CCNPP3eRAIPEm Resource

From: Arora, Surinder
Sent: Thursday, March 24, 2011 10:38 AM
To: 'Poche, Robert'; 'cc3project@constellation.com'
Cc: CCNPP3eRAIPEm Resource; Jeng, David; Hawkins, Kimberly; Colaccino, Joseph; Miernicki, Michael; Wilson, Anthony; Vrahoretis, Susan
Subject: Draft RAI 301 SEB2 5566
Attachments: DRAFT RAI 301 SEB2 5566.doc

Rob,

Attached is Draft RAI No. 301 (eRAI No. 5566). You have until April 7, 2011 to review it and decide whether you need a clarification phone call to discuss any questions in the RAI before the final issuance. After the phone call or on April 7, 2011, the RAI will be finalized and sent to you for response. You will then have 30 days to provide a technically complete response or an expected response date for the RAI.

Thanks

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Request for Additional Information No. 301 (eRAI 5566)
DRAFT
3/24/2011

Calvert Cliffs Unit 3
UniStar
Docket No. 52-016
SRP Section: 03.08.04 - Other Seismic Category I Structures
Application Section: FSAR 3.8.4

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

03.08.04-17

The staff reviewed the RAI response to Question 03.08.04-6 provided in UniStar Letter UN#10-193 dated July 23, 2010 (ML102100480) and found that the RAI response addressed some of the staff's concerns; however, additional information is needed. The RAI response stated that, "In areas where the buried electrical duct banks will be below groundwater table, the buried electrical duct banks will have water-tight construction joints utilizing water stops." This is inconsistent with Subsection 3.8.4.1.8 of the CCNPP Unit 3 FSAR. Clarify this apparent inconsistency. Additionally, explain the extent to which the fluctuation of the ground water table is considered in determining where not to apply water stops in the buried electrical duct banks.

The staff needs the above information to be able to conclude in the SER that there is reasonable assurance that the first COL Item listed in Section 3.8.4.4.5 of CCNPP Unit 3 FSAR has been adequately implemented and addressed in the CCNPP Unit 3 COLA.

03.08.04-18

10 CFR 50, Appendix A, GDC 1 specifies that structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. As such, the design and analysis procedures used for Seismic Category I structures should be in accordance with corresponding quality standards and records. Rev. 7 of Calvert Cliffs Unit 3 FSAR Section 3.8.4.4.7 provides updated information about the design and analysis procedures for the Forebay and the UHS Makeup Water Intake Structure. To ensure the applicant meets SRP Acceptance Criteria 3.8.4.II.4.A and B, the staff's review of this section found that the following additional information is needed:

(a) The 7th paragraph of Section 3.8.4.4.7 describes loads considered in the static analysis for the two site-specific Seismic Category I structures. Explain why the loads of buoyancy (other than that associated with hurricane events) and pipe reactions are not included. As written, Section 3.8.4.4.7 is not consistent with the load combinations in Section 3.8.4.3 of both the EPR FSAR and CCNPP Unit 3 FSAR.

(b) Regarding seismic analysis, Section 3.8.4.4.7 indicates that the combination rule of SRSS was applied to calculate the maximum nodal accelerations, before applying the 100-40-40 rule to calculate member forces.

According to Rev. 2, as well as the latest proposed updates to Rev. 2, of U.S. EPR FSAR Section 3.7.2.4.6, for the Nuclear Island Common Basemat Structures, the algebraic summation of the acceleration time histories derived from the three directional seismic input motions is used to determine the maximum nodal accelerations. Explain why the SRSS method was used for the Forebay and the UHS Makeup Water Intake Structure, instead of the algebraic summation of the acceleration time histories.

In addition, regarding the response combination rules to calculate member forces, the staff notes that the latest proposed updates to Rev. 2 of U.S. EPR FSAR indicate that the EPR DC application now uses SRSS method instead of the 100-40-40 rule for all Seismic Category I structures. In light of this change, provide the technical basis for using the 100-40-40 rule to calculate member forces, as indicated by Rev. 7 of CCNPP Unit 3 FSAR Section 3.8.4.4.7.

(c) The last paragraph of Section 3.8.4.4.7 states that procedures for stability evaluation and bearing pressure calculation are discussed in Section 3.8.5.4.6. The staff could not find a discussion of the procedure for bearing pressure calculation in Section 3.8.5.4.6, nor in other sections of the FSAR. Explain where the discussion of the referenced procedure is provided in the FSAR.

