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Date: 10/1/2007 3:32:44 PM
Subject: ACRS Meeting - Highlights of Staff Review of Geology, Seismology, and Geotechnical Engineering
cc: "Rebecca Karas" <RLK@nrc.gov>,"Clifford Munson" <CGM1@nrc.gov>,"Yong Li" <YXL1@nrc.gov>

Dave,

Attached are the discussion topics you requested of Yong Li. Let me know if you have any questions.

Christian

Hearing Identifier: Vogtle_Non_Public
Email Number: 7340

Mail Envelope Properties (472A0B7B.HQGWDO01.TWGWPO04.200.2000007.1.CF3B0.1)

Subject: ACRS Meeting - Highlights of Staff Review of Geology, Seismology, and Geotechnical Engineering
Creation Date: 10/1/2007 3:32:44 PM
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Created By: CJA2@nrc.gov

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Files	Size	Date & Time
MESSAGE	124	10/1/2007 3:32:44 PM
Vogtle ESP Application highlights2.doc		33280
5:23:07 PM		11/1/2007

Options

Priority: Standard
Reply Requested: No
Return Notification: None
None

Concealed Subject: No
Security: Standard

Vogtle ESP Application highlights.

The Vogtle ESP applicant investigated an area with a radius of 200 miles with progressively finer resolution closer to the site. The site is next to VEGP Units 1 and 2, which were constructed in 1980's and is near the Savannah River site (SRS). The Safety Analysis Report (SAR) integrated all the previous research for VEGP Units 1 and 2 and SRS as well as the applicant's own investigation results for the ESP site. For the purpose of discussion, the NRC staff would like to bring up the following issues to the attention of the ACRS committee. Some of these issues may be site-specific, but some of them may have impact to other future ESP or COL applications too.

Geology and Seismology (Sections 2.5.1-2.5.3)

- **Pen Branch Fault**
The fault was detected beneath the ESP site, dipping towards southeast at an angle about 45 degrees. Previous researchers identified the fault as a non-capable fault, not causing earthquakes and with no recent activity. The ESP applicant did further investigations to confirm this conclusion.
- **Charleston seismic source updates**
One of the largest historical earthquakes (1886) occurred east of the Rocky Mountains in the Charleston area. The Charleston earthquake epicenter is about 100 miles from the site. The earthquake triggered extensive liquefaction in the area. Paleoliquefaction evidence was found in the area indicating similar liquefaction triggering events occurred prior to the 1886 earthquake. The applicant used this evidence to characterize the Charleston seismic source in terms of magnitude and recurrence and integrated the new source configuration into its Probabilistic Seismic Hazard Analysis (PSHA) model for the ESP site.
- **Other seismic sources**
The ESP applicant used EPRI's seismic source model, developed during the late 1980s, as a starting point for its regional seismic source characterization. The applicant updated its source model with the new Charleston seismic source model, described above. However, the applicant chose not to update other regional seismic source zones described by the EPRI source models. One of the EPRI teams (Dames and Moore) assigned very low probabilities of activity for two seismic source zones, which the staff believes should be updated. Earlier seismic source characterizations for the SRS also reached this conclusion. The effect of these lower probabilities of activity is to lower the seismic hazard for the ESP site.

Geotechnical Engineering (Section 2.5.4-2.5.5)

- **Limited borings and laboratory tests**
The applicant did sufficient soil borings and testing for the ESP site but frequently used previous test results from VEGP Units 1 and 2 results to define design values, such as the undrained shear strength. The applicant's reliance on older data for Units 1 and 2 is due to some anomalous values that it obtained from the

ESP site. The applicant is supplementing the ESP data with additional data from its COL site investigations, which has been submitted as part of the LWA request.

- Foundation settlement
Applicant referenced Peck settlement guidelines (total settlement up to 2 in and differential settlement up to $\frac{3}{4}$ in) but also notes that observed settlements for Units 1 and 2 have been as high as 4.7 in (total). The applicant will perform a settlement analysis as part of its COL application.