrrDmlr Resource; RidsNrrDmlrMrpb Resource; RidsNrrPMRiverBend Resource; RidsOgcMailCenter Resource; Wilson, George; Donoghue, Joseph; Wong, Albert; Billoch, Araceli; Iqbal, Naeem; Casto, Greg; Rogers, Bill; Burton, William; Alley, David; Martinez Navedo, Tania; Bailey, Stewart; Wittick, Brian; Ruffin, Steve; Bloom, Steven; Regner, Lisa; Turk, Sherwin; Sowa, Jeffrey; Parks, Brian; Pick, Greg; Kozal, Jason; Young, Cale; Young, Matt; Werner, Greg; McIntyre, David; Dricks, Victor; Moreno, Angel; Burnell, Scott; 'Broussard, Thomas Ray'; Lach, David J; SCHENK, TIMOTHY A; 'Coates, Alyson'; Min, Seung; Alley, David; Allik, Brian; Lopez, Juan; Prinaris, Andrew
**Subject:** FINAL REQUESTS FOR ADDITIONAL INFORMATION FOR THE SAFETY REVIEW OF THE RIVER BEND STATION LICENSE RENEWAL APPLICATION (CAC NO. MF9757) - SET 5
**Attachments:** RAI Set 5 Enclosure 12-13-2017.pdf

**Importance:** High

Docket No. 50-458

By letter dated May 25, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17153A282), Entergy Operations, Inc. (the applicant) submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants,” to renew the operating license NPF-47 for River Bend Station.

On December 8, 2017, the U.S Nuclear Regulatory Commission (NRC) staff sent Entergy Operations, Inc. the draft Requests for Additional Information (RAIs). Entergy Operations, Inc. subsequently informed the NRC staff that a clarification call was needed to discuss the information requested. The clarification call was held on December 12, 2017 between NRC staff and Entergy Operations, Inc. representatives, during which the subject information requests were discussed. The draft RAIs were modified based on these discussions. The final RAIs are enclosed.

David Lach of your staff agreed to provide a response to the final RAIs within 30 days of the date of this email. The NRC staff will be placing a copy of this email in the NRC’s Agencywide Documents Access and Management System.

Sincerely,

Emmanuel Sayoc, Project Manager
License Renewal Projects Branch (MRPB)
Division of Materials and License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-458

Enclosure:
As stated

| OFFICE | PM:MRPB:DMLR | BC:MRPB:DMLR | PM:MRPB:DMLR |
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| NAME | ESayoc | EOesterle | ESayoc |
| DATE | 12/13/2017 | 12/13/2017 | 12/13/2017 |

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**Subject:** FINAL REQUESTS FOR ADDITIONAL INFORMATION FOR THE SAFETY REVIEW OF THE RIVER BEND STATION LICENSE RENEWAL APPLICATION (CAC NO. MF9757) - SET 5
**Sent Date:** 12/13/2017 1:57:46 PM
**Received Date:** 12/13/2017 1:57:00 PM
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REQUEST FOR ADDITIONAL INFORMATION
LICENSE RENEWAL APPLICATION
RIVER BEND STATION, UNIT 1
DOCKET NO.: 50-458
CAC NO.: MF9757
Office of Nuclear Reactor Regulation
Division of Materials and License Renewal

Section 54.21(a)(3) of 10 CFR requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. As described in SRP LR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL Report, when the evaluation of the matter in the GALL Report applies to the plant.

**RAI B.1.4-1** (TRP 35 Buried Piping)

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.

**RAI B.1.4-2** (TRP 35 Buried Piping)

Background:

During the audit, the staff reviewed cathodic protection surveys which documented test station voltage readings ranging from approximately +0.1 to -1.9 volts direct current (VDC) relative to a copper/ copper sulfate reference electrode (CSE).

The “preventive actions” program element of GALL Report AMP XI.M41, as modified by LR-ISG-2015-01, states that to prevent damage to the coating or base metal, the limiting critical potential should not be more negative than -1200 millivolts (mV) relative to a CSE, instant-off.

The “detection of aging effects” program element of GALL Report AMP XI.M41, as modified by LR-ISG-2015-01, states that piping inspection locations are selected based on characteristics such as coating type, coating condition, cathodic protection efficacy, backfill characteristics, soil resistivity, pipe contents, and pipe function.

Issue:

The staff notes that cathodic protection efficacy (i.e., test station voltage readings more negative than -850 mV) is a characteristic that determines piping inspection location; however, it is unclear to the staff why exceeding the limiting critical potential (i.e., test station voltage readings more negative than -1200 mV) is not a characteristic that determines piping inspection location given that cathodic protection surveys have documented test station voltage readings as negative as -1900 mV relative to a CSE.

Request:

Provide a basis for why exceeding the limiting critical potential of -1,200 mV relative to a CSE did not result in damage to coatings or the base metal, or state the changes to the “detection of aging effects” program element necessary to include exceeding the limiting critical potential as a criterion when determining piping inspection locations.