The staff needs the above information to be able to determine whether FSAR Section 3.8.4.4.7 is consistent with SRP Acceptance Criteria 3.8.4.II.4.A and B.

03.08.04-19

The following editorial changes were identified during the review of Rev. 7 of Calvert Cliffs Unit 3 FSAR Section 3.8 and should be corrected by the applicant:

(a) In Section 3.8.4.1.11, Page 3-168, the 2nd paragraph references Figure 9.2-5 and Figure 9.2-6 for the description of the Forebay. However, the two figures do not show any information on the Forebay. Please revise the reference, or explain why these figures are referenced.

(b) In Section 3.8.4.1.11, Page 3-168, the 3rd paragraph indicates a height value of 58 ft for the UHS Makeup Water Intake Structure. This is not consistent with 69 ft that can be determined from Figure 9.2-8. Please revise the text, or provide an explanation.

(c) Section 3.8.4.1.11 references Figure 9.2-4. Information shown in Figure 9.2-4, such as the width of 60 ft of the UHS MWIS and a layout of the Electrical Building, is not consistent with the information in other places of the FSAR. Please revise the figure, or provide an explanation.

(d) On Page 3-172 of Rev. 7 of the CCNPP Unit 3 FSAR Subsection 3.8.4.4.5, near the end of the paragraph following the bulleted items, the word "Figures" is missing.

(e) In Section 3.8.4.4.7, Page 3-173, 6th paragraph, Figure 3E.4-8 should be revised to read "3E-5" because of the change in the figure numbering system.

(f) In the 2nd paragraph of Subsection 3.8.5.1.4, Figure 9.2-8 should also be

referenced since it shows a section view of the UHS MWIS.

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03.08.04-20

10 CFR 50, Appendix A,GDC 1 specifies that structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. As such, the design and analysis procedures used for Seismic Category I structures should be in accordance with corresponding quality standards and records. Rev. 7 of Calvert Cliffs Unit 3 FSAR Section 3.8.5.3 provides a list of load combinations for bearing pressure evaluation. As part of demonstrating that the listed load combinations for bearing pressure evaluation are consistent with the load combinations provided in Section 3.8.4.3 of both the EPR FSAR and CCNPP Unit 3 FSAR, explain why soil load/lateral earth pressure (H) is not included in the load combinations listed in Rev 7 CCNPP Unit 3 FSAR Section 3.8.5.3 for the bearing pressure evaluation of the Common Basemat Intake Structures (CBIS).

In addition, bearing capacity evaluation results for the Common Basemat Intake Structures (CBIS) are presented in Rev. 7 of Calvert Cliffs Unit 3 FSAR Table 3.8-3. The table shows that the maximum bearing pressure under the UHS Makeup Water Intake Structure (UHS MWIS) is 5.67 ksf. Rev. 6 of Calvert Cliffs Unit 3 FSAR Table 3.8-1 shows that the maximum dynamic bearing pressure under UHS MWIS is 9.3 ksf. Explain the large difference between the two values, considering that one more story was added to the UHS Makeup Water Intake Structure (UHS MWIS) and the size of the basemat was not changed dramatically. Also explain the large changes in the values of static and dynamic bearing capacities between Table 3.8-3 of Rev. 7 and Table 3.8-1 of Rev. 6 of the FSAR.

The staff needs the information to determine whether the foundation design of the Seismic Category I structures is consistent with SRP Acceptance Criteria 3.8.5.II.2 and 3 and has been adequately addressed in the CCNPP Unit 3 FSAR.

03.08.04-21

SRP Section 3.8.5.I.5 states that the foundation design should include the design limits imposed on the various parameters that serve to quantify the structural behavior of each foundation, emphasizing the extent of compliance with the allowable limits delineated in the SRP acceptance criteria 3.8.5.II.5. Rev. 7 of Calvert Cliffs Unit 3 FSAR Section 3.8.5.5 provides updated information about the structural acceptance criteria for foundations. The staff's review of this section found that this section is not clear as to how the sliding analysis is performed for each Seismic Category I structure. Provide a detailed description of the sliding analysis for each Seismic Category I structure. The description should include the values of itemized lateral forces applied and values of itemized shear resistance calculated for all applicable load combinations. Explain how the contribution of soil adhesion to overall soil shear resistance is considered and combined with the contribution to the soil shear resistance derived from soil internal friction. Also, explain whether the postulated maintenance condition, discussed in the last paragraph of Page 3-173, is considered in the sliding analysis and floating analysis. During this maintenance condition, interior or exterior below-grade cells may be empty.

