

PSEGSPeRAIPEm Resource

From: Chowdhury, Prosanta
Sent: Monday, December 12, 2011 4:36 PM
To: 'PSEGRAIResponses@pseg.com'
Cc: PSEGSPeRAIPEm Resource; 'James.Mallon@pseg.com'; 'David.Robillard@pseg.com'; Segala, John; Silvia, Andrea; Clark, Phyllis; Canova, Michael; McLellan, Judith; Plaza-Toledo, Meralis; Stirewalt, Gerry; Bauer, Laurel; Karas, Rebecca
Subject: PSEG Site ESPA FINAL RAI 44 (eRAI 6164) SRP-02.05.03 (RGS1)
Attachments: PSEG Site ESPA Final RAI 44 (eRAI 6164).pdf

Please find attached RAI 44 for the PSEG Site ESP Application. Following issuance of the draft of RAI 44 on November 14, 2011, a telecon was held on December 12, 2011, to provide clarification on Question 02.05.03-8, as requested by PSEG on November 30, 2011. Following the clarification, we understand that you have no further questions on this specific RAI, and therefore, we are issuing this RAI as final with no changes made to it.

The schedule we have established for review of your application assumes technically correct and complete responses within 30 calendar days of receipt of RAIs; however, via an email on November 30, 2011, your requested extended response durations for several Questions in this RAI as summarized below:

- 02.05.03-1 (45 days)
- 02.05.03-2 (45 days)
- 02.05.03-3 (45 days)
- 02.05.03-4 (45 days)
- 02.05.03-7 (60 days)
- 02.05.03-8 (possibly more than 30 days)
- 02.05.03-9 (60 days)
- 02.05.03-10 (60 days)
- 02.05.03-13 (60 days)

We assume that response to Questions 02.05.03-5, 02.05.03-6, 02.05.03-11, and 02.05.03-12 will be submitted within 30 calendar days of receipt of the final RAI. Additionally, we are assuming that response to Question 02.05.03-8 will be submitted within 45 calendar days. After reviewing your request, we concluded that the above requested response durations are acceptable for this RAI. Please note, SSAR Section 2.5.3 review schedule will be adjusted with these extended response durations, and any impact the additional response times may have on the overall review schedule will be assessed. If this RAI cannot be responded to within the durations specified above, it is expected that the dates for receipt of response to specific Questions will be provided to the staff within the 30-calendar day period so that the staff can assess how this information will further impact the schedule.

If you have any questions, please contact me.

Prosanta Chowdhury
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301-415-1647

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Request for Additional Information No. 44

Application Revision 0

FINAL

12/12/2011

PSEG Site ESP
PSEG Power LLC, PSEG Nuclear LLC
Docket No. 52-043
SRP Section: 02.05.03 - Surface Faulting
Application Section: 2.5.3

QUESTIONS for Geosciences and Geotechnical Engineering Branch 1 (RGS1)

02.05.03-1

SSAR Subsection 2.5.3.1.2, "Regional Geologic Studies," discusses a subsurface fault located in the site vicinity about 20 miles north-northwest of the site (shown in Figure 2.5.3-1). This subsurface fault is defined by Benson (2006) to affect the Lower Cretaceous (145.5-99.6 Ma) Potomac Formation. The applicant indicated that this feature is the only buried potential fault discovered by the regional geologic studies. The applicant states that this structure does not deform overlying Quaternary units, but it is not clear whether this conclusion is drawn from Benson (2006) or from siting investigations performed for the PSEG site since there is no reference provided to support the statement.

In order for the staff to adequately evaluate the potential for faulting near the PSEG site, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please clarify what type of published information or field investigation results were used to make the conclusion that the fault proposed by Benson (2006) does not affect stratigraphic units of Quaternary age in the PSEG site vicinity.

02.05.03-2

SSAR Subsection 2.5.3.1.2 discusses subsurface faults postulated by Spoljaric (1972, 1973, 1974, 1979) to occur in the PSEG site vicinity, including the New Castle County faults that were identified by Crone and Wheeler (2005) and Wheeler (2005) as potential Quaternary structures (i.e., Class C structures = lacking proven evidence of Quaternary displacement). These faults are shown in SSAR Figure 2.5.3-1. The applicant stated that no published geologic studies reviewed for the PSEG site indicate the presence of Quaternary structures capable of producing surface deformation in the site vicinity. However, it is not clear to the staff if the applicant relied solely on studies by Spoljaric and the compilations of Crone and Wheeler to make this conclusion.

In order for the staff to adequately evaluate the potential for faulting in the PSEG site vicinity, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please clarify what published information was reviewed to conclude that no published geologic studies reviewed indicate the presence

of Quaternary structures capable of producing surface deformation in the site vicinity. Also, please summarize the data that was reviewed to support this conclusion.

