Entergy®

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RBG-47817

February 6, 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 Additional Information - Set 6
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, Set 6 – RBS License Renewal Application – dated December 27, 2017 (ADAMS Accession No. ML17361A396)

3) Entergy Letter: Request for Due Date Extension for License Renewal Application NRC Request for Additional Information From 30-45 Days (RBG-47814 dated December 20, 2017)

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 December 27, 2017, (Reference 2) the NRC staff made a Request for Additional Information (RAI), needed to complete the License Renewal application review. On December 20, 2017, (Reference 3) Entergy requested that the due date for this submittal be extended from a 30 day response to a 45 day response. The extension was requested due to decreased resources during the latter part of December 2017. Enclosure 1 provides the responses to the Set 6 RAIs. 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 February 6, 2018.

Sincerely,

WFM/RMC/alc

Enclosure 1: Set 6 RAI Responses – River Bend Station

cc: (with Enclosure)

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

cc: (w/o Enclosure)

U. S. Nuclear Regulatory Commission
Attn: Lisa Regner
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U.S. Nuclear Regulatory Commission
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NRC Resident Inspector
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Central Records Clerk
Public Utility Commission of Texas
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Austin, TX 78711-3326

Department of Environmental Quality
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P.O. Box 4312
Baton Rouge, LA 70821-4312

RBF1-18-001

RBG-47817

Enclosure 1

Responses to Request for Additional Information

Set 6

REQUEST FOR ADDITIONAL INFORMATION
LICENSE RENEWAL APPLICATION
RIVER BEND STATION, UNIT 1 – SET 6
DOCKET NO.: 50-458
CAC NO.: MF9757
Office of Nuclear Reactor Regulation
Division of Materials and License Renewal

Question
RAI B.1.33-1 (TRP 36 One-Time Inspection – Small-Bore Piping)

Background
LRA Section B.1.33 states that the One-Time Inspection – Small-Bore Piping Program will be consistent with GALL Report AMP XI.M35. It also states that "this program provides a one-time volumetric or opportunistic destructive inspection of a 3-percent sample or maximum of 10 ASME Class 1 piping butt weld locations and a 3-percent sample or a maximum of 10 ASME Class 1 socket weld locations that are susceptible to cracking."

GALL Report AMP XI.M35 states that "This inspection should be performed at a sufficient number of locations to ensure an adequate sample."

Issue
LRA Section B.1.33 does not appear to provide the total population of welds for each weld type or the total number of these welds that will be included in the volumetric examinations. Based on discussions with the applicant, it appears the number of socket welds estimated is unusually low compared to similar plants.

Request
Please provide the total population for each weld type.

Response
The total population of ASME Class 1 butt welds at River Bend Station is 381.
The total population of ASME Class 1 socket welds at River Bend Station is 64.

In accordance with the program sample description, 10 ASME Class 1 piping butt welds and 2 ASME Class 1 socket welds will be inspected.

During River Bend Station construction, the piping specification specified that socket welded connections shall not be used in ASME Class 1 piping systems. Thus, socket welds are generally found only in General Electric supplied ASME Class 1 piping and in joints connecting ASME Class 1 piping with components that include socket weld joint preparation.

Question
RAI 4.6-1 (TRP 63 Fatigue Analysis)

Background
ASME Section III, Division 2, "Code for Concrete Reactor Vessel and Containments," Subsection CC, "Concrete Containments," and Division 1, Subsection NE, "Class MC Components," require a fatigue analysis for liner plates, metal containments, and penetrations that considers all cyclic loads based on the anticipated number of cycles. Section 4.6 of the SRP LR states that if a plant's code of record requires a fatigue analysis, then this analysis may be a time limited aging analyses (TLAA) and must be evaluated in accordance with 10 CFR 54.21(c)(1) to ensure that the effects of aging on the intended functions are adequately managed for the period of extended operation.

License renewal application (LRA) Section 4.6, "Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis," identifies (1) the fatigue analysis for the steel containment cylinder and dome as evaluated in accordance with ASME Section III, Division 1, Subsection NE, and (2) the fatigue analysis for the floor liner plate as evaluated in accordance with ASME Section III, Division 2. This LRA section appears to disposition these analyses in accordance with 10 CFR 54.21(c)(1)(iii) by stating that the Fatigue Monitoring Program will manage the aging effects due to cumulative fatigue. Section 6A.15.1.3.3 of the Updated Safety Analysis Report (USAR) describes the transients associated with the floor liner plate fatigue analysis.

