LeeRAIsPEm Resource

From: Brian Hughes
Sent: Monday, January 12, 2009 1:27 PM
To: LeeRAIsPEm Resource
Subject: RAI 1874 Letter # 061 SRP 02.05.04 FOR THE WS LEE III UNITS 1 AND 2 COLA
Attachments: LEE-RAI-LTR-061.doc

Brian Hughes
Project Manager
NRO/DNRL/NWE1
US NRC
301-415-6582

Hearing Identifier: Lee_COL_RAI
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From: Brian Hughes

Created By: Brian.Hughes@nrc.gov

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January 12, 2008

Mr. Peter S. Hastings, P.E.
Licensing Manager, Nuclear Plant Development
Duke Energy
526 South Church Street
Charlotte, NC 28201-1006

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 061 RELATED TO SRP 02.05.04 FOR THE WILLIAM STATES LEE III UNITS 1 AND 2 COMBINED LICENSE APPLICATION

Dear Mr. Hastings:

By letter dated December 12, 2007, as supplemented by letters dated January 28, 2008, February 6, 2008 and February 8, 2008, Duke Energy submitted its application to the U. S. Nuclear Regulatory Commission (NRC) for a combined license (COL) for two AP1000 advance passive pressurized water reactors pursuant to 10 CFR Part 52. The NRC staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed application.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the enclosure to this letter.

To support the review schedule, you are requested to respond within 30 days of the date of this letter. If changes are needed to the final safety analysis report, the staff requests that the RAI response include the proposed wording changes.

If you have any questions or comments concerning this matter, you may contact me at 301-415-6582.

Sincerely,

/**RA**/

Brian Hughes, Senior Project Manager
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket Nos. 52-018
52-019

Enclosure:
Request for Additional Information

CC: see next page

If you have any questions or comments concerning this matter, you may contact me at 301-415-6582.

Sincerely,

/**RA**/

Brian Hughes, Senior Project Manager
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket Nos. 52-018
52-019

eRAI Tracking No. 1874

Enclosure:
Request for Additional Information

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NRO-002

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DATE	01/07/09	12/18/08	01/08/09	01/12/09

*Approval captured electronically in the electronic RAI system.

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Request for Additional Information No. 1874

1/12/2009

William States Lee III, Units 1 and 2
Duke Energy Carolinas, LLC
Docket No. 52-018 and 52-019
SRP Section: 02.05.04 - Stability of Subsurface Materials and Foundations
Application Section: 2.5.4.8 - Liquefaction Potential

QUESTIONS for Geosciences and Geotechnical Engineering Branch 1 (RGS1)

02.05.04-11

The liquefaction analyses presented in the May 2008 supplement to the COL application apply two methods to evaluate the potential for liquefaction in the engineered fill that provides sliding resistance for the nuclear island and foundation support for the Category II and non-safety related structures adjacent to the nuclear island. Based on Figure 1 of the supplement, the SPT N-values method shows that the factors of safety (FS) range from 1.0 to greater than 4, and are highly variable throughout the testing depth.

In order for the staff to assess the conclusion made regarding the liquefaction susceptibility of Lee engineered fill, please discuss the following: a) Why engineered fill placed to a uniform density of 95% standard Proctor would produce such wildly divergent results as shown in this figure? b) How is it concluded that the Cