SeabrookNPEm Resource

From: Plasse, Richard
Sent: Wednesday, March 09, 2011 9:59 AM
To: Cliche, Richard
Subject: FW: Seabrook follow up RAI for metal fatigue and TLAA
Attachments: DRAFT Followup RAI Serabrook 4.3 Metal Fatigue_ 4.7 TLAA.doc

Hearing Identifier: Seabrook_License_Renewal_NonPublic
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Mail Envelope Properties (Richard.Plasse@nrc.gov20110309095900)

Subject: FW: Seabrook follow up RAI for metal fatigue and TLAA
Sent Date: 3/9/2011 9:59:12 AM
Received Date: 3/9/2011 9:59:00 AM
From: Plasse, Richard

Created By: Richard.Plasse@nrc.gov

Recipients:
"Cliche, Richard" <Richard.Cliche@fpl.com>
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Files	**Size**	**Date & Time**
MESSAGE	13	3/9/2011 9:59:00 AM
DRAFT Followup RAI Serabrook 4.3 Metal Fatigue_ 4.7 TLAA.doc	131070	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
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Draft Follow up RAI for Seabrook Station LRA Related to Metal Fatigue and selected TLAA.

Follow-up RAI 4.3-1b

Background:

In its response to RAI 4.3-1 the applicant stated that the fatigue conformance of ASME Class 1 valves was demonstrated by performing an "umbrella" fatigue analysis of the piping system containing the valves (i.e., in accordance with ASME Section III, Subsection NB-3650). However, UFSAR Section 3.9(N).1.4(e) states that the pressure boundary portions of Class 1 valves in the reactor coolant system were designed and analyzed according to the valve design requirements of ASME Section III, NB-3500 (edition 1971 including 1972 Addenda).

Issue:

It is not clear why the fatigue analyses of Class 1 valves was performed in accordance with ASME Section III Subsection NB-3650 "Analysis of Piping Products," instead of the requirements of Subsection NB-3500 as indicates in UFSAR Section 3.9(N).1.4(e)

Request:

Clarify and explain why Class 1 valves fatigue conformance was demonstrated by performing an "umbrella" fatigue analysis using ASME Section III Subsection NB-3650 instead Subsection NB-3500. Justify that the "umbrella" fatigue analysis using ASME Section III Subsection NB-3650 is equivalent to or more conservative than the NB-3500 analysis.

Follow-up RAI 4.3.1-1b

Background:

In its response to RAI 4.3.1-1, the applicant stated that in LRA Table 4.3.1-3, the rows for Unit Loading Between 0% and 15% Power and Unit Unloading Between 15% and 0% Power were revised, and the 60-year projected cycles for Unit Loading and Unloading are 70 and 65, respectively.

Issue:

The revised values for the 60-year projected cycles for Unit Loading and Unloading between 0% and 15% Power are inconsistent with the projected values for the other transients. In LRA Table 4.3.1-3, all the projected values for other transients have been linearly extrapolated from 18.6-year to 60-year operation with a ratio of 3.22 or higher (the ratio between 60-year projected cycle and current number of cycle is 3.22). For Unit Loading and Unit Unloading transients, the ratios between 60-year projected cycle and current number of cycle are 2.6 and 2.5, respectively.

Request:

Provide the basis and justify the 60-year projected values for the Unit Loading and Unit Unloading transients.

RAI 4.3.1-2

Background & Issue

For the "Feedwater Heaters Out of Service" transient in LRA Table 4.3.1-3, the number of NSSS Design Cycles is "2000" for with footnote (5) indicating that the original design analysis number is assumed to be the anticipated number of cycles at the end of the period of extended operation. However, the number of 60-yr projected cycle of this transient is listed as “39” in the Table 4.3.1-3

LRA Table 4.3.1-2 identified three Emergency Transients that are Reactor Coolant System design transients. The applicant did not provide the number of current cycles and the number of 60-yr projected cycles for these three Emergency Transients in LRA Table 4.3.1-3.

Request

(1) For consistency, amend LRA Table 4.3.1-3 to reflect the proper 60-yr projected cycles for the “Feedwater Heaters Out of Service” transient or justify why footnote (5) is not applicable to this transient.

(2) Provide the number of current cycles and the number of 60-yr projected cycles for the three Emergency Transients in LRA Table 4.3.1-3 or justify why cycle projections are not needed. Clarify whether these transients will be monitored under the Metal Fatigue of Reactor Coolant Pressure Boundary program or justify why the transients need not be monitored.

Follow-up RAI 4.3.3-1b

Background:
In its response to RAI 4.3.3-1 the applicant stated that the intent is to disposition fatigue of the vessel internals using 10 CFR 54.21 (c)(1)(i). The applicant added that, based on generic and plant-specific analyses, the following were identified as fatigue limiting locations: lower support columns, core barrel nozzle, lower core plate, and upper core plate. The fatigue CUFs for these locations were all shown to be less than 1.0. The applicant further stated that the effects of fatigue at these locations will also be monitored by cycle counting under its Metal Fatigue of Reactor Coolant Pressure Boundary program to verify that the number of design cycles assumed in the analyses will not be exceeded during the period of extended operation.