Issue:
Section 4.6 of the LRA does not describe the transients considered for the steel containment cylinder and dome fatigue analysis, their design limits, and their calculated cumulative usage factor values. Additionally, it is not clear if the applicant's general disposition in LRA Section 4.6 was intended for these analyses.

Request
1. Clarify the disposition, in accordance with 10 CFR 54.21(c)(1), for the steel containment cylinder and dome fatigue analysis and describe the following:
    a. list the transients considered in the analysis (event name),
    b. the design cycle limits of each transient, and
    c. the review of the calculated cumulative usage factor (CUF)

Otherwise, provide technical justification for not requiring a disposition under 10 CFR 54.21(c)(1) and describe how the aging effect of cumulative fatigue damage due to cyclic loading will be adequately managed pursuant to 10 CFR 54.21(a)(3).

2. Clarify the disposition, in accordance with 10 CFR 54.21(c)(1), for the floor liner plate fatigue analysis.

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

Response

1. USAR Section 3.8 describes the River Bend Station (RBS) steel containment vessel (SCV). As identified in USAR Section 3.8-1, the SCV is backed by structural concrete up to elevation 94 feet 8 inches. As identified in USAR Section 3.8-2, above this elevation the SCV shell is free standing and is designed to act as an independent structural component within the reactor building. USAR Figure 3.8-1 provides the SCV general layout.

   USAR Table 3.8-1 identifies the loading combinations for the SCV cylinder and dome under design operating and test conditions. Table 3.8-1 indicates that fatigue is considered for operating conditions I(b), II, III(b) and IV. The free standing SCV cylinder and dome analysis reviews the operating conditions identified in USAR Table 3.8-1 and concludes that fatigue during operating conditions I(b), II, III(b) and IV does not occur because the containment vessel is free to expand, thereby preventing cyclic loading. Therefore, the freestanding containment vessel and dome were not analyzed for fatigue and there are no cycle limits or cumulative usage factors.

   The bottom portion of the containment vessel cylinder is supported by the structural concrete and a metal fatigue analysis was not performed for this composite structure.

2. USAR Appendix 6A.15.1 discusses the evaluation of the basemat liner. As identified in USAR Section 6A.15.1.1, the liner is continuously backed by concrete; therefore positive pressure loads do not govern the design of the basemat liner. The governing loading conditions result from a net negative pressure developed in the suppression pool by hydrodynamic forces during SRV, LOCA, and seismic events. As identified in USAR Section 6A.15.1.3.3, the stress cycles used are the cycles shown in Table 6A.15-1, which include 1800 SRV lift events with 8 pressure cycles per event, 5 operating basis earthquakes (OBE) with 20 cycles per event, 1 safe shutdown earthquake with 20 cycles, 1 small or intermediate break and 1 design basis accident.

   Faulted events such as safe shutdown earthquakes, small or intermediate breaks or the design basis accident have not occurred. The basemat liner analysis results are acceptable using values for SRV actuations and OBE cycles that are greater than or equal to the limiting cycles in LRA Table 4.3-1, which are tracked under the Fatigue Monitoring Program. Therefore, the Fatigue Monitoring Program will manage the effects of aging associated with the basemat liner fatigue analysis in accordance with 10 CFR 54.21(c)(1)(iii).

3. LRA Section A.2.4 is revised as shown below. Additions are underlined.

A.2.4 Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis

RBS utilizes a BWR Mark III containment. As described in USAR Section 3.8.2.4.1, fatigue analysis requirements for the steel containment cylinder and dome are evaluated in accordance with the requirements of ASME B&PV Code Section III, Division I, Subsection NE. <u>The evaluation determined the freestanding containment vessel and dome did not require fatigue analysis.</u> Fatigue analysis requirements for the floor liner plate are evaluated in accordance with the requirements of ASME B&PV Code, Section III, Division 2. Further review of the containment dynamic loading effects are contained in USAR Appendix 6A. <u>The basemat liner analysis results are acceptable using values for SRV actuations and OBE cycles that are greater than or equal to the limiting cycles tracked under the Fatigue</u>

Monitoring Program. Therefore, the Fatigue Monitoring Program manages the effects of aging associated with the basemat liner fatigue analysis in accordance with 10 CFR 54.21(c)(1)(iii).