**RAI B.1.4-3** (TRP 35 Buried Piping)

Background:

LRA Tables 3.3.2-3, “Service Water,” 3.3.2-7, “Fire Protection – Water,” 3.3.2-12, “Control Building HVAC,” and 3.3.2-17, “Fuel Oil,” state that loss of material will be managed for carbon steel bolting, fire hydrants, piping, tanks, and valve bodies exposed to soil.

GALL Report AMP XI.M41, as modified by LR-ISG-2015-01, states that steel components can experience stress corrosion cracking when exposed to a carbonate/bicarbonate environment depending on cathodic polarization level, temperature, and pH. This modification to GALL Report AMP XI.M.41 is based on the staff’s review of NACE SP0169-2013, “Control of External

Corrosion on Underground or Submerged Metallic Piping Systems," Figure 2, "SCC [stress corrosion cracking] Range of Pipe Steel in Carbonate/Bicarbonate Environments."

During the audit, the staff reviewed results from soil corrosivity testing and cathodic protection surveys, which documented: (a) soil carbonate concentrations ranging from 60 to 150 milligrams per liter; (b) soil pH ranging from 6 to 7; and (c) test station voltage readings ranging from approximately +0.1 to -1.9 VDC relative to a CSE.

Issue:

The LRA does not address cracking of steel exposed to soil, which can occur in a carbonate/bicarbonate environment depending on cathodic polarization level, temperature, and pH. Based on the staff's review of soil corrosivity testing and cathodic protection surveys during the audit, it is unclear why cracking is not an aging effect requiring management for steel piping exposed to soil.

Request:

State the basis for why cracking is not an aging effect requiring management for steel piping exposed to soil. Alternatively, state the changes to the LRA necessary to address cracking of buried steel piping.

**DRAI B.1.14-1** (TRP 44 Containment Leak Rate)

Background:

NUREG-1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report," in its Introduction states:

> [I]f an applicant takes credit for a program in the GALL Report, it is incumbent on the applicant to ensure that the conditions and operating experience at the plant are bounded by the conditions and operating experience for which the GALL Report program was evaluated. If these bounding conditions are not met, it is incumbent on the applicant to address the additional effects of aging and augment the GALL Report aging management program(s) as appropriate.

LRA Section B.1.14, "Containment Leak Rate," program states that the applicant has implemented Option B of 10 CFR Part 50 Appendix J for leak rate testing (LRT) and is consistent, with no exceptions or enhancements, with the GALL Report AMP XI.S4. The regulation in 10 CFR Part 50, Appendix J requires LRTs to assure containment leakage does not exceed allowable leakage rates. The GALL Report AMP XI.S4, "10 CFR Part 50, Appendix J," "scope of program," program element sets the bounding condition, "the scope of the containment LRT program includes all containment boundary pressure-retaining components."

As required by 10 CFR 54.21(a)(3), relevant aging effects (e.g., as described in GALL Report, Revision 2) associated with the containment boundary pressure-retaining components must be adequately managed so that their intended function will be maintained consistent with the CLB for the period of extended operation.

Issue:

LRA AMP B.1.14 Basis Document contains Procedure SEP-APJ-004, "Primary Containment Leakage Rate Testing (Appendix J) Program," as the implementing procedure for the 10 CFR 50, Appendix J, LRT. The procedure specifies a number of containment structure pressure-retaining components (e.g., penetrations, valves) to be excluded from local leak rate tests (LLRTs). It is not clear how the applicant's containment leak rate AMP will meet the bounding condition described in the "scope of program" program element to satisfy program consistency with the GALL Report AMP XI.S4, and adequately manage aging effects of the excluded components so that their intended function will be maintained consistent with the CLB for the period of extended operation.

Request:

1. For those containment pressure-retaining components that have been excluded from the "scope of program," program element of LRA AMP B.1.14 "Containment Leak Rate," identify how aging effects will be adequately managed during the period of extended operation.

2. Indicate which AMPs, TLAAs, and/or AMR line items will be used to manage the aging effects for each of the components not included, or justify why an AMP, TLAA, and/or AMR line item is not necessary to manage the relevant aging effects during the period of extended operation.

**D-RAI 3.5.1.76-1** (TRP 46 Structures Monitoring)

Background:

SRP-LR Table 3.5-1, item 76, recommends that sliding surfaces for radial beam seats in BWR drywell be managed for loss of mechanical function due to corrosion, distortion, dirt, overload, and wear during the period of extended operation by the Structures Monitoring Program.

LRA Table 3.5-1, item 3.5.1-76, states that RBS containment does not have the steel radial beam seats in BWR drywell subject to the listed aging effects. However, Section 3.8.3.4.7 of River Bend Station Unit 1 (RBS) Updated Safety Analysis Report (USAR) states that drywell floor beams at the drywell end and containment floor beams at the containment end have sliding supports. The USAR describes the drywell floor framing as vertically supported by the drywell and the primary shield wall, and the containment floor framings as vertically supported at the drywell and the steel containment.