02.05.03-3

SSAR Subsection 2.5.3.1.4, "Previous Site Investigations," cites the UFSARs for Hope Creek and Salem operating plants, and states that studies performed for these sites did not reveal surficial folding or faulting in the site area and did not reveal any evidence for prior earthquakes in surficial materials in the site area. The SSAR also states that these previous investigations concluded that near-surface stratigraphic units beneath the site are planar and undisrupted by folding and faulting. However, SSAR Subsection 2.5.3.1.4 does not summarize the pertinent information from the two UFSARs that support these statements. In particular, the SSAR does not provide details regarding the search for earthquake-induced liquefaction features with respect to the statement concluding a lack of evidence for prior earthquakes in the site area.

In order for the staff to adequately evaluate the potential for faulting at the PSEG site, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please summarize the pertinent information from the two UFSARs leading to the three conclusion statements provided in SSAR Subsection 2.5.3.1.4.

02.05.03-4

SSAR Subsection 2.5.3.1.5, "Aerial Imagery Analysis," discusses lineaments trending into the site vicinity based on historical (1930s) and modern (2007 and 2008) imagery, two of which also extend into the site area. The SSAR concludes that none of the "identified and accessible" lineaments investigated showed tectonic or geologic features indicative of surface faulting. Upon reviewing SSAR Subsection 2.5.3.1.5 and SSAR Figure 2.5.3-1, it is not clear to the staff which lineaments were physically investigated in the field and which lineaments were considered inaccessible.

In order for the staff to adequately evaluate the potential for faulting within the PSEG site vicinity and at the PSEG site, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please clarify the process used to document the conclusion that none of the lineaments in the site vicinity or site area showed tectonic or geologic features indicative of surface faulting. Please identify which lineaments were evaluated in the field and which features were determined to be inaccessible. In addition, please describe what approach was applied to evaluate those features that were determined to be inaccessible in the field.

02.05.03-5

SSAR Subsection 2.5.3.1.6, "Current Aerial and Field Reconnaissance," states that aerial reconnaissance was conducted to evaluate the site area in regard to faulting and deformation. In particular, evaluations included (a) viewing lineaments identified in historic or modern aerial imagery; (b) inspecting the areas around the features proposed by Pazzaglia (1993) and Marple (2004); and (c) looking for other faulting or

paleoliquefaction evidence in the site vicinity. The SSAR indicated that no anomalous features clearly associated with faulting or deformation were found in the site vicinity as a result of the reconnaissance studies. Regarding (b), it is not clear what features were "inspected" to document that none showed evidence of faulting near to the locations where Pazzaglia (1993) or Marple (2004) proposed their structures to occur in the site vicinity. Regarding (c), it is not clear what systematic approach was applied to look for faults and paleoliquefaction features in the site vicinity.

In order for the staff to adequately evaluate the potential for faulting within the PSEG site vicinity and at the PSEG site, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting,"

- (1) please describe what features were inspected to document that no evidence exists for faulting at the locations where Pazzaglia (1993) or Marple (2004) proposed their structures to occur in the site vicinity.
- (2) please describe what systematic approach was applied to look for faults and paleoliquefaction features in the site vicinity, and whether or not the materials examined were susceptible to earthquake-induced liquefaction or may hinder the development of such features.

02.05.03-6

SSAR Subsection 2.5.3.1.6, "Current Aerial and Field Reconnaissance," states that elliptical to round, light colored patches were identified in the field near the PSEG site and on aerial photographs of the Delaware Bay area. The SSAR states that these features formed as a result of periglacial processes. It is not clear to the staff if these features were evaluated as potential earthquake-induced liquefaction features.

In order for the staff to fully evaluate the earthquake hazard and the potential for faulting in the PSEG site vicinity, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please discuss the systematic approach that was used to evaluate the light colored, elliptical patches described in SSAR Subsection 2.5.3.1.6 and the basis for concluding that these features are related to periglacial processes rather than seismically-induced shaking. Also, please include a discussion of field investigations conducted to evaluate these features.

02.05.03-7

SSAR Subsection 2.5.3.2.1, "Paleozoic Structures Exposed in the Piedmont," states that the Pleasant Grove-Huntingdon Valley fault crosscuts the Rosemont fault, and that both faults are Paleozoic in age. However, the SSAR does not identify the location where this field observation was made.

In order for the staff to fully evaluate the potential for faulting within the PSEG site vicinity, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please clarify the location where the field relationship of crosscutting Paleozoic structures was observed.

02.05.03-8

SSAR Subsection 2.5.3.2.2, "Faults Buried by Coastal Plain Sediments," states that Benson (1992) used gravity and magnetic anomaly maps, boreholes, and seismic lines to map three Mesozoic basins buried beneath Coastal Plain sediments in the site vicinity. Benson (1992) concluded that the faults associated with these three basins do not cut rocks younger than Cretaceous (145.5-65.5 Ma). However, the SSAR does not provide any detail regarding the degree of resolution of these data sets for detecting fault displacement (i.e, what minimal displacement might be missed in these data), or which data type was relied upon most heavily to determine that post-Cretaceous rocks were not affected by faulting associated with these basins. It is also not clear to the staff whether these data sets were adequate to eliminate the possibility of a Mesozoic basin and associated boundary fault underlying the site area.

