

## CCNPP3eRAIPEm Resource

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**Sent:** Monday, October 15, 2012 8:19 AM  
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**Cc:** CCNPP3eRAIPEm Resource; Segala, John; Wilson, Anthony; Thomas, Brian; Chakrabarti, Samir; Miernicki, Michael; McLellan, Judith  
**Subject:** CCNPP3 - Draft RAI 370 SEB 6691  
**Attachments:** DRAFT RAI 378 SEB 6726.doc

Paul,

Attached is Draft RAI No. 378 (eRAI No. 6726) pertaining to section 3.7.2 of the Calvert Cliffs Unit 3 FSAR. Note that this RAI is a follow up to your response to Question 3.7.2-45 of RAI 253 (eRAI 4788). You have until October 29, 2012 to review it and decide whether you need a conference call to discuss the RAI before the final issuance. After the phone call or after October 29, 2012, the RAI will be finalized and sent to you for your 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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## Request for Additional Information 378 (eRAI 6726)

DRAFT

Issue Date: 10/15/2012

Application Title: Calvert Cliffs Unit 3 - Docket Number 52-016

Operating Company: UniStar

Docket No. 52-016

Review Section: 03.07.02 - Seismic System Analysis

Application Section: FSAR 3.7.2

### QUESTIONS

03.07.02-75

#### Follow up Question to RAI, Question 03.07.02-45

In RAI 253, Question 03.07.02-45 the applicant was asked to provide the details of analysis for those portions of the Fire Protection System (FPS) designated as Seismic Category (SC) II-SSE including an explanation of how ISRS for mechanical/electrical equipment designated as SC II-SSE would be developed. The applicant was also asked to provide a table to identify the response spectrum (site SSE or CSDRS) to be used in the analysis and design of Category II-SSE structures, systems and components (SSC's) and Category II SSC's in the proximity of Category I SSC's. Finally, the applicant was requested to provide additional information describing the methods of analysis, allowable stresses and piping design codes that will be used to qualify SC II and SC II-SSE FPS's.

In its response the applicant stated that it was removing the Category II-SSE classification of FPS from the CCNPP Unit 3 COLA and that the FPS would be seismically qualified consistent with U.S. EPR FSAR Revision 3 Sections 3.2, 3.7. 2.8, and 9.5. With this change, the Fire Protection Building (FPB) and Fire Water Storage Tanks (FWSTs) are now classified as conventional seismic (CS) structures. Fire Water (FW) distribution piping is classified as (a) Category II (Cat II) for piping within Category I (Cat I) facilities; (b) Cat I for piping within penetraton of containment; and (c) Non-Seismically Classified (NSC) elsewhere. SSC's categorized as CS will comply with SRP Acceptance Criteria 3.7.2.8A in that the collapse of a non Category I structure will not cause the non Category I structure to strike a category I structure. Included in the applicant's response were markups to the COLA providing the revised requirements for the CCNPP Unit 3 FPS.

Section 3.2.1.f.vi of Regulatory Guide (RG) 1.189, Revision 2 states in part "Provisions should be made to supply water to at least two standpipes and hose connections for manual firefighting in areas containing equipment required for safe plant shutdown in the event of an SSE. The piping system serving such hose stations should be analyzed for SSE loading and be provided with support to ensure pressure integrity". It is not clear from the applicant's response how these provisions are met by the changes to the FP seismic classifications and by the revised COLA sections submitted as part of the applicant's response. The staff notes a number of inconsistencies in the applicant's response and has concerns regarding the design basis and design requirements for the FPS. These are itemized in the following:

- a. In Enclosure 2, page 14 of 38 it states that Section 3.2.1 categorizes Fire Protection SSC into two categories: 1) SSC that must remain functional during and after an SSE; and 2) SSC that must remain intact after an SSE without deleterious interaction with any Seismic Category I SSC. In the revised markup of Section 3.2.1 the staff could not find where the FPS was divided into these two categories. Therefore, the applicant is requested to identify each portion of the CCNPP Unit 3 FPS along with its seismic classification that come under these categories and include this information in the FSAR.
- b. In CCNPP Unit 3 FSAR Section 3.7.2.3.4, "Conventional Seismic (CS) Structures," it states there are no departures or supplements. In U.S.EPR FSAR Section 3.7.2.3.4 it states that analysis and design of CS building structures will be in accordance with the applicable requirements of the IBC and other codes, as appropriate. This is inconsistent with the analysis and design for the CS structures proposed in CCNPP Unit 3 FSAR Section 3.7.2.8 in that significant additional requirements have been imposed on the FPB and FWSTs. The applicant is requested to expand the description in CCNPP Unit 3 FSAR Section 3.7.2.3.4 to include directly or by reference the design requirements for the FPB, FWSTs and any other CS structures which have requirements over and above those stated in U.S. EPR FSAR Section 3.7.2.3.4.
- c. In Enclosure 2, page 5 of 38, CCNPP Unit 3 FSAR Section 3.2.1.2 markup states that SSC's classified as SC II are designed to withstand SSE seismic loads without incurring a structural failure that permits deleterious interaction with any SC I SSC or that could result in injury to main control room occupants. However, on page 18 of 38 which addresses buried pipe and pipe ducts it states that in accordance with Section 3.2.1, Fire Protection piping to Seismic Category (SC) I structures that is classified as: 1) SC II is designed to maintain its pressure boundary after an SSE event; and 2) is designed to remain functional during and following an SSE event. First, as written it is not clear whether all FP piping connected to SC I structures is classified as SC II and is designed to maintain its pressure boundary and remain functional during and after an SSE event. Second, Section 3.2.1 does not reflect these additional requirements. FSAR Section 3.2.1 should be revised to identify the specific seismic requirements applicable to the FPS and the sentence on page 18 of 38 should be rewritten to make clear what the seismic requirements are for FP piping connected to SC I structures.

d. In Enclosure 1, page 3 of 5 it states that SSCs categorized as CS comply with SRP 3.7.2 Acceptance Criteria 8A. This criteria requires that the collapse of a non-category I structure will not cause the non-category I structure to strike a Category I structure. However, COLA mark-up for FSAR Section 3.7.2.8, Interaction of Non-Seismic Category I Structures with Seismic Category I Structures,” does not include this information. Further, it is not clear what criteria will be used to determine that the collapse of a non-category I structure will not result in its striking a category I structure. The applicant is requested to revise CCNPP FSAR Section 3.7.2.8 to include the SRP 3.7.2 Acceptance Criteria 8A for SSCs categorized as CS and provide the criteria that will be invoked to assure CS SSCs meet this SRP guidance.

e. In Enclosure 1, page 4 of 5, it states that the seismic design of the FWSTs is in accordance with the American Society of Civil Engineers (ASCE) Standard ASCE 43-05. However this standard does not specifically address the analysis of tanks. The applicant is requested to provide, in addition to the applicable references, the specific analysis methods, seismic models, seismic input, and acceptance criteria that will be used to seismically qualify the FWSTs and include this information in Section 3.7.3 of the FSAR.

f. In Enclosure 2, page 15 of 38 it states that the FPB and the FWSTs are designated as SC II. For the FPB and FWSTs this statement does not agree with the seismic classification provided in Table 3.2-1. The applicant is requested to resolve this discrepancy throughout the CCNPP FSAR so it is clear as to what seismic classification the FPB and FWSTs belong.

g. In Enclosure 2, page 10 of 38 after discussion of the SC II Circulating Water Makeup Intake Structure it states that other site-specific SC II structures are designed using conventional codes and standards, but are also analyzed for site SSE. However this is not true for the SC II Access Building, Turbine Building, and Switchgear Building which according to CCNPP FSAR Section 3.7.2.8 are designed to have the same margin of safety as a SC I structure and are designed using the same codes as those used for SC I structures. In addition the use of conventional codes and standards for other site-specific SC II structures may not meet the requirement stated in Enclosure 2, page 5 of 38 which is that SSC classified as SC II must be designed to withstand SSE seismic loads without incurring a structural failure that permits deleterious interaction with any SC I SSC. The applicant is requested to revise the writeup in CCNPP FSAR Section 3.7.2.3.3, “Seismic Category II Structures,” to make it consistent with the requirements for each of the SC II structures described in the CCNPP FSAR and to explain how the use of conventional codes and standards will prevent the deleterious interaction of a SC II with a SC I structure.

h. In Enclosure 2, page 15 of 38 it states that the buried FP SSC identified in Table 3.2-1 are seismically analyzed using the design response spectra identified in 3.7.1.1.1.4. It states “These piping mains will be designed according to ASCE 4-98, 1983 ASCE Report ‘Seismic Response of Buried Pipes and Structural Components,’ and the AREVA Topical Report ANP 10264, ‘US. EPR Piping Analysis and Pipe Support Design Topical Report’.” The 1983 ASCE report is not identified in FSAR Section 3.7.3.12 which addresses the analysis of buried FP pipe. The applicant is requested to explain this omission and describe what additional requirements from the 1983 ASCE report will be applied to the analysis and design of buried FP pipe and to include this information in Section 3.7.3 of the FSAR. In addition, the AREVA Topical Piping Report only addresses the qualification of ASME III piping (safety class 1,2, and 3). According to Table 3.2-1 of the markup, the FP piping is qualified using the provisions of ANSI/ASME B31.1. The applicant is requested to explain how the AREVA Topical Piping Report is applicable to seismic qualification of the FP piping. Lastly, buried FP SSC are not explicitly identified in Table 3.2-1 even though this is indicated to be the case in the applicant’s response. The applicant is requested to revise Table 3.2-1 to include the identification of buried FP SSC.

i. In Enclosure 2, Table 3.2-1 of the response, a portion of SSCs in component code SGA are designated as SC II and are required to provide safe shutdown equipment protection following an SSE. This is inconsistent with the definition of SC II provided on response page 5 of 38 which only requires that SC II SSCs be designed to withstand SSE seismic loads without incurring a structural failure that permits deleterious interaction with any Seismic Category I SSC. The applicant is requested to resolve this discrepancy.

j. In Enclosure 2, page 29 of 38 provides ITAAC for the FPB and FPT structural fill material. There is no requirement to perform field measurements of the shear wave velocity of the fill material. As the applicant is requiring shear wave velocities to be obtained for SC II structures, which are not required to remain functional after an SSE, the applicant is requested to justify why shear wave velocity information is not required for the FPB which, according to page 30 of 38, is required to remain functional during and after an SSE. The applicant is also requested to address why the ITAAC requirements of the FPB are also not applicable to the FWSTs.

k. In Enclosure 2, the ITAAC of Tables 2.4-21, 2.4-24 and 2.4-25 identify seismic qualification reports as Acceptance Criteria for the FPB ventilation system, FW distribution system, and Fire Suppression Systems, respectively. The applicant is requested to identify the source(s) of the seismic input and the method of seismic qualification for the FPB ventilation system, FW distribution system, and Fire Suppression Systems and include this information in Section 3.7.3 of the FSAR. For the FPB ventilation system and other portions of the Fire Protection System supported within the FPB and other structures, the applicant is requested to identify how the seismic input for these SSCs will be developed.

l. In Enclosure 2, the ITAAC of Table 2.4-21 provide Commitment Wording, Inspections, Tests or Analysis, and Acceptance Criteria for portions of the UHS Fire Protection Building System piping and ducting implying that portions of the system are SC I. However, in CCNPP FSAR Table 3.2-1 there is no system identified by this name nor is any part of the Fire Protection System in Table 3.2-1 designated as SC I. The applicant is requested to provide additional details regarding this system including its description, location, design requirements and include this information in the CCNPP FSAR Table 3.2-1 and FSAR Section 3.7.

m. In Enclosure 2, ITAAC Table 2.4-24 for item c under the column “ Inspection Test or Analysis” it states in part that type tests, analyses or a combination of tests and analyses will be performed on the piping identified as SC II using analytical assumptions or under conditions which bound the SC I design requirements. As this piping has been designated as SC II under the Commitment Wording Column, the applicant is requested to explain this apparent disagreement in the designation of the Fire Water Distribution System seismic classification.

In summary, the revised markup provided by the applicant is inconsistent in its definition of the seismic categories and lacks specific criteria for the design and analysis of various portions of the FPS that must remain functional during and after an SSE event. As the response is currently written, the staff is unable to determine what the seismic design requirements are for the CS and SC II portions of the FPS and how these requirements are being met. Also, it is not sufficient to state that the seismic design of the FPB is in accordance with ASCE 43-05 since that standard has not been endorsed by the NRC. If ASCE 43-05 is referenced, the provisions of the Standard that are being used should be clearly described with justification provided as to how their use will meet the FPS design requirements. Therefore, in addition to addressing the staff concerns in items a through g above the applicant is requested to provide the following additional information regarding the seismic design for the CCNPP Unit 3 FPS:

n. Provide a table which identifies the seismic classification for each portion of the FPS to include:

- i. Safety classification
- ii. Seismic category
- iii. Applicable design codes
- iv. Design requirement (no seismic requirement/must remain structurally intact under an SSE/must maintain its pressure boundary under an SSE/must remain functional during and after an SSE)

o. For each SSC that must remain structurally intact under an SSE; must maintain its pressure boundary under an SSE; or must remain functional during and after an SSE the applicant is requested to provide the seismic inputs, type of seismic model, methods of analysis, and the acceptance criteria that are imposed which ensure that the SSC will meet its applicable design requirement and to include this information in the appropriate section of the FSAR.