Issue:

Based on the information provided in the LRA, it is not clear if the sliding support surfaces described in USAR Section 3.8.3.4.7 are within the scope of RBS license renewal and subject to aging management review pursuant to 10 CFR 54.21(a)(1), and whether they will be managed for loss of mechanical function due to corrosion, distortion, dirt, overload, and wear during the period of extended operation pursuant to 10 CFR 54.21(a)(3).

Request:

1. State, with supporting justification, whether or not the floor beam sliding supports described in USAR Section 3.8.3.4.7 are within the scope of RBS license renewal and subject to aging management review pursuant to 10 CFR 54.21(a)(1).

2. If within the scope of license renewal and subject to aging management review, state whether and how the loss of mechanical function due to corrosion, distortion, dirt, overload, and wear will be managed, pursuant to 10 CFR 54.21(a)(3), for the beam sliding supports described in USAR Section 3.8.3.4.7 . Further, identify the associated AMR line item(s).

3. Update the LRA and FSAR supplement, as appropriate, to be consistent with the response to the above requests.

**D-RAI B.1.41-1** (TRP 46 Structures Monitoring)

Background:

The “parameters monitored or inspected,” and “detection of aging effects” program elements of GALL Report AMP XI.S3, “ASME Section XI, Subsection IWF,” and GALL Report AMP XI.S6, “Structures Monitoring,” recommends that high strength (actual measured yield strength greater than or equal to 150 ksi) structural bolts in sizes greater than 1 inch in diameter be monitored for stress corrosion cracking (SCC). The GALL Report also recommends that visual inspections be supplemented with volumetric or surface examinations to detect cracking for this type of bolt.

LRA Section B.1.41, “Structures Monitoring,” and LRA Section B.1.23, “Inservice Inspection – IWF” state that the ISI-IWF and Structures Monitoring Program are existing programs, with enhancements, that will be consistent with GALL Report AMPs XI.S3 and XI.S6 respectively. The staff notes that LRA Sections B.1.23 and B.1.41 do not provide an enhancement to the “parameters monitored or inspected,” and/or “detection of aging effects” program elements to address the aging effects of SCC in high strength structural bolts. LRA Table 3.5.1, item 69, states, in part, that RBS “does not have high strength bolts that are subject to sustained high tensile stress in a corrosive environment,” and that “[the] listed aging effects do not require management.”

During the AMP audit, the staff reviewed the applicant's document RBS-EP-15-00008, "Aging Management Program Evaluation Results - Civil/Structural" (AMPER), and associated implementing procedures and structural specifications and drawings, and noted the following:

- RBS specifications for structural steel and miscellaneous steel (e.g. Specifications Nos. 210.330, 210.311) allow the use of high strength bolts with diameters greater than 1 inch.
- The applicant excluded the use of supplemental examinations in high strength structural bolts and stated, in part, "since thread lubricants recommended in plant procedures do not contain molybdenum disulfide, SCC is not plausible, inspections are not supplemented with volumetric or surface examinations." (Reference AMPER Section 3.4.B.4.b)

Issue:

It is not clear to the staff if "parameters monitored or inspected," and "detection of aging effects" program elements of the Structures Monitoring Program is consistent with the GALL Report recommendation because:

1. The applicant's ISI-IWF and Structures Monitoring Program and associated AMPERs do not provide sufficient justification for not managing the aging effects of SCC in high strength structural bolting since the GALL Report does not credit the molybdenum disulfide thread lubricants as the only contributor to SCC in high strength bolts.

2. It is not clear to the staff (1) whether high strength structural bolts (exempt for ASTM A325, F1852, and A490 under the Structures Monitoring Program, but applicable to the ISI-IWF program) greater than 1 inch in diameter are used or not in structural applications, or (2) how supplemental examinations are performed for these bolts because the plant's structural specifications do not preclude the use of high strength structural bolts with diameter greater than 1 inch.

Request:

1. State whether or not there are high-strength structural bolts (ASTM A325, F1852, and A490 are exempt for SMP applications, but are not exempt for ISI-IWF applications) in sizes greater than 1 inch diameter used in structural applications or component supports at RBS.

2. If high-strength structural bolts (ASTM A325, F1852, and A490 are exempt for SMP applications, but are not exempt for ISI-IWF applications) in sizes greater than 1 inch diameter are used in structural applications or component supports:
    a. State whether and how the GALL Report recommendations for managing degradation of high-strength bolts due to SCC described in the "parameters monitored or inspected," and "detection of aging effects" of the GALL Report AMP XI.S6 will be implemented for the Structures Monitoring Program. Otherwise,

provide adequate technical justification for the exception taken to the GALL Report AMP recommendation.

b. If the SCC aging effect is determined to be not applicable, as discussed in LRA Table 3.5.1, item 3.5.1-68, and Table 3.5.1, item 3.5.1-69, describe how the environment is monitored to ensure that the aging effect of cracking due to SCC remains not applicable for high-strength structural bolting.

3. Update the LRA and FSAR supplement, as appropriate, to be consistent with the response to the above requests.