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SOUTHERN COMPANY
Energy to Serve Your World℠

OCT 14 2008

Docket Nos.: 52-011

ND-08-1577

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Southern Nuclear Operating Company
Vogtle Early Site Permit Application Reference Changes

Ladies and Gentlemen:

In letter AR-08-0483, dated March 28, 2008, Southern Nuclear Operating Company (SNC) submitted Revision 4 of the Vogtle Early Site Permit (ESP) Application to the U.S. Nuclear Regulatory Commission (NRC). In addition, in letter AR-08-1171, dated August 14, 2008, SNC responded to NRC Request for Additional Information (RAI) Letter No. 11 and action items from the NRC seismic calculation audit at the Bechtel Frederick, MD office on June 19 and 20, 2008. In letter AR-08-1171, SNC provided proposed changes to ESP application Revision 4 text that will be incorporated into Revision 5 of the ESP application. As discussed with the NRC staff, this letter provides additional changes to the proposed Revision 5 text. The additional changes update references in selected subsections of Site Safety Analysis Report (SSAR) Section 2.5.4, "Stability of Subsurface Materials and Foundations," and in SSAR Appendix 2.5E, "AP1000 Vogtle Site Specific Seismic Evaluation Report." Enclosure 1 contains the proposed ESP application SSAR text changes that perform this action and Enclosure 2 contains an updated SSAR Appendix 2.5E. These proposed ESP application changes will be reflected in Revision 5 to ESP application.

If you have any questions regarding this letter, please contact Mr. Jim Davis at 205-992-7692.

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NRO

Ms. M. M. Caston states she is Vice President and General Counsel of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of her knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Moanica M. Caston

Sworn to and subscribed before me this 14th *day of* October, *2008*

Notary Public: Glenda C. Spinks

My commission expires: 11/10/2010

MMC/BJS/dmw

Enclosures:

1. Vogtle Early Site Permit Application Proposed Reference Changes
2. Westinghouse Report SV0-1000-S2R-802, Revision 4, AP1000Vogtle Site Seismic Evaluation Report, October 2008

cc: Southern Nuclear Operating Company
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Mr. J. L. Whiteman, Principal Engineer, Licensing & Customer Interface

Southern Nuclear Operating Company

ND-08-1577

Enclosure 1

Vogtle Early Site Permit Application

Proposed Reference Changes

NOTE: This enclosure consists of a four-page document.

Proposed 2.5.4 Design Reference Changes

2.5.4.5.3 Backfill Design

(4th paragraph)

The Phase I test pad program is complete and is documented in Appendix 2.5D. The objective of this program was to establish site-specific design properties for the backfill, including density, compaction, gradation, and shear wave velocity, and to show that the backfill will satisfy the AP1000 standard plant design~~ siting criteria **(WEC 2007)**~~. The test pad was constructed below grade, was 20 ft deep, and was 20 ft x 60 ft in plan area. The test pad was constructed in the switchyard borrow area using methods similar to those used to construct the backfill for VEGP Units 1 and 2. The placement and compaction of the backfill were monitored and tested. Results of the test pad program demonstrated that the siting criterion for shear wave velocity of 1,000 fps at the NI foundation depth was achieved with the backfill material within the 20 ft thickness of the test pad.

2.5.4.10.1 Bearing Capacity

All structures in the power block footprint will be founded on the structural backfill compacted to a minimum of 95% (ASTM D 1557) as presented in Section 2.5.4.5. The structural backfill will be about 90 ft thick in the power block area. The Nuclear Island will be founded at a depth of about 40 ft below grade (about 50 ft of structural backfill beneath the foundation). Other structures will be founded at an approximate depth of 4 ft below grade. The allowable static bearing capacity values are calculated with Terzaghi's bearing capacity equation. An internal angle of friction of 36° was used for the compacted backfill as developed from field and laboratory testing of borrow materials during the Phase I test pad program (Appendix 2.5D) and the COL investigation (Appendix 2.5C). The influence of the Blue Bluff Marl on the allowable bearing pressure was evaluated using procedures outlined by Vesic (1975). With a factor of safety of 3.0 **(ASCE 1994)**, site conditions provide an allowable bearing pressure of 34 ksf under static loading conditions for the Nuclear Island, which is greater than the ~~DCD~~ required~~ment of~~ 8.6 ksf **(WEC CCC-004)**. An internal friction angle of 34° was used to calculate the allowable bearing capacity values for foundations placed on compacted fills at depths of about 4 ft below finished grade as provided in Figure 2.5.4-13.

