PSEGESPeRAIPEm Resource

From: Chowdhury, Prosanta
Sent: Thursday, December 08, 2011 4:19 PM
To: 'PSEGRAIResponses@pseg.com'
Cc: PSEGESPeRAIPEm Resource; 'James.Mallon@pseg.com'; 'David.Robillard@pseg.com'; Segala, John; Silvia, Andrea; Clark, Phyllis; McLellan, Judith; Candelario, Luissette; Vega, Frankie; Karas, Rebecca
Subject: PSEG Site ESPA FINAL RAI 41 (eRAI 6153) SRP-02.05.04 (RGS2)
Attachments: PSEG Site ESPA Final RAI 41 (eRAI 6153).pdf

Please find attached RAI 41 for the PSEG Site ESP application. Following issuance of the draft of RAI 41 on November 14, 2011, a telecon was held on December 8, 2011, to provide clarification on Questions 02.05.04-4, 02.05.04-5, 02.05.04-7, 02.05.04-8, 02.05.04-16, 02.05.04-17, 02.05.04-18 and 02.05.04-19, as requested by PSEG on November 30, 2011. As a result of the discussion, in Question 02.05.04-4, SSAR Section number was expanded from 2.5.4 to 2.5.4.10 to make the reference more specific; in Question 02.05.04-7, the last sentence was deleted with the understanding that it will be covered in the response to Question 02.05.04-14; in Question 02.05.04-8, the last sentence was revised by adding the phrase “located on the north site” and changing the word “strengths” to “strength;” and in Question 02.05.04-19, the last sentence was revised to read “Also discuss how the difference in the chosen depth affects the safety factors against liquefaction.” Additionally, in the 1st and last sentences of Question 02.05.04-15, the unit symbol “lbs/ft^3” was clarified. No other changes were necessary, and therefore, we are issuing this RAI as final.

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, you indicated during the telecon, followed by a request via email on December 8, 2011, that you would need 45 days to respond to this RAI, specifically, for Questions 02.05.04-7, 02.05.04-9, 02.05.04-13, 02.05.04-15, and 02.05.04-18. After reviewing your request, we concluded that a 45-day response period is acceptable for this RAI. As our standard practice, we will assess any impact the additional response time may have on the review schedule. If this RAI cannot be responded to within 45 calendar days, it is expected that a date for receipt of this information will be provided to the staff within the 30-calendar day period so that the staff can assess how this information will impact the published schedule.

If you have any questions, please contact me.

Prosanta Chowdhury
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Request for Additional Information No. 41

Application Revision 0

FINAL

12/08/2011

PSEG Site ESP
PSEG Power LLC, PSEG Nuclear LLC
Docket No. 52-043
SRP Section: 02.05.04 - Stability of Subsurface Materials and Foundations
Application Section: Section 2.5.4

QUESTIONS for Geosciences and Geotechnical Engineering Branch 2 (RGS2)

02.05.04-4

SSAR Section 2.5.4.1.2.3.2 states that the top of Vincentown Formation ranges considerably throughout the site due to subaerial exposure, weathering, and fluvial erosion prior to deposition of the overlying units. In addition, this upper portion of the Vincentown exhibited considerable low SPT N Values. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please describe the extent of the weathered zones, the possible impact on Safety Cat. 1 foundations and what measures will be taken to ensure foundation bearing quality as described in the SSAR Section 2.5.4.10.

02.05.04-5

SSAR Section 2.4.12.1.2.5 states that groundwater in the Vincentown Formation beneath the PSEG Site has relatively high concentrations of chloride and is not adequate for use as a water supply. High concentration of chloride content has the potential to increase the risk of corrosion of steel reinforcement in concrete foundations. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please indicate any measures that will be taken to mitigate these effects. Also, please provide chemical analyses for groundwater and soils, specifically for sulfate and chloride concentrations, and pH values.

02.05.04-6

SSAR Section 2.5.4.2.1.1 states that RCTS tests were performed on 6 soil samples and the results for one of these tests were not considered due to the high void ratio in the sample. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please explain the origin

of this high void ratio and indicate if this was a localized condition or if it was encountered in other locations in the site.

02.05.04-7

SSAR Section 2.5.4.2.1.3.4 states that a Ko=.5 was used to calculate horizontal effective stresses on samples for RCTS Testing. The applicant mentioned that Ko=.5 is considered a typical value for generally normally consolidated soils. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please provide additional details to justify selecting this value, especially when SSAR Section 2.5.4.10.3 states that the soils in the Vincentown formation and below are considered to be over-consolidated.

02.05.04-8

SSAR Table 2.5.4.2-4 illustrates some Consolidated Undrained Triaxial test results for several samples from the Vincentown and Hornerstown formations. These soils have the presence of cemented sands and thus, samples from such materials are susceptible to disturbance. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please explain how two tests located on the north site are considered reliable to assess the soil’s shear strength properties.

02.05.04-9

SSAR Section 2.5.4.2.2.1.5 states that for engineering purposes the Vincentown and Hornerstown formations are combined into one engineering layer due to their similar engineering properties. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," and in order to reach this conclusion, please provide additional details regarding properties from both layers and how overall properties were weighted. Also, please justify that both formations would behave similarly, especially when the Vincentown formation is classified as mostly a silty sand layer while the Hornerstown has a considerable increase in fine content.

02.05.04-10

SSAR Table 2.5.4.2-8 states that the N60 values were corrected for field conditions, including hammer efficiency. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations:

a) please indicate if overburden corrections were applied to sandy layers and thus, if (N1)60 values were calculated.

b) please clarify if the SPT blowcounts, mentioned in SSAR Section 2.4.5.10 and used in calculation checks to determine the internal friction angle, were N 60 or (N1)60.
c) since (N1) 60 values were used for design purposes, please include such values in SSAR Table 2.5.4.2-8.

02.05.04-11

SSAR Section 2.5.4.2.2.1.6 states that two intact soil samples were recovered from the Navesink Formation. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please explain why no soil strength tests or other types of evaluations were performed for this formation given that it is located directly within the safety related foundation zone of influence.

02.05.04-12

SSAR Section 2.5.4.2.2.1.8 states that the unit weights of soils for formations below the Mount Laurel were not determined for the ESPA. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please explain why unit weights were not determined; also, please include these values in SSAR Table 2.5.4.2-8 “Design Values for Static Engineering Properties of Subsurface Materials.”

02.05.04-13

SSAR Section 2.5.4.7.5 indicates that the applicant did not use RCTS test results to characterize the degradation property of foundation bearing soils because of sample disturbances of the cemented soil layers. Darendeli equations were instead used to estimate modulus reduction and damping variation with shear strain. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please justify the validity of such equations and how they could represent actual degradation properties of the soils at the site, and discuss whether it is a conservative approach when used in site seismic response analysis.

02.05.04-14

SSAR Section 2.5.4.10.3, “Settlement Analysis,” states that the Vincentown formation and below soils will deform elastically because of the sandy composition of soils and over-consolidated nature of clays. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please provide additional information to support this statement, especially when the pre-consolidation pressures were not obtained from one

dimensional consolidation tests for these clay type soils. Also, please clarify if drained elastic modulus values were calculated for clay type soils to assess long term conditions.

02.05.04-15

SSAR Section 2.5.4.10.2 states that for the bearing capacity calculations, a friction angle of 37 degrees was selected based on N 60 values and a unit weight of 125 pounds per cubic foot (lbs/ft^3) was selected based on a weighted average of unit weights from the Vincentown, Hornestown, Navesink and Mount Laurel formations. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," for the selection of the internal friction angle, please clarify why N 60 instead of (N1) 60 values were used, provide the correlation that was ultimately used, and compare these values with those obtained by triaxial testing. Regarding the unit weight, please justify selecting 125 pounds per cubic foot (lbs/ft^3) (pounds per cubic foot) especially when the referenced values given in SSAR Table 2.5.4.2-9 were all below such number.

02.05.04-16

SSAR Section 2.5.4.10, “Static Stability,” does not include information for lateral loading conditions. RS-002, “Processing Application for Early Site Permits,” indicates the stability of all planned safety related facilities should be analyzed from a static stability standpoint including bearing capacity, rebound, settlement, differential settlement and lateral loading conditions. In compliance with 10 CFR 100.23 (d) (4), and in conformance to RS-002 and NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations,” please explain why lateral loading conditions are not included as part of the ESP, and indicate if the lateral earth pressure evaluation is intended to be performed at the COL stage.

02.05.04-17

SSAR Section 2.5.4.7.4.1 states that the site shallow dynamic profile was based on four P-S suspension logged boreholes. Out of these four, two were used to record shear wave velocity measurements in deeper layers (between 300ft and 600 ft), and out of these two, just one P-S suspension velocity logging was performed within the northern portion of the site or proposed location of Seismic Cat 1 buildings. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please indicate how variations in shear wave velocity were estimated based on only one reading over the deeper portion of the profile.

02.05.04-18

SSAR Table 2.5.4.6-3 shows a summary of groundwater drawdowns at existing structures within the Vincentown Formation after one year of dewatering. Calculation Package PSEG 2251-ESP-GT-009-4, Figure 2251-ESP-GT-009-4, shows contour maps depicting these drawdowns overlaid onto a general layout plan of existing HCGS and SGS plants. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations,"please discuss the impact of different groundwater levels across the structure foundation on differential settlements and stability of existing HCGS and SGS safety related structures.

02.05.04-19

In calculation package 2251-ESP-GT-008, Rev. 5, "Potential Liquefaction Evaluation," the staff noted that for the calculation of the Cyclic Stress Ratio, the stress reduction factor (rd) was calculated starting at elevation -67 ft and the total overburden stress and the effective overburden stress were calculated starting at the existing ground level. In compliance with 10 CFR 100.23 (d) (4) and in conformance to NUREG-0800, Standard Review Plan, Section 2.5.4, "Stability of Subsurface Materials and Foundations," please justify the difference in the chosen depth for the calculation of the stress reduction factor, overburden stresses and effective overburden stresses. Also discuss how the difference in the chosen depth affects the safety factors against liquefaction.