

## CCNPP3eRAIPEm Resource

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**From:** Arora, Surinder  
**Sent:** Wednesday, August 14, 2013 2:24 PM  
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**Cc:** CCNPP3eRAIPEm Resource; Segala, John; Wilson, Anthony; Xu, Jim; Chakrabarti, Samir; Miernicki, Michael; McLellan, Judith  
**Subject:** Draft RAI 395 SEB2 7201  
**Attachments:** DRAFT RAI 395 SEB2 7201.docx

Paul,

Attached is Draft RAI No. 395 (eRAI No. 7201) pertaining to section 3.7.1 of the Calvert Cliffs Unit 3 FSAR. Note that this RAI is a follow up to your response to Question 03.07.01-18 of RAI 344 (eRAI 6470). You have until August 28, 2013 to review it and decide whether you need a clarification phone call to discuss the RAI question before the final issuance. After the phone call or after August 28, 2013, 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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**Hearing Identifier:** CalvertCliffs\_Unit3Col\_RAI  
**Email Number:** 316

**Mail Envelope Properties** (B46615B367D1144982B324704E3BCEED010439C344F8)

**Subject:** Draft RAI 395 SEB2 7201  
**Sent Date:** 8/14/2013 2:24:00 PM  
**Received Date:** 8/14/2013 2:24:02 PM  
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<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	846	8/14/2013 2:24:02 PM
DRAFT RAI 395 SEB2 7201.docx		33410

**Options**

**Priority:** Standard

**Return Notification:** No

**Reply Requested:** No

**Sensitivity:** Normal

**Expiration Date:**

**Recipients Received:**

# Request for Additional Information 395 (eRAI 7201)

DRAFT

Issue Date: 08/14/2013

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

Operating Company: UniStar

Docket No. 52-016

Review Section: 03.07.01 - Seismic Design Parameters

Application Section: FSAR 3.7.1

## QUESTIONS

03.07.01-19

### Follow Up Question to RAI 344, Question 03.07.01-18

In RAI 344, Question 03.07.01-18 the applicant was asked to explain certain inconsistencies in the specified values of shear wave velocities provided with the response to RAI 314, Question 03.07.01-17 (bullet 3) and to clarify structural fill installation requirements as applicable to the Fire Protection Building (FPB) and the Fire Protection Tanks (FPTs). The lack of consistency in shear wave velocity values has been corrected. In addition the applicant has clarified the requirements for the backfill under the FPB and FPTs as being the same as the requirements for the back fill. The staff finds this change to be adequate. However, the staff has other concerns regarding the response which need to be addressed:

1. In part 1 of the response the applicant has provided the backfill low strain best estimate shear wave velocities. These are shown in Figure 1 of the response as the best estimate low strain velocity profile. Since it was not clear from the response, the applicant is requested to describe how the backfill low-strain best estimate shear wave velocities were determined.
2. In part 4 of the response, the applicant describes how the best estimate strain compatible shear wave velocities for the structural backfill were determined from a site response analysis. The acceptance criteria of Standard Review Plan (SRP) 3.7.2 states under special guidelines for soil-structure interaction (SSI) analysis that seismic demands be computed for a minimum of three soil cases; best estimate (BE), lower bound (LB) and upper bound (UB), wherein the upper and lower bound shear modulus is defined in terms of the best estimate value as:

$$GLB=GBE / (1+COV)$$

$$GUB=GBE \times (1+COV)$$

The coefficient of variation (COV) for well-investigated sites should be no less than 0.5 and otherwise should be taken as a value of at least 1.0. The applicant in its response has assumed a COV of 0.5 in establishing the upper and lower bound strain compatible shear wave velocities for the backfill. The requirements for computing seismic demands from three soil cases are part of the conservatism included in the design process that are intended to provide sufficient design margin to achieve the performance goal of  $1 \times 10^{-5}$  for nuclear power plants. Since the structural backfill properties used in the response analysis are not based on in-situ field tests, they should be treated as preliminary. Therefore, the applicant is requested to provide the basis for using a COV of 0.5 for determining upper and lower bound shear wave velocities instead of a value of at least 1.0.

3. In part 5 of the response a new acceptance criteria for the shear wave velocity ITAAC is defined and presented in Figure 2 and Table 7. The acceptance criteria for the backfill shear wave velocity values are apparently based on the difference between the BE SSI profile and the LB SSI profile. The response goes on to state that the selected acceptance criteria shear wave velocity profile ensures that that the expected corresponding strain compatible profiles fall within the range used in the SSI analysis of the CCNPP Unit 3 building facilities. The response concludes that a strain-compatible profile that results from a low strain profile that is close to the acceptance criteria defined in Figure 2 will be within the bounds of the CCNPP Unit 3 SSI analysis.
  - a. The applicant is requested to explain how the shear wave velocity ITAAC Acceptance Criteria based the difference between the BE SSI profile and LB SSI profile was determined.
  - b. The shear wave velocities shown in Figure 2 which comprise the acceptance criteria are less than those of the low-strain best estimate shear wave velocities. Since the applicant has already assumed the minimum SRP COV value of 0.5 in determining the lower bound strain compatible shear wave velocities, the use of the ITAAC acceptance criteria profile in a randomization process to determine strain compatible shear wave velocities can only result in lower bound strain compatible shear wave velocities that are less than the values assumed in the SSI analysis, not greater than these values as stated in the applicant's response. The applicant is therefore requested to provide the basis for its conclusion that a

strain-compatible profile that results from a low strain profile that is close to the acceptance criteria defined in Figure 2 will be within the bounds of the CCNPP Unit 3 SSI analysis.

4. Although founded on native soil, the common basemat intake structure (CBIS) is surrounded by backfill from the basemat up to grade elevation. To ensure the backfill impedance is consistent with that of the surrounding native soil and consistent with the values identified in the response to RAI 304, Question 03.07.01-17, Item 1 (Bullet 1) the applicant is requested to include requirements for the CBIS backfill in the Engineered Fill ITAAC of Table 2.4-1.