

## CCNPP3eRAIPEm Resource

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**From:** Arora, Surinder  
**Sent:** Wednesday, February 20, 2013 7:45 AM  
**To:** Infanger, Paul; UNECC3Project@unistarnuclear.com  
**Cc:** CCNPP3eRAIPEm Resource; Segala, John; Wilson, Anthony; Karas, Rebecca; Stieve, Alice; Ford, Tanya; McLellan, Judith; Seber, Dogan  
**Subject:** CCNPP3 - Final RAI 385 RGS2 6950  
**Attachments:** FINAL RAI 385 RGS2 6950.doc

Paul,

Attached to this email message is Final RAI No. 385 (eRAI No. 6950) pertaining to Section 2.5 of the FSAR for the Combined License Application for CCNPP3. The draft of this RAI was issued to UniStar on January 30, 2013. A clarification phone call, requested by UniStar, was held on February 14, 2013; however, no changes to the draft questions were required by this clarification phone call. This email, therefore, transmits the "final" version of the RAI with no changes to the previously transmitted draft questions.

The schedule that we have established for review of your application assumes that your technically complete response to the RAI question or a schedule for providing the response must be received within 30 days of the final RAI. Please note that if you are providing a response schedule in lieu of the technically complete response, the staff will re-evaluate the completion schedule of the chapter based on your proposed response date.

Additionally, please make sure that your response letter includes a statement whether or not your response contains any sensitive or proprietary information.

Thanks.

**SURINDER ARORA, PE**  
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## **Request for Additional Information 385 (eRAI 6950)**

Issue Date: 2/20/2013

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

Operating Company: UniStar

Docket No. 52-016

Review Section: 02.05.01 - Basic Geologic and Seismic Information

Application Section:

### **QUESTIONS**

02.05.01-70

In response to supplemental RAI 219, Question 2.5.1-65, April 30, 2010, UniStar provided a revised map with earthquakes from two seismicity catalogs, EPRI-SOG (1986) and the revised earthquake catalog (1985-2006). UniStar also provided information regarding the earthquake location uncertainty, especially with respect to the Newark and Richmond basins.

In support of 10 CFR 100.23, please revise these figures per the new earthquake catalog developed for the CEUS SSC and review and revise the previously provided discussion as needed with respect to earthquake location uncertainty.

02.05.01-71

This question pertains to supplemental response to RAIs 284, 322, and 345 and the COLA Markups submitted with letter UN#12-127, November 20, 2012.

In FSAR Section 2.5.1, Regional tectonic setting, staff notes that UniStar has deleted the discussion of Schulte and Mooney, 2005 and Johnston et al, 1994. In a previous RAI (2.5.1-63) concerned with seismicity and extended crust, NRC specifically asked that a discussion of these two investigations be included in the FSAR.

In support of 10 CFR 100.23, please reinstate this discussion in the FSAR.

02.05.01-72

This question pertains to supplemental response to RAIs 284, 322, and 345 and the COLA Markups submitted with letter UN#12-127, November 20, 2012.

In FSAR Section 2.5.1, Stafford Fault of Mixon, UniStar states: However, the interpretation of these offsets as tectonic in origin is equivocal, simply because the offsets are so small. UniStar also states: On this basis, the conclusions developed by Powars et al. (Powars, 2010b) are considered speculative, and the Stafford fault system is therefore not considered a capable tectonic source.

Staff notes that since Powars et al reports that the fault offsets Pleistocene terrace deposits, this is an indication that the fault might be Quaternary. In support of 10 CFR 100.23, please discuss the specific evidence provided by Powars et al about the fault. Justify how the dimensions of fault offset render the interpretation equivocal. Provide the basis for a conclusion that the SFS does not impact site suitability or design basis.

02.05.01-73

This question pertains to supplemental response to RAIs 284, 322, and 345 and the COLA Markups submitted with letter UN#12-127, November 20, 2012.

In FSAR Section 2.5.1, National Zoo Faults UniStar states: More recently, Southworth et al. (Southworth, 2007) suggested that some discrete younger thrust faults of the Rock Creek shear zone near the National Zoo have placed crystalline rocks against Tertiary and Quaternary sediments. Additional studies are planned by the USGS to further investigate the age of deformation in the area, and the lateral continuity of the faults. Nonetheless, it is concluded that the National Zoo faults are not a capable tectonic source, given the lack of seismicity spatially associated with the fault zone.

Staff notes that crystalline basement rock in fault contact with Quaternary age sediments indicates the fault is potentially Quaternary age. Staff also notes that geologically young faults are considered in the safety review for their impact on site suitability and design basis. In support of 10 CFR 100.23, please include this fault in the list of potential Quaternary faults within the 200 mi radius of the CCNPP. Provide the basis that supports a conclusion that the National Zoo faults do not impact site suitability or design basis.

02.05.01-74

This question pertains to supplemental response to RAIs 284, 322, and 345 and the COLA Markups submitted with letter UN#12-127, November 20, 2012,

In FSAR Section 2.5.1, with respect to the Central Virginia seismic zone:

a. UniStar states that paleoliquefaction sites of Obermeier and McNulty (Obermeier, 1998) reflect pre-historical occurrences of seismicity within the Central Virginia seismic zone, and do not indicate the presence of a capable tectonic source. In another paragraph UniStar also states: "A post-event report provided by the Geotechnical Extreme Events Reconnaissance (GEER) Association indicated that there were few instances of ground failure produced by the [Mineral 2011] earthquake (GEER, 2011). Only minor liquefaction and slumping was noted along some streams, along with rockfalls, and slope movements in marginally stable slopes. Most of these observations were in the earthquake epicentral region. Green and Lasley (Green, 2012) in an independent study indicated that only two definite liquefaction features, one likely feature, and one questionable feature were found near the epicenter."

In support of 10 CFR 100.23, please justify the basis for your conclusion that paleoliquefaction sites rule out 'the presence of a capable tectonic source'.

In addition, please discuss where the Mineral VA earthquake occurs with respect to the paleoliquefaction area of Obermeier and McNulty. If the recent liquefaction sites occur outside of the roughly defined paleoliquefaction zone of Obermeier and McNulty, provide a basis to explain how consideration of the Mineral earthquake would affect the seismic hazard using the CEUS-SSC model. If the recent liquefaction sites occur within the paleoliquefaction zone, provide the rationale that Mineral earthquake is consistent with the CEUS-SSC basis for the CVSZ (eg. recurrence, rate, M). Please substantiate your discussion with a map of the liquefaction site locations within the CVSZ: from the GEER group, from Green and Lasley and from Obermeier and McNulty sites. Include earthquake locations and the trace of any named fault (such as the Long Branch fault) on the same map.

b. Northeast trending faults in the region are currently being reevaluated by geologists (Spears, 2012; Horton et al, 2012; Harrison, 2012; Harrison et al, 2011; Hughes and Hibbard, 2012) following the Mineral VA earthquake as potential sources of the Mineral VA earthquake. Northeast trending Quaternary faults are consistent with the local, maximum horizontal stress direction as reported by Mazzotti and Townend, 2010, who report that the CVSZ has a statistically significant 48 degree clockwise rotation between the regional and the local stress directions.

In support of 10 CFR 100.23, please provide a discussion regarding specific information about the faults (such as the Long Branch and Quail faults among others (Horton et al, 2012)) and include these faults in the list of potential Quaternary faults within the 200 mi radius of the CCNPP. Include a figure or geologic map that shows fault traces, seismic events and liquefaction sites to support your discussion. Does the new information require any updates to the regional seismic source model defined NUREG 2115, as it does not have the CVSZ a separate seismic zone?