Furthermore, explain whether a zero snow load case is considered for the SSE case in the sliding analysis.

The staff needs the information to determine whether the foundation design of the Seismic Category I structures is consistent with SRP Acceptance Criteria 3.8.5 II.5 and has been adequately addressed in the CCNPP Unit 3 FSAR.

03.08.04-22

SRP Sections 3.8.4.I.6 and SRP 3.8.5.I.6 discuss information on the materials used in the construction of Seismic Category I structures and their foundations. The staff reviewed the RAI response to Question 03.08.04-4 provided in UniStar Letter UN#10-193, dated July 23, 2010 (ML102100480), and found that the RAI response addressed most of the staff's concerns. However, the staff also found that both the RAI response and Rev. 7 of the CCNPP Unit 3 FSAR indicated that waterproofing is not needed for some Seismic Category I structures or some portions of below grade concrete of Seismic Category I structures. This is inconsistent with AREVA's final RAI response (to U.S. EPR Design Certification Application Question 03.08.05-21), which states that "Waterproofing and dampproofing systems are required for Seismic Category I foundations below grade." Furthermore, Section 3.4.2, Rev. 3 interim, of the U.S. EPR FSAR states that "Seismic Category I structures provide protection from external floods and groundwater by incorporating the following external flood protection measures: ...Portions of Seismic Category I structures located below grade elevation incorporate the use of waterstops and waterproofing to mitigate environmental deterioration of exposed surfaces and thereby minimize long term maintenance...Waterproofing and dampproofing systems shall be applied per the International Building Code, Sections 1805.2 and 1805.3." Therefore, the staff requests that the applicant address the inconsistency, and revise the RAI response to UniStar Question 03.08.04-4 and the CCNPP Unit 3 FSAR accordingly.

In addition, the staff noticed that reference to ACI 515.1R-79 is removed from Rev. 7 of CCNPP Unit 3 FSAR Subsections 3.8.4.6.1 and 3.8.5.6.1. The staff requests that the applicant explain the reason for the removal and indicate where the reference to this code or other related code(s) for the waterproofing system is provided in the FSAR. Also, explain whether the fluctuation of the groundwater table and flood level are considered in the design of the waterproofing system.

The staff needs the above information to determine whether FSAR Sections 3.8.4.6.1 and 3.8.5.6.1 are consistent with SRP Acceptance Criteria 3.8.4.II.6 and 3.8.5.II.6.

03.08.04-23

In RAI number 03.08.04-7, the staff requested that the applicant provide design reports for the site-specific structures in Calvert Cliffs Unit 3 FSAR Sections 3.8.4.4.6 (Other Seismic Category I Structures - Design Report) and 3.8.5.4.5 (Foundations - Design Report), or expand Appendix 3E.4 to include the information described in SRP 3.8.4, Appendix C. Appendix C to SRP 3.8.4 provides guidance on design reports for Seismic Category I structures.

The staff reviewed the response to RAI 03.08.04-7 provided in UniStar Letter UN#10-193, dated July 23, 2010 (ML102100480), and also reviewed Rev.7 of the Calvert Cliff Unit 3 FSAR. Relative to the guidance in Appendix C to SRP 3.8.4, the staff found that the RAI response and the revised FSAR do not provide sufficient information as requested by the RAI, and additional information is needed to resolve the RAI. Regarding Appendix 3E.4 of the Calvert Cliffs Unit 3 FSAR, explain why the design result Tables 3E-1 through 3E-4 for the Ultimate Heat Sink Makeup Water Intake Structure and the Forebay do not include the load term SPH (Standard Project Hurricane), considering that it is listed and defined in Section 3E.4.3 (Structural Loads and Load Combinations). Also, since Section 3E.4.1 identifies two critical sections in the basemat of the Common Basemat Intake Structure, explain why the design result Tables 3E-2 and 3E-3 only provide information for one critical section for the common basemat. The staff needs the above information to determine whether FSAR Sections 3.8.4.4.6 and 3.8.5.4.5 are consistent with the guidance provided in SRP 3.8.4.II.4, SRP 3.8.5.II.4 and Appendix C to SRP 3.8.4.