CCNPP3COLA PEmails

From: Arora, Surinder
Sent: Thursday, September 03, 2009 3:36 PM
To: Poche, Robert; Jennifer.McQueeney@unistarnuclear.com; michael.stevenson@unistarnuclear.com
Cc: CCNPP3COL Resource; Chakrabarti, Samir; Samaddar, Sujit; Colaccino, Joseph; Miernicki, Michael; Biggins, James; Simon, Marcia; Vrahoretis, Susan
Subject: CCNPP3 - DRAFT RAI 167 SEB2 3607
Attachments: Draft RAI 167 SEB2 3607.doc

Rob,

Attached is DRAFT RAI No. 167 (eRAI No. 3607). You have until September 18, 2009 to review it and decide whether you need a conference call to discuss it before the final issuance. After the call or after September 18, 2009, the RAI will be finalized and sent to you for response. You will then have 30 days to respond.

Thanks.

SURINDER ARORA, PE
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Subject: CCNPP3 - DRAFT RAI 167 SEB2 3607
Sent Date: 9/3/2009 3:35:40 PM
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From: Arora, Surinder

Created By: Surinder.Arora@nrc.gov

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MESSAGE	555	9/3/2009 3:35:42 PM
Draft RAI 167 SEB2 3607.doc	36858	

Options
Priority: Standard
Return Notification: No
Reply Requested: Yes
Sensitivity: Normal
Expiration Date:
Recipients Received:

Request for Additional Information No. 167 (eRAI 3607)
Draft
9/3/2009

Calvert Cliffs Unit 3
UniStar
Docket No. 52-016
SRP Section: 03.07.02 - Seismic System Analysis
Application Section: FSAR Section 3.7.2

QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)

03.07.02-32

Follow-up Question to RAI 65, Question 03.07.02-3

The staff reviewed the response to RAI No. 65, Question 03.07.02-3, submitted by the applicant in its letter UN#09-291 dated June 12, 2009. The staff noted that the applicant will quantify the building seismic relative displacements in a structure-soil-structure interaction (SSSI) analysis of the Ultimate Heat Sink (UHS) Makeup Water Intake Structure (MWIS) and the UHS Electrical Building (EB) after a geotechnical site investigation. Since this analysis will provide input for design of seismic category I buried commodities, please confirm that the SSSI analysis was performed and the results used for design of seismic category I buried commodities, and update the FSAR accordingly.

03.07.02-33

Follow-up Question to RAI 65, Question 03.07.02-5

The staff reviewed the response to RAI No. 65, Question 03.07.02-5, submitted by the applicant in its letter UN#09-291 dated June 12, 2009. The applicant stated in the response that GT STRUDL element type SBHQ6 was used in the finite element analysis of the Ultimate Heat Sink (UHS) Makeup Water Intake Structure (MWIS). The SBHQ6 element is a stretching and bending element appropriate for thin plates and shells. However, the foundation and some of the walls of this structure have low span-to-depth ratios such that out-of-plane shear deformations could be significant. Therefore, please provide a technical basis for using the SBHQ6 element for the static analysis of the UHS MWIS.

03.07.02-34

Follow-up Question to RAI 65, Question 03.07.02-7

The staff reviewed the response to RAI No. 65, Question 03.07.02-7, submitted by the applicant in its letter UN#09-291 dated June 12, 2009. The staff noted that the applicant's current analysis of the Ultimate Heat Sink (UHS) Makeup Water Intake Structure (MWIS) is based on preliminary soil data, and a soil-structure interaction (SSI) analysis that will include effects of ground water will be performed after further geological

investigations. Therefore, please provide a detailed description of the SSI analysis of the UHS MWIS including the boundary conditions, modeling assumptions, how the dynamic input was determined, how ground water effects were accounted for, and revise the FSAR accordingly.

03.07.02-35

Follow-up Question to RAI 65, Question 03.07.02-8

In order for the staff to complete its review of response to RAI No. 65, Question 03.07.02-8, submitted by the applicant in its letter UN#09-291 dated June 12, 2009, please provide the following additional information:

1. Please explain the difference between the results which represent seismic and non-seismic loading combinations (north-south exterior wall) and results which represent the worst case loading condition (other structural elements) by providing the specific loading combinations used for each result, identifying the locations of the other structural elements and describing for the other structural elements how the worst case loading combination was determined.