Question
RAI 4.6-2 (TRP 63 Fatigue Analysis)

Background
ASME Section III, Division 2, "Code for Concrete Reactor Vessel and Containments," Subsection CC, "Concrete Containment," and Division 1, Subsection NE, "Class MC Components," requires a fatigue analysis for liner plates, metal containments, and penetrations that considers all cyclic loads based on the anticipated number of cycles. Section 4.6 of the SRP LR states that if a plant's code of record requires a fatigue analysis, then this analysis may be a time limited aging analyses (TLAA) and must be evaluated in accordance with 10 CFR 54.21(c)(1) to ensure that the effects of aging on the intended functions are adequately managed for the period of extended operation.

License renewal application (LRA) Section 4.6, "Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis," identifies the fatigue analyses for the following containment structural components: personnel airlock, polar crane, equipment hatch, drywell airlock, drywell combination door/hatch assembly, and drywell head. The LRA generally describes the normal and upset loading conditions considered in the analyses as to include earthquakes and safety relief valves (SRV) lifts. The applicant dispositioned these analyses in accordance with 10 CFR 54.21(c)(1)(iii) by stating that the Fatigue Monitoring Program will manage the aging effects due to cumulative fatigue.

Issue
Section 4.6 of the LRA does not clearly identify the transients considered for each of the containment structural components analyses referenced above, the design cycle limits for each transient, and any analyzed cumulative usage factor against which the transients will be monitored. Additionally, based on the staff review of the components specifications during the audit, the staff is not clear whether earthquakes and SRV lift are the only transients considered in the fatigue analyses.

Request
1. For each of the fatigue analyses dispositioned under LRA section 4.6 for the containment structural components listed in the "Background" section above, describe the following:
   a. identify the transients considered in each analysis (event name),
   b. the design cycle limits of each transient against which they will be monitored by the Fatigue Monitoring Program, and
   c. the review of the calculated cumulative usage factor (CUF)

2. Clarify if earthquakes and SRV lifts are the only transients considered for all the fatigue analyses referenced above. Otherwise, state any other transient(s) evaluated.

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

<u>Response</u>

1. The following are additional details of the fatigue analyses for the components identified above from Section 4.6 of the LRA.

A) Personnel Airlock

The personnel airlock analysis considered cycles from atmosphere to operating pressure, normal operating pressure fluctuations, a loss of coolant accident (LOCA), operating basis earthquakes (OBE), safe shutdown earthquake (SSE) and safety relief valve (SRV) actuations. The airlock was evaluated against the criteria in ASME Section NE 3222.4(d) considering the stresses, number of cycles, temperature difference, and pressure stresses. The evaluation concluded that analysis for cyclic operation was not necessary. No cumulative usage factors were calculated. The evaluation assumed 120 plant startup cycles. LRA Table 4.3-1 has a limiting value of 168 for plant startups, but because the allowable number of cycles for this ASME Section NE 3222.4(d) criterion was 2,800 cycles, the increase in cycles shown in LRA Table 4.3-1 does not impact the conclusion that a fatigue analysis is unnecessary.

B) Polar Crane

The polar crane fatigue analysis calculated CUFs based on 5,000 SRV actuations, 100 OBE cycles and 50 SSE cycles. The CUFs were all less than 1. Earthquake cycles have not occurred and the number of SRV lifts used in the analysis is much greater than the limiting value in LRA Table 4.3-1. The Fatigue Monitoring Program tracks SRV actuations and OBE against the limiting values in the last column of Table 4.3-1.

C) Equipment Hatch

The equipment hatch calculation determined a fatigue analysis was not necessary after considering loads from OBE, SSE, LOCA, SRV lifts and heatups because the loads were very low. Cumulative usage factors were not calculated.

D) Drywell Airlock Drywell Combination Door/Hatch Assembly

The drywell airlock, drywell combination door/hatch assembly evaluation determined that a fatigue analysis was not necessary after considering OBE, SSE, LOCA, SRV and heatup loads. The hatch cover was evaluated against the criteria in ASME Section NE 3222.4(d) considering the stresses, number of cycles, temperature difference, and pressure stresses. The review concluded that analysis for cyclic operation was not necessary. No cumulative usage factors were calculated. The evaluation assumed 120 plant startup cycles. LRA Table 4.3-1 has a limiting value of 168 for plant startups, but because the allowable number of cycles for this ASME Section NE 3222.4(d) criterion was 2,800 cycles, the increase in cycles shown in LRA Table 4.3-1 does not impact the conclusion that a fatigue analysis is unnecessary.