Issue:

The applicant did not update LRA Section 4.3.3 and applicable section LRA Appendix A reflecting that these TLAA have been dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

Request:
For consistency in the LRA, Amend LRA Section 4.3.3 indicating that, for the reactor vessel internal components, the TLAA disposition is in accordance with 10 CFR 54.21(c)(1)(i) using the Metal Fatigue of Reactor Coolant Pressure Boundary program.

Follow up RAI 4.1-1b

Background: In its response to RAI 4.1-1, the applicant stated that a flow-induced vibration (FIV) analysis is not part of the current licensing basis (CLB) for its reactor vessel internal (RVI) components. Also, in its response to RAI 4.1-2, the applicant indicated that fluence-dependent reduction of fracture toughness of vessel internals is not analyzed as part of the current licensing design basis for Seabrook.

Issue:
Part 1 - LRA Table 4.1-3 still indicates that an FIV analysis and loss of fracture toughness (ductility reduction) analysis are part of the CLB for the RVI components and these analyses are addressed in LRA Section 4.3.3. The applicant did not amend LRA Table 4.1-3 to indicate that FIV and ductility reduction/loss of fracture toughness analyses are not part of its CLB. Furthermore, LRA Section 4.3.3 does not include any discussion regarding how the FIV and ductility reduction/loss of fracture toughness analyses factor into the CUF calculations for the RVI core support structure components.

Part 2 – The response to RAI 4.1-1 indicated that there are "further analyses performed for the Seabrook Station reactor internals" for FIV of the RVI components. However, the applicant's response did not provide any comparison of these FIV analyses to the NRC's six criteria for TLAAs in 10 CFR 54.3. Therefore, the staff cannot determine whether these additional analyses need to be identified as a TLAA for the LRA.

Request:
Part 1 - For consistency in the LRA, the staff requests that the applicant either amend LRA Table 4.1-3 to identify that FIV and ductility reduction/loss of fracture toughness analyses are not part of the CLB and provide the justification for making these changes to LRA Table 4.1-3; or else amend LRA Section 4.3.3 to clarify how the cumulative usage factor calculations account for and bound any considerations of FIV in the RVI core support structures and/or reduction in ductility or fracture toughness properties for the materials that the core support structures are fabricated from.

Part 2 – Provide the basis and justify why these additional analyses for the RVI components does not conform to the definition of a TLAA in 10 CFR 54.3.

Follow-up RAI 4.3.4-1b

Background:
In its response to RAI 4.3.4-1 request (1), the applicant clarified that the hot leg surge nozzle-to-pipe weld was evaluated to be the limiting location in the surge line. The staff notes that the surge nozzle-to-pipe weld consists of nozzle, nozzle-to-safe end weld, safe end, safe end-to-pipe weld, and the pipe.

Issue:
It is not clear to the staff whether the fatigue limiting CUF evaluations were performed for the nozzle-to-safe end weld or the safe end-to-pipe weld. In footnote (1) of Table 1 of the applicant's response to RAI 4.3-1, the highest fatigue usage location is identified as nozzle transition and safe end, whereas in Table 2 of the applicant's response to RAI 4.3.2-1 the highest fatigue usage location is identified as nozzle safe end-to pipe weld.

Furthermore, the staff notes that there are inconsistencies in the values of CUF listed in various tables:

- In LRA Table 4.3.4-1, for the **hot leg surge nozzle-to-pipe weld**, the 60-year CUFs is 0.2844 in air and 3.428 in reactor coolant environment. F_{en} is 12.05.

- In RAI 4.3.4-1 response, for the **hot leg surge nozzle safe-end**, the 60-year CUFs is 0.2844 in air and 3.2848 in reactor coolant environment. F_{en} is 11.55.

Request:

(1) Resolve or justify the inconsistencies in the reported values of CUF. Revise the LRA sections and Tables accordingly
(2) Clarify the fatigue limiting location of the hot leg surge nozzle. Revise the LRA sections and Tables accordingly.

Follow up RAI 4.3.5-1b

Background
In LRA Section 4.3.5, the applicant described the TLAA for steam generator tube fatigue in the U-bend region resulting from fluid-induced vibrations (FIV). In its response to RAI 4.3.5-1, the applicant amended its LRA Section 4.3.5. The amendment separated the original TLAA description into two LRA Sections: 4.3.5 to deal with fatigue and a new Section 4.7.15 to deal with wear – both caused by FIV. The applicant also changed the disposition of Section 4.3.5 to 10 CFR 54.21(c)(1)(iii).

Issue
The staff notes that the applicant did not remove wear-related (loss of material) discussion in the amended Section 4.3.5. The staff also notes that the title of Section 4.3.5 remains unchanged, which still indicated the loss of material as part of the TLAA of Section 4.3.5.