The allowable bearing capacity of the structural backfill under the Nuclear Island for dynamic loading conditions was evaluated using Terzaghi's bearing capacity equation for local shear (**Peck et al. 1974**) and Soubra's method with seismic bearing capacity factors **(Soubra 1999)** using Terzaghi's bearing capacity equation for general shear with an internal friction angle of 36°. To simulate the potential for higher edge pressures during dynamic loading, three foundation widths were considered (10, 25, and 50 ft) corresponding to 10, 25, and 50 percent of the width of the Nuclear Island basemat. The results from these two methods compared well, with Terzaghi's approach for local shear providing more conservative values. The computed average ultimate capacities for the three widths (10, 25, and 50 ft) were 89, 100, and 119 ksf, respectively. A width of 25 ft and a factor of safety of 2.25 **(ASCE 1994)** were used for site specific conditions providing an allowable bearing pressure greater than 42 ksf under dynamic loading conditions for the Nuclear Island. This value is greater than the required 35 ksf for

dynamic bearing **(WEC SC2-065)** as ~~provided in the DCD as~~ well as the Vogtle site specific maximum dynamic demand (for the ESP soil profile as described in Appendix 2.5E) of 18 ksf.

The bearing capacity of the structural backfill was also evaluated in terms of the ratio of the ultimate bearing capacity against the structure demand. This capacity over demand (C/D) ratio provides an alternative measure of the margin of safety against bearing failure. These C/D ratios were evaluated for the static and dynamic demand conditions as provided by Westinghouse **(WEC CCC-004 and WEC SC2-065)**~~in the DCD~~, as well as the maximum dynamic demand from the Vogtle site specific seismic evaluation (Appendix 2.5E). The results are given below;

Condition	**~~DCD~~ Static**	**~~DCD~~ Dynamic**	**Site-Specific Dynamic**
Ultimate Capacity (C), ksf	102	100[1]	100[1]
Demand (D), ksf	8.6[4]	35[3]	18[2]
C/D	11.9	2.9	5.6

(1) Based on a reduced foundation width of 25 feet to account for higher edge pressures during a seismic event.
(2) Based on analysis using ESP profile in Appendix 2.5E
(3) APP-1000-S2C-065, Rev. 0, *Nuclear Island Stick Model Analysis at Soil Sites*
(4) APP-1000-CCC-004, Rev.0, *Nuclear Island - Stability Evaluation*

The C/D ratios are higher than those typically utilized for standard practice. While these results do not take into account settlement of the structures, the significant margin suggests that settlements will be minimal and within the design requirements **(WEC SC2-065)**~~of the DCD~~. A further discussion of settlement is provided in Section 2.5.4.10.2.

2.5.4.11 Design Criteria

Applicable geotechnical-related design criteria are ~~provided in the AP1000 DCD **(WEC 2007)** and are~~ discussed in various sections of the SSAR~~. The criteria~~and are summarized below~~ are considered geotechnical-related criteria~~.

Section 2.5.4.8 specifies that the acceptable factor of safety against liquefaction of site soils should be ≥ 1.1 in accordance with Regulatory Guide 1.198.

Bearing capacity criteria are presented in Section 2.5.4.10. A minimum factor of safety of 3 is used when applying bearing capacity equations. This factor of safety is also applied against breakout failure due to uplift forces on buried piping. For soils, this factor of safety can be reduced to 2.25 when dynamic or transient loading conditions apply. **(ASCE 1994)**

Section 2.5.5.2 specifies that the minimum acceptable long-term static factor of safety against slope stability failure is 1.5~~. Section 2.5.5.3 specifies~~ and that the minimum acceptable long-term seismic factor of safety against slope stability failure is 1.1 **(USACE 2003)**.

Appendix 2.5E describes the site-specific analyses that have been performed to show the acceptability of the AP1000 plant at the Vogtle site.

Section 2.5.4 References

(selected)

(ASCE 1994) American Society of Civil Engineers, *Bearing Capacity of Soils*, Technical Engineering and Design Guide, 1994.

(USACE 2003) U. S. Army Corps of Engineers, *Engineering and Design - Slope Stability,* EM 1110-2-1902, Office of the Chief of Engineers, Dept. of the Army, 2003.

(WEC 2007) deleted
~~"AP-1000 Design Control Document, Revision 16," Westinghouse Electric Company LLC., Pittsburgh, PA, May 2007.~~

(WEC SC2-065) APP-1000-S2C-065, Rev. 0, *Nuclear Island Stick Model Analysis at Soil Sites*

(WEC CCC-004) APP-1000-CCC-004, Rev.0, *Nuclear Island - Stability Evaluation*

2.5.5.2 New Slopes

(3rd paragraph)

The proposed permanent non-safety-related slopes will be analyzed for dynamic and static conditions during the design stage. The minimum acceptable factors of safety against stability failure of permanent slopes are 1.5 for long-term static conditions and 1.1 for long-term seismic conditions **(USACE 2003)**. The construction excavation cut slopes will be analyzed for static conditions during the design stage. The minimum acceptable factor of safety against stability failure of excavation slopes is 1.3, based on what was used for Units 1 and 2. These analyses will be performed to ensure that these slopes will not pose a hazard to the public. Such analyses are not part of the ESP SSAR.