E) Drywell Head

The drywell head calculation determined the alternating stresses from earthquakes and SRV loads were so low that the allowable number of cycles were infinite (CUF~0).

2. As identified in the responses above, tracking of earthquake cycles and SRV lifts ensures the calculated CUFs will remain valid. Other transients were considered, but did not warrant inclusion in the determination of CUFs.

3. LRA changes are provided below for USAR Supplement Section A.2.4. Additions are underlined. The changes indicate that of the containment structural components discussed in the background of this RAI, only the polar crane analysis determined cumulative usage factors for which the Fatigue Monitoring Program would track cycles to ensure validity of the analysis through the period of extended operation.

Change to Paragraph 3 of LRA Section A.2.4

Containment structural components including the personnel airlocks, polar crane, equipment hatch, drywell airlock, drywell combination door/hatch assembly, and drywell head were evaluated for fatigue. The normal and upset loading conditions considered for fatigue of the primary containment components include earthquakes and effects from safety/relief valve (SRV) lifts. Loads that would occur during an accident such as a loss of coolant accident or main steam line break were also evaluated. Only the polar crane analysis determined cumulative usage factors for which the Fatigue Monitoring Program would track cycles. Tracking of SRV lifts and operating basis earthquakes in accordance with the Fatigue Monitoring Program provides assurance of the ongoing validity of the polar crane cumulative usage factors through the period of extended operation.

Question

RAI 4.6-3 (TRP 63 Fatigue Analysis)

Background

Section 4.6 of the SRP LR states that penetration bellows may be designed and/or analyzed in accordance with ASME code requirements. The SRP-LR also states that if a plant's code of record requires a fatigue analysis, then this analysis may be a time limited aging analyses (TLAA) and must be evaluated in accordance with 10 CFR 54.21(c)(1) to ensure that the effects of aging on the intended functions are adequately managed for the period of extended operation.

License renewal application (LRA) Section 4.6, "Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis," identifies the fatigue analyses for expansion joints (bellows) in sleeved penetrations, and fuel transfer tubes bellows. The LRA states that transient cycles for plant startups, operating basis earthquake (OBE) cycles, and safety relief valves (SRV) lifts are tracked for these expansion joints (bellows) as shown in LRA Section 4.3.2. The LRA also states that these analyses remain adequate for the period of extended operation. For the fuel transfer tube bellows, the LRA states that the bellows is designed for seismic events that are tracked and 150 cycles of flexing.

Issue

Based on the information provided in LRA Section 4.6, it is not clear what is the applicant's disposition under 10 CFR 54.21(c)(1) for the fatigue analyses of expansion joints (bellows) in sleeved penetrations, and the fatigue analysis for the fuel transfer tube bellows. Additionally, the staff is not clear where the "cycles of flexing" is considered in LRA Table 4.3 1 for tracking purposes under the Fatigue Monitoring Program, and what is the designed cycle limit considered

for earthquakes in the fatigue analysis of the fuel transfer tube bellows.

Request

1. State, with supporting justification, the disposition under 10 CFR 54.21(c)(1) for the fatigue analyses of expansion joints (bellows) in sleeved penetrations.

2. State, with supporting justification, the disposition under 10 CFR 54.21(c)(1) for the fatigue analyses of fuel transfer tube bellows.

3. Clarify the following for the fatigue analysis of fuel transfer tube bellows:
    a. how the "cycles of flexing" is considered in LRA Table 4.3 1 and how they are tracked under the Fatigue Monitoring Program,
    b. list any other transients considered in the analysis (e.g. temperatures cycles), and
    c. specify the design cycle limits for seismic OBE.

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

Response

1. As shown on the Updated Safety Analysis Report (USAR) Figure 3.8-4, bellows (expansion joints) are utilized on some sleeved penetrations. The specification required these be qualified for 14,000 cycles due to pipe thermal loads, 500 operating basis earthquake cycles, and 20,000 SRV lift cycles. As indicated in LRA Table 4.3-1, plant startups, OBE cycles and SRV actuations are tracked to ensure they remain below the values used in the analyses. As indicated in LRA Section 4.3.2, operating cycles of the affected systems and the concurrent pipe thermal loads will not exceed 7,000 cycles. Because plant startups, OBE cycles and SRV actuations are tracked, the Fatigue Monitoring Program manages the effects of aging due to fatigue in accordance with 10 CFR 54.21(c)(1)(iii).