2. FSAR Table 3E.4-2, "Demand Table for the UHS MWIS Side Walls," contains a load combination of (DL+LL+H), in which the M_{YY} moment is 418.65 kip-ft/ft. Please explain why the results for this loading combination are repeated in the bottom row of the same table.

3. Please explain why in note 1, Table 1 of Enclosure 3 of the response referred to above, the load combination of DL + LL+ H is divided by a factor of 1.5.

03.07.02-36

Follow-up Question to RAI 65, Question 03.07.02-11

In its response to RAI No. 65, Question 03.07.02-11 submitted via letter UN#09-291 dated June 12, 2009, the applicant provided reasonable assumptions regarding the preliminary design approach to account for the convective forces of sloshing water and its impact on the Ultimate Heat Sink (UHS) Makeup Water Intake Structure (MWIS). In FSAR Section 3.7.2.4 it states that during detailed design it will be confirmed that the convective forces of water sloshing have a negligible impact on both the overall design of the structure and component design. Therefore, please include in the FSAR a comparison of the results from a soil-structure interaction (SSI) analysis which includes the effect of the convective water mass with the preliminary design approach, and confirm that the convective forces on the structure are acceptable.

03.07.02-37

Follow-up Question to RAI 65, Question 03.07.02-23

The staff reviewed the applicant's response to RAI No.65, Question 03.07.02-23 submitted via letter UN#09-291 dated June 12, 2009, and found the results of the comparison of modal damping ratios using composite modal damping formulation and complex eigensolution to be acceptable. The use of 7 percent structural damping for the generation of in-structure response spectra (ISRS) is justified if the stresses in the structure are near their code allowables as this implies concrete sections are cracked. The applicant in its response to **Question 03.07.02-8** states that the use of uncracked section properties is justified for the seismic analysis of the Ultimate Heat Sink (UHS) Makeup Water Intake Structure (MWIS). This suggests that structural damping values used in seismic analysis to generate ISRS should be 4% not 7%. Therefore, please demonstrate the validity of the ISRS for the UHS MWIS currently shown in FSAR Figures 3.7-39 through 3.7-41 by comparing them with the ISRS obtained by soil-structure interaction (SSI) analysis using 4 percent structural damping per RG 1.61, and update the FSAR accordingly. Similarly, ISRS used for the UHS EB should be confirmed by the SSI analysis for that structure using 4 percent structural damping.

03.07.02-38

Follow-up Question to RAI 65, Question 03.07.02-26

The staff reviewed the applicant's response to RAI No. 65, Question 03.07.02-26 submitted via letter UN#09-291 dated June 12, 2009. The approach used by the applicant to determine the sliding forces and overturning moments considered the three components of earthquake response, and is acceptable to the staff. However, in order for the staff to complete its evaluation the applicant needs to provide the following additional information:

- The applicant stated that the stability of the Ultimate Heat Sink (UHS) Makeup Water Intake Structure (MWIS) for applicable loading is determined using the stability load combinations provided in SRP 3.8.5, Acceptance Criteria 3 (NRC, 2007a), which are listed as Load Combinations 6 to 9 in FSAR Table 3E.4-1. However the restoring moments apparently include (in addition to the self weight of the structure and the weight of the permanent equipment) the contained water during normal operation, 25% of the design live load and 75% of the design snow load. Please provide technical justification for including these additional loads in developing the restoring moment for the structure.
- It is not clear if, in calculating the resistance to sliding, the applicant has reduced the deadweight of the structure by the effect of the structure's vertical acceleration. Please include this clarification in the FSAR.
- Table 2.5-36 provides coefficients of friction for the native soils but does not provide a coefficient of friction for the structural backfill that will support the UHS MWIS foundation and the foundations of other seismic Category I structures. Please identify the coefficient of friction for structural backfill used in the sliding computation.