With regard to fatigue issue, the staff does not find the applicant's change of disposition of TLAA for steam generator tube fatigue due to the FIV acceptable. The staff notes that, with the existing fatigue evaluation in Section 4.3.5, the applicant demonstrated that the CUF is well below the acceptance value of 1.0 for the period of extended operation. The staff finds the 10 CFR 54.21(c)(1)(i) disposition appropriate for steam generator tube fatigue issue. The staff noted that the Steam Generator Tube Integrity Program cannot be used to substitute ASME Code Section III fatigue evaluation unless justifications are provided to demonstrate that the Steam Generator Tube Integrity Program addresses the fatigue-related CUF analysis.

The staff also could not confirm the adequacy of UFSAR supplement summary for the TLAA of Section 4.3.5 because the applicant did not amend the applicable UFSAR supplement description.

Request
(a) Amend Section 4.3.5 and move wear-related (loss of material) discussion to Section 4.7.15. Limit the title and discussion in Section 4.3.5 to that pertaining only to the fatigue issue. Revise Table 4.1-1 to make it consistent with the revised text of 4.3.5.

(b) Justify the TLAA disposition of the steam generator tube fatigue due to FIV in accordance with 10 CFR 54.21(c)(1)(iii), or reassess TLAA to include the disposition of the steam generator tube fatigue TLAA due to FIV accordance with 10 CFR 54.21(c)(1)(i).

(c) Provide an updated UFSAR supplement section LRA Appendix A commensurate with the amended TLAA Section 4.3.5.

RAI 4.7.15-1

Background
In its response to RAI 4.7.15-1, the applicant dispositioned the steam generator tube wear TLAA in accordance with 10 CFR 54.21(c)(1)(i). The applicant stated that the basis for its disposition of the wear TLAA was the stretch power uprate (SPU) previously approved in staff's SER (Adams Accession No. ML050140453). The staff noted that the applicant received a 1.7% Measurement Uncertainty Recapture approval on 05/22/2006 (Adams Accession No. ML061360034).

Issue
The staff noted that the SPU approved in the staff's SER (ML050140453) is for 5.2% power increase and it was discussed in the revised LRA Section 4.3.5. However, section 4.7.15 indicated that the power uprate is 7.4%. It is not clear if the actual power uprate is for 5.2% or for 7.4%. The staff noted that, in the staff's SER of SPU, tube wear increased from approximately 0.003 inches to approximately 0.005 inches at the 5.2% uprated condition.

The staff could not confirm the adequacy of UFSAR supplement summary for the TLAA for the Steam Generator Tubes wear due to FIV for Section 4.7.15 because the applicant did not add a new section in LRA Appendix A for LRA Section 4.7.15.

Request
(a) Clarify or reconcile the actual power uprate applicable for the period of extended operation and amend LRA Sections 4.3.5 and 4.7.15 accordingly.

(b) Provide an updated UFSAR supplement section in LRA Appendix A commensurate with the added TLAA Section 4.7.15.

Follow up RAI 4.3.7-1b

Background
In its respond to RAI 4.3.7-1, the applicant stated that there are B31.1 piping, piping components, and piping elements that are within the scope of the license renewal.

Issue
The applicant did not amend LRA Section 4.3.7 to include piping and piping components that were designed in accordance with B31.1 rules as part of the non-class 1. The staff noted that that only ASME Section III Class 2 and 3 are considered as non-class 1 in LRA Section 4.3.7.

Request
For consistency, amend LRA Section 4.3.7 and applicable LRA Appendix A Section to include piping and piping components that were designed in accordance with B31.1 rules as part of the Non-class 1.

Follow up RAI 4.7.9-1b

Background:

In its response to RAI 4.7.9-1, the applicant stated that there is no specific aging effect identified for canopy seal clamp assemblies. The applicant stated that there is an aging effect identified for the Head Adapters since a fatigue analysis was developed using design transients over the current operating term. In LRA Section 4.7.9, the applicant stated that the canopy seal clamp assemblies were designed for a 40 year design life on the basis of meeting stress limits.

Issue:

From the review of LRA Table 3.1.2-2, the staff did not find an AMR line item that addresses head adapters and associated aging effect. Furthermore, in the revised LRA Section 4.7.9, the applicant stated that the canopy seal clamp assemblies were designed for a 40 year design life and fatigue analysis is performed for the head adapters. The applicant has not identified, in the LRA, the relationship between the canopy seal clamp assemblies and the head adapters. The applicant also has not demonstrated how the head adapter's 60-year evaluation support the canopy seal clamp assemblies design life basis of meeting stress limits. Furthermore, the UFSAR Supplement Appendix A.2.4.5.7 was not revised to reflect the change made to LRA Section 4.7.9 summary description.

Request:

(1) Identify the AMR line item, in the LRA Section 3 Tables, that is applicable to the head adapters or justify that an AMR line item is not needed for the head adapters.

(2) Clarify and explain how the head adapters' 60-year TLAA evaluation support the canopy seal clamp assemblies design life basis of meeting stress limits.

(3) Provide an updated UFSAR supplement section in LRA Appendix A commensurate with the change in LRA Section 4.7.9.