In order for the staff to adequately evaluate the potential for faulting within the PSEG site vicinity, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please clarify the degree of resolution of the data sets used to determine a lack of evidence for displacement of Quaternary stratigraphic units in the site vicinity, and whether there was adequate data to eliminate a concern about a subsurface Mesozoic basin in the site area.

02.05.03-9

SSAR Subsection 2.5.3.2.2, "Faults Buried by Coastal Plain Sediments," states that Benson (2006) used geophysical well log data to stratigraphically correlate the Cretaceous age Potomac Formation, and determine that Cretaceous stratigraphy does not show any fault disruptions with the exception of one apparent offset of Cretaceous units about 15-20 miles north-northwest of the site. The SSAR states that the base of the overlying Quaternary units was not offset by this fault, but did not address the degree of resolution of this data set for making this conclusion.

In order for the staff to adequately evaluate the potential for faulting within the PSEG site vicinity, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please clarify the degree of resolution of the geophysical well log data used to determine that the buried fault located 15-20 miles north-northwest of the site does not offset stratigraphic units of Quaternary age.

02.05.03-10

SSAR Subsection 2.5.3.2.2, "Faults Buried by Coastal Plain Sediments," discusses the lineaments and basement faults postulated by Spoljaric (1972, 1973, 1974, 1979), broadly known as the New Castle County faults, two of which extend into the site area as lineaments (based on Landsat data). The SSAR description distinguishes between the postulated basement faults and the lineaments, and states that the basement faults have been demonstrated to be pre-Cretaceous in age, thus posing no surface faulting hazard at the site. However, SSAR Subsection 2.5.3.2.2 does not summarize the data that demonstrate the validity of a pre-Cretaceous age. The SSAR further indicates that the interpretation of a young age for the lineaments is unsupported for the following reasons: (a) Borings have not revealed offsets in near-surface units that cross the projection of the lineaments; (b) earlier studies show that basement faults do not extend into Cretaceous or Tertiary units; (c) trenching of one lineament north of the PSEG site

revealed unfaulted Tertiary and Quaternary units; and (d) Spoljaric (1974) noted that surface faulting was not evident along the lineaments. However, the SSAR does not indicate which lineament was trenched to conclude that Quaternary units were not offset along the lineament.

In order for the staff to adequately evaluate the potential for faulting within the PSEG site vicinity and at the PSEG site, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please clarify what data were used to demonstrate the validity of a pre-Cretaceous age for the basement faults of Spoljaric. Please also clarify which lineament was trenched and provide additional details of the trench investigation, as this action provides support for concluding that the lineaments do not represent Quaternary faults.

02.05.03-11

SSAR Subsection 2.5.3.2.3, "Hypothesized Features," states that field and/or aerial reconnaissance investigations confirm that the features postulated by Marple (2004) and Pazzaglia (1993) do not disrupt stratigraphic units at the location of the extension of these features into the site vicinity. However, SSAR Subsection 2.5.3.2.3 does not provide a summary of these apparently definitive data.

In order for the staff to adequately evaluate the potential for faulting within the PSEG site vicinity and at the PSEG site, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please clarify what field information was used to conclude that the features postulated by Marple (2004) and Pazzaglia (1993) do not disrupt stratigraphic units at the location of the extension of these features into the site vicinity.

02.05.03-12

SSAR Subsection 2.5.3.8, "Potential for Surface Tectonic Deformation or Non-Tectonic Deformation at the Site," states that some sinkholes and karst dissolution exist within the site vicinity and are associated with the Cockeysville marble, a unit present in the PSEG site vicinity. The SSAR refers to SSAR Figure 2.5.3-1. The staff notes that karst features are not identified on SSAR Figure 2.5.3-1.

In order for the staff to assess the potential for karst in the PSEG site vicinity, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please indicate the location of the Cockeysville marble in SSAR Figure 2.5.3-1 as well as any karst features within the site vicinity.

02.05.03-13

SSAR Figure 2.5.3-1 includes a north-northwest yellow line that is not defined in the figure legend and it is not clear what this line represents on the map showing site vicinity geology and seismology. The SSAR Figure 2.5.3-1 map legend identifies only Cretaceous and Quaternary coastal plain units, which is inconsistent with SSAR Figure 2.5.1-12a that shows tertiary units in the eastern portion of the site vicinity.

In order for the staff to adequately evaluate the potential for faulting within the PSEG site vicinity and at the PSEG site, and in compliance with 10 CFR 100.23 and in conformance to NUREG 0800, Section 2.5.3, "Surface Faulting," please update the legend in SSAR Figure 2.5.3-1 to be consistent with SSAR Figure 2.5.1-12a and please identify the north-northwest yellow line included in the map. Also, please explain the significance of Quaternary units in contact with Cretaceous units along the fall line west of the site.