2. As shown in USAR Figures 3.8-8 and 9.1-20 and LRA drawing LRA-PID-34-04A, bellows are utilized on the fuel transfer tube. As identified in USAR Table 9.1-3, the upper containment bellows (identified as Item 19) is safety-related. Because the cycles that require counting are tracked, the Fatigue Monitoring Program manages the effects of aging due to fatigue in accordance with 10 CFR 54.21(c)(1)(iii). See response to item 3 for additional details of cycles that require tracking.

3. a The upper fuel transfer tube bellows is designed for seismic events and 150 cycles of flexing to accommodate 1.7 inches of movement to support blind flange installation. The inclined fuel transfer system (IFTS) blind flange is removed and reinstalled, on average, twice per operating cycle. (Once during pre-outage activities and testing and once to allow fuel assembly movement during the outage.) During removal, the flanges are separated approximately 3/4 inches to allow for removal of the blind flange and installation of the flange ring. Moving this flange 3/4 inches would not constitute a full cycle of the bellows. During reinstallation of the blind flange, the flanges are separated by 1.625 inches. Approximately 70 such reinstallations are expected through the end of the period of extended operation. Tracking the installation cycles is unnecessary because the bellows are designed for more than twice the number of cycles expected through the period of extended operation.

b. Other transients were not specified. It is not expected that there would be any cycling of the upper IFTS bellows as a result of thermal expansion because the bellows are in buildings that do not experience significant temperature variations.

c. The bellows were specified for 30 operating basis earthquake cycles, which are tracked as indicated in LRA Table 4.3-1, and one design basis earthquake cycle. No earthquake cycles have occurred.

4. An LRA change is identified below to provide additional information for the fuel transfer tube bellows cycles. Additions are underlined and deletions are lined through. The last paragraph of Section 4.6 states that "RBS will manage the aging effects due to fatigue for the containment components using the Fatigue Monitoring Program in accordance with 10 CFR 54.21(c)(1)(iii)." The last paragraph of USAR Supplement Section A.2.4 provides the same conclusion, so an LRA change is not needed to indicate that 10 CFR 54.21(c)(1)(iii) was the option used to evaluate the fuel transfer tube bellows fatigue TLAA.

Change to Paragraph 5 LRA Section A.2.4

As shown in USAR Figures 3.8-8 and 9.1-20, bellows are utilized on the fuel transfer tube. As shown in USAR Figure 9.1-20 and USAR Table 9.1-3, the upper bellows are safety-related. This bellows is designed for seismic events that are tracked (none have occurred) and 150 cycles of flexing ~~(some of which occur during the installation of the fuel transfer tube blind flange).~~ <u>The inclined fuel transfer system blind flange is removed and reinstalled on average, twice per operating cycle. Approximately 70 such reinstallations are expected through the end of the period of extended operation. Tracking the installation cycles is unnecessary because the bellows are designed for more than twice the expected number of cycles</u>.

<u>Question</u>
RAI 3.5.1.9-1 (TRP 63 Fatigue Analysis)

<u>Background</u>
Section 4.6 of the SRP-LR states that dissimilar metal welds that connect the piping penetrations to the bellows or stainless steel plates provides a leak-tight penetration, and they may be designed in accordance with the requirements of Section III of the ASME Code. The SRP-LR also states that if a plant's code of record requires a fatigue analysis, then this analysis may be a time-limited aging analyses (TLAA) and must be evaluated in accordance with 10 CFR 54.21(c)(1) to ensure that the effects of aging on the intended functions are adequately managed for the period of extended operation. GALL Report item II.B4.C-13, associated with SRP Table 3.5.1, item 9, addresses, in part, the cumulative fatigue damage due to fatigue for penetrations with dissimilar metal welds.

Section 3.5.2.2.1.6 of the license renewal application (LRA) states that there are dissimilar metal welds associated with stainless steel bellows welded to carbon steel penetration sleeves.

<u>Issue</u>
It is not clear to the staff if dissimilar metal welds were considered in the fatigue analyses of piping penetrations and whether they were properly evaluated in accordance with 10 CFR 54.21(c)(1) to ensure that the aging effects of cumulative fatigue damage due to cyclic loading are adequately managed for the period of extended operation. The staff notes that LRA Section 4.6,

"Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis," item 3.5.1-9 of LRA Table 3.5.1, and LRA Section 3.5.2.2.1.5, "Cumulative Fatigue Damage," do not address dissimilar metal welds.

Request

1. Clarify if dissimilar metal welds were considered in the fatigue analyses of piping penetrations.

2. If considered, address the disposition under 10 CFR 54.21(c)(1) for dissimilar metal welds in piping penetration. If not considered, how will the aging effect of cumulative fatigue damage due to cyclic loading be adequately managed for dissimilar metal welds pursuant to 10 CFR 54.21(a)(3).

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

Response

1. Each fatigue analysis for a steel containment vessel penetration was performed for the penetration as a whole. The analyses determined cumulative usage factors at locations where cyclic stresses were sufficient to cause fatigue effects. If the penetration included dissimilar metal welds, the dissimilar metal welds were considered in the fatigue analysis.

2. Dissimilar metal welds were considered in the fatigue analyses of piping penetrations. License renewal application (LRA) Section 4.6 addresses the evaluation of the containment penetration fatigue analyses, which are considered time-limited aging analyses for license renewal. As indicated in the last paragraph of LRA Section 4.6 and Section A.2.4, the Fatigue Monitoring Program will manage the effects of aging due to fatigue for containment components, including penetrations, in accordance with 10 CFR 54.21(c)(1)(iii).

3. No update to the LRA or FSAR supplement is necessary because LRA Section 4.6 and Section A.2.4 correctly conclude that the Fatigue Monitoring Program will manage the effects of aging due to fatigue for containment components discussed in those sections in accordance with 10 CFR 54.21(c)(1)(iii).

Question

RAI 3.5.1.9-2 (TRP 63 Fatigue Analysis)

Background

Section 4.6 of the license renewal application (LRA) identify the following components as being managed for fatigue by the Fatigue Monitoring Program: steel containment cylinder and dome, floor liner plate, personnel airlocks, polar crane, equipment hatch, drywell airlock, drywell combination door/hatch assembly, drywell head, expansion joints (bellows) from sleeved penetrations, and fuel transfer tube bellows.

LRA Table 3.5.2-1 provides, in part, aging management review results for the following components associated with LRA Table 3.5.1 item 3.5.1-9: sleeved penetrations, penetration bellows, accessible steel elements, and steel components: drywell personnel airlock, drywell combination equipment hatch and personnel door.

<u>Issue</u>

The staff did not find aging management review results in LRA Table 3.5.2-1 for the following steel components associated with TLAAs being dispositioned under LRA Section 4.6 as being managed by the Fatigue Monitoring Program:

- polar crane
- equipment hatch
- drywell airlock
- drywell head
- fuel transfer tube bellows

<u>Request</u>

1. Clarify whether the components listed in the "Issue" section above will be managed for cracking due to cumulative fatigue damage by the Fatigue Monitoring Program as dispositioned in LRA Section 4.6.

2. Update LRA Table 3.5.2-1 as necessary to be consistent with response.

<u>Response</u>

1. The polar crane, equipment hatch, drywell airlock and fuel transfer tube bellows are included in license renewal application (LRA) Table 3.5.2-1 under component types rather than plant-specific component names. The relevant component types associated with cracking due to fatigue are as follows.

   - Polar crane is addressed under LRA Table 3.5.2-1 Item "Crane: structural girders."
   - Equipment hatch and drywell airlocks are included in LRA Table 3.5.2-1 Item "Steel components: drywell personnel airlock, drywell combination equipment hatch and personnel door."
   - Fuel transfer tube bellows is addressed under LRA Table 3.5.2-1 Item "Penetration: sleeves and bellows."

   Each of these items indicates that there is an associated TLAA involving metal fatigue.

   The drywell head also has a TLAA for cracking due to metal fatigue that is evaluated in LRA Section 4.6.

2. As shown in the response above, all components are addressed in LRA Table 3.5.2-1 for cracking due to fatigue with the exception of the drywell head. LRA Table 3.5.2-1 is revised to add a line item indicating that there is a TLAA for metal fatigue for the drywell head.

   During preparation of this response, Entergy identified the need to correct the Table 1 Item references for three additional line items in Table 3.5.2-1.

The changes to LRA Table 3.5.2-1 follow with additions underlined and deletions lined through.

Table 3.5.2-1: Reactor Building

Structure and/or Component or Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Penetration: sleeves	EN, MB, PB, SNS, SRE, SSR	Carbon steel	Air – indoor uncontrolled	Loss of material	CII – IWE Containment Leak Rate	II.B4.CP-36	~~3.5.1-28~~ 3.5.1-35	B
Penetration: sleeves	EN, MB, PB, SNS, SRE, SSR	Stainless steel	Air – indoor uncontrolled	Loss of material	CII – IWE Containment Leak Rate	II.B4.CP-36	~~3.5.1-28~~ 3.5.1-35	B
Steel elements: drywell head and finger pins	EN, MB, PB, SSR	Stainless steel	Air – indoor uncontrolled or fluid environment)	Cracking	TLAA – metal fatigue	II.B2.2.C-48	3.5.1-9	C
Concrete (accessible areas): containment internal structures; all	EN, MB, PB, SRE, SSR	Concrete	Air – indoor uncontrolled	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring	III.A4.TP-26	~~3.5.1-56~~ 3.5.1-66	A

Question
RAI 4.7.2-1 (TRP 102.2 High Energy Line Break)

Background
LRA Section 4.7.2 describes the applicant's TLAA for the Class 1 systems associated with the high energy line break (HELB) analysis, which is also discussed in USAR Section 3.6. The disposition for this TLAA is in accordance with 10 CFR 54.21 (c)(1)(iii), which requires the applicant to demonstrate that the effects of aging on the intended functions will be adequately managed for the period of extended operation. The applicant credits the Fatigue Monitoring Program for tracking transient cycles and determining the necessary corrective actions if transient cycle limits are reached.

USAR Section 3.6 provides the applicant's basis for the HELB analysis and how it complies with general design criteria No. 4, "Dynamic Effects." USAR Table 3.6A-21 identifies the high-energy piping inside containment. USAR Section 3.9 and Table 3.9A-1 provide a summary of the design basis transients and the cycle limits that are applicable to Class 1 piping systems.

Issue
a. LRA Section 4.7.2 does not appear to identify which high energy piping systems are within the scope of the Fatigue Monitoring Program's cycle counting activities.

b. LRA Section 4.7.2 does not appear to identify the HELB component transients that are tracked by the Fatigue Monitoring Program.

Request

a. Identify the high energy piping systems subject to the HELB TLAA that are within the scope of the Fatigue Monitoring Program's cycle counting activities.

b. Identify the HELB component transients that are tracked by the Fatigue Monitoring Program.

Response

a) High-energy fluid systems are defined in USAR Section 3.6.2.1.1A as those systems or portions of systems that during normal plant conditions are either in operation or are maintained pressurized under conditions where either or both of the following are met:
   - Maximum temperature exceeds 200°F, or
   - Maximum pressure exceeds 275 psig.

   USAR Tables 3.6A-21 and -22 lists the systems inside and outside of containment that meet the high-energy fluid system definition. The high-energy piping that is analyzed to ASME Class 1 can utilize the 0.1 cumulative usage factor (CUF) criterion when identifying intermediate break locations as described in USAR Section 3.6.2.1.5A. The high-energy systems of which at least portions are analyzed to Class 1 and are consequently within the scope of the Fatigue Monitoring Program for HELB analysis purposes are:

   Main Steam
   Main Steam Drains
   Reactor Core Isolation Cooling
   Feedwater
   Recirculation
   High Pressure Core Spray
   Low Pressure Core Spray
   Reactor Water Cleanup
   RPV Vent Line
   Residual Heat Removal
   Residual Heat Removal/Low Pressure Core Injection
   Standby Liquid Control

b) The Class 1 piping fatigue analyses included the determination of locations where the 0.1 CUF criterion was applied. These analyses were reviewed as documented in an RBS calculation to determine the cycles that required tracking. The resulting transient cycles are shown in LRA Table 4.3-1. The Fatigue Monitoring Program tracks the transients shown in LRA Table 4.3-1, which include the transients that require tracking to support the determination of HELB exclusion locations based on a CUF of less than 0.1.