

## CCNPP3eRAIPEm Resource

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**From:** Arora, Surinder  
**Sent:** Monday, May 23, 2011 3:34 PM  
**To:** Robert.Poche@unistarnuclear.com; 'cc3project@constellation.com'  
**Cc:** CCNPP3eRAIPEm Resource; Jeng, David; Hawkins, Kimberly; Colaccino, Joseph; Miernicki, Michael; Wilson, Anthony; Vrahoretis, Susan  
**Subject:** Draft RAI 310 SEB2 5746  
**Attachments:** Draft RAI 310 SEB2 5746.doc

Rob,

Attached is Draft RAI No. 310 (eRAI No. 5746). You have until June 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 June 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.

**SURINDER ARORA, PE**  
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**From:** Arora, Surinder

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Request for Additional Information No. 310 (eRAI 5746)  
DRAFT  
5/23/2011

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

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

03.08.04-24

Appendix C to SRP 3.8.4 provides guidance on design reports for Seismic Category I structures. In RAI number 03.08.04-9, the staff requested that the applicant provide the technical basis for only providing the details of the design for a typical wall for each of the UHS Makeup Water Intake Structure (UHS MWIS) and the UHS Electrical Building (UHS EB), and explain why other concrete walls and slabs were not considered.

The staff reviewed the RAI response to Question 03.08.04-9 provided in UniStar Letter UN#10-193 dated July 23, 2010 (ML102100480), and also reviewed Rev. 7 of Calvert Cliffs Unit 3 FSAR Section 3.8 and Appendix 3E. The staff notes that the RAI response was issued prior to the configuration change of CCNPP Unit 3 intake structures, while Rev. 7 of the CCNPP Unit 3 FSAR incorporates the configuration change. The RAI response provided an explanation for the selection of one critical section for the UHS MWIS and one critical section for the previous UHS EB; however, the RAI response did not explain why only one wall was selected for each of the structures. The RAI response did not explain why other concrete walls and slabs were not considered. In fact, Rev. 7 of the FSAR now only identifies one critical section for the new UHS MWIS, which now is a combination of the previous UHS MWIS and UHS EB. The staff does not understand how this one critical section can represent all of the important portions of the safety related structures in terms of differences in functionality, loading conditions, structural dimensions, and other key design features. Therefore, unless it can be demonstrated that one critical section can adequately represent the design of the entire combined UHS MWIS, the staff requests that the applicant provide the details of the design for key critical wall and critical floor slab sections of the UHS MWIS. The technical basis for the selection of the key critical sections should be provided.

The staff needs the information to be able to conclude in the SER that there is reasonable assurance that the design report for site-specific Seismic Category I structures is consistent with Appendix C to SRP 3.8.4.

03.08.04-25

SRP acceptance criteria 3.8.4.II.6 and 3.8.5.II.6 discuss information on the material used in the construction of Seismic Category I structures and their foundations. The staff reviewed the RAI response to Question 03.08.04-10 provided in UniStar Letter UN#10-193 dated July 23, 2010 (ML102100480), and also reviewed Rev. 7 of Calvert Cliffs Unit 3 FSAR Section 3.8 and Appendix 3E.

The RAI response regarding the requirement of concrete water-cement ratio addressed the original RAI question. Regarding the requirement of the minimum compressive strength, the RAI response states that, "According to the durability requirements

presented in Chapter 4 of ACI 349, the minimum compressive strength shall be 5000 psi for concrete exposed to brackish water. For concrete exposed to sulfate, the minimum compressive strength shall be 4500 psi for severe or very severe exposure. A minimum compressive strength of 5000 psi satisfies both requirements and is specified for other Seismic Category I structures addressed in revised CCNPP Unit 3 FSAR Section 3.8.4, including buried concrete pipes and duct banks. This requirement is also applicable to Seismic Category II and II-SSE concrete structures." The staff noted that Rev. 7 of Calvert Cliffs Unit 3 FSAR Section 3.8.4.6.1 has been revised to state that "...concrete mixtures for Seismic Category I Forebay, UHS Makeup Water Intake Structure and buried utilities (i.e., buried concrete electrical duct banks and pipes) will have ... a minimum specified compressive strength of 5000 psi. A maximum water-cementitious materials ratio of 0.4 is also specified for the Essential Service Water Building as they can also be exposed to the brackish water." However, it is not clear to the staff that a minimum concrete compressive strength of 5000 psi is specified for the foundations of the ESWBs.

Clarify that a minimum compressive strength of 5000 psi is used for the ESWB foundations, as well as for all other foundations for Seismic Category I concrete structures exposed to brackish water. If not, provide the technical basis for any alternate criteria that are used. Also provide the technical basis for the assumption that other Seismic Category I structures adjacent to the ESWB will not be exposed to the brackish water. Revise the RAI response and the FSAR Sections 3.8.4.6.1 and 3.8.5.6.1 accordingly.

The staff needs the information to be able to conclude in the SER that there is reasonable assurance that the applicant's implementation of the design code requirements for other SC-I structures are consistent with SRP acceptance criteria 3.8.4.II.6 and 3.8.5.II.6.

#### 03.08.04-26

SRP acceptance criterion 3.8.4.II.7 discusses information on testing and inservice surveillance requirements. The staff reviewed the RAI response to Question 03.08.04-12 provided in UniStar Letter UN#10-193 dated July 23, 2010 (ML102100480) and found that the response addressed most of the staff's concerns. The staff notes that Rev. 7 of CCNPP Unit 3 FSAR Section 3.8.4.7 states that, "The buried duct banks have shallow embedment depth. Therefore, the condition of the buried concrete duct banks in the utility corridor that may be exposed to low-pH groundwater of the Surficial aquifer will be monitored by excavating the surrounding soil. The frequency of this monitoring will be determined based on the groundwater level and pH values recorded by the groundwater monitoring program described in Section 3.8.5.7." The RAI response has sentences similar to the first and the second sentences quoted above.

The staff requests that the applicant explain whether the monitoring program discussed above, for buried concrete duct banks that may be exposed to low-pH groundwater, also covers buried piping (concrete or steel) that may be exposed to low-pH groundwater. If yes, revise the response and the FSAR accordingly. Otherwise, explain where in the FSAR the monitoring program, for buried piping that may be exposed to low-pH groundwater, is discussed and describe the technical basis for this program.

The staff needs the information to be able to conclude in the SER that there is reasonable assurance that inservice inspection requirements for buried Seismic Category I structures and piping are consistent with SRP acceptance criteria 3.8.4.II.7.

03.08.04-27

The staff reviewed the RAI response to Question 03.08.04-2 provided in UniStar Letter UN#10-193 dated July 23, 2010 (ML102100480) and found that the responses to Items 2 and 3 are adequate. However, the following information is needed to address Item 1 of the RAI.

Regarding the hurricane parameters and the calculation for wave pressure distributions, the staff reviewed Rev. 7 of CCNPP Unit 3 FSAR Section 3.8. The staff found Rev. 7 of FSAR Section 3.8.4.3.1 states that, "The wave pressures on the north and west walls (of the UHS Makeup Water Intake Structure) are calculated based on the breaking wave heights corresponding to the still water depths," while the RAI response indicated that wave pressures on the west and south walls were estimated based on corresponding applicable breaking wave heights. The staff requests that the applicant explain whether the wave pressures on all the exterior walls of UHS MWIS were estimated based on the breaking wave heights and revise the FSAR Section 3.8.4.3.1 accordingly.

The staff needs the information to be able to conclude in the SER that there is reasonable assurance that design loads for the site-specific Category I structures have been adequately addressed in the CCNPP Unit 3 FSAR.

03.08.04-28

SRP acceptance criterion 3.8.4.1.5 states that the design of other Seismic Category I structures should include the design limits imposed on the various parameters that serve to quantify the structural behavior of each structure and its components, with specific attention to stresses, strains, gross deformations and factors of safety against structural failure. Rev. 7 of Calvert Cliffs Unit 3 FSAR Section 3.8.4.5 provides structural acceptance criteria (design limits) for structures. Specific structural acceptance criteria are provided for the buried UHS Makeup Water Pipes and CCNPP Unit 3 Intake Pipes. However, no specific structural acceptance criteria are provided for buried Essential Service Water Pipes. As indicated in Section 3.8.4.4.5, Seismic Category I buried pipes include buried Essential Service Water Pipes, buried UHS Makeup Water Pipes, and buried CCNPP Unit 3 Intake Pipes. Furthermore, Rev. 3 of the FSAR Section 3.8.4.5 included the acceptance criteria for Essential Service Water Pipes. Therefore, explain why the acceptance criteria for buried Essential Service Water Pipes were removed from Rev. 7 of the FSAR Section 3.8.4.5. The staff needs the above information to be able to conclude in the SER that there is reasonable assurance that FSAR Section 3.8.4.5 follows the guidance of SRP 3.8.4 II.5.