PMVogtleCOLPEm Resource

From: Christian Araguas
Sent: Friday, February 27, 2009 5:42 PM
To: wasparkm@southernco.com; Aughtman, Amy G.
Cc: PMVogtleCOLPEm Resource; John-Chau Nguyen
Subject: Draft RAI 2171 Related SRP Section 2.5.4 for Vogtle Units 3 and 4
Attachments: RAI 2171 draft.pdf

To All,

Attached is Draft RAI 2171 related to SRP Section 2.5.4 for Vogtle Units 3 and 4. Please contact me if you desire a phone conference regarding these RAIs. If no response is heard by close of business March 4, 2009, the final RAI will be issued.

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Request for Additional Information No. 2171 Revision 0
Vogtle
Southern Nuclear Operating Co.
Docket No. 52-0025 and 52-0026
SRP Section: 02.05.04 - Stability of Subsurface Materials and Foundations
Application Section: 2.5.4

QUESTIONS for Geosciences and Geotechnical Engineering Branch 1 (RGS1)

02.05.04-3

SSAR Section 2.5.4 does not include a discussion of the lateral earth pressures or hydrostatic pressures at the site. RAI 2.5.4-1 requested an explanation of the methodologies used to determine the lateral earth pressures and the hydrostatic pressures acting on the safety-related structures at the VEGP Units 3 and 4 site. The response to RAI 2.5.4-1 stated that the static lateral earth pressures were evaluated using Rankine's theory for active, at-rest, and passive conditions; seismic lateral earth pressures for active and at-rest conditions were evaluated using methods presented by Mononobe-Okabe and ASCE 4-98, respectively; and lateral earth pressures resulting from an areal surcharge applied at the ground surface alongside below-grade walls were evaluated for active and at-rest conditions. Sample earth pressure diagrams for active and at-rest conditions were provided.

As a result of the response to RAI 2.5.4-1, the following concerns were noted:

1) It appears the ASCE 4-98 reference for at-rest conditions is not for the case of Rankine at-rest conditions but rather refers to the Wood solution for dynamic pressures against a rigid wall, as Figure 2 of the response to the RAI resembles the Wood dynamic pressure solution. It is not obvious how this relates to the at-rest pressure conditions, as an at-rest condition is associated with a static overburden condition where pressures increase with depth due to dead weight of the soil under a presumed zero displacement assumption of the wall.

2) The M-O active pressure solution presumes that the rigid wall moves enough under the soil loads to generate shear failure in the soil along a potential failure surface, and the M-O solution assumes that the failure surface is a simple linear one emanating from the base of the wall. The guidance provided in ASCE 4-98 is to not use this approach unless the wall displacements are expected to be enough to generate this reduction. Previous discussions had indicated that the use of tie-back construction of the MSE walls was intended to ensure that wall displacements would be minimal during backfill operations behind the walls. Additionally, backfill placement and construction methods would be such that the displacements of the wall during backfill operations would be such as to minimize the shear wave velocity contrasts between the compacted soil immediately behind the wall and the soils compacted away from the MSE wall by heavy equipment.

3) When comparing the resulting seismic force against the wall computed by the M-O method and the dynamic Wood solution, the M-O solution is less than half of the Wood solution for walls away from other adjacent walls.

4) The AP1000 exterior walls of the nuclear island were designed to resist the envelope of both the dynamic Wood solution and the peak passive pressure solution. The envelope pressure may be very much larger than the M-O solution, particularly along the lower two-thirds of the wall. The lateral seismic pressures acting on the vertical walls will be generated in SASSI and are typically approximated by the Wood solution.

Please address each of the concerns listed above and provide justification for the use of or any reference made to wall pressure calculations discussing active soil pressures conditions employing the Mononobe-Okabe method.

02.05.04-4

AP1000 DCD, Revision 17, Table 2.5-1, provides the limits of acceptable settlement without additional evaluation. The table provides that the total settlement for the nuclear island foundation mat is three (3) inches, and the differential settlement across the nuclear island foundation mat is limited to ½ inch in fifty (50) feet. Additionally, the differential settlement between the nuclear island and the turbine building is limited to 3 inch, and the differential settlement between the nuclear island and other buildings is also limited to 3 inch.

In the case of the nuclear island foundations, turbine buildings, and other surrounding buildings supported on structural backfill, please provide a description of the program and/or method that will be implemented to ensure that the actual settlement and differential settlement of structures does not exceed the AP1000 DCD settlement criteria.

Relates to AP1000 DCD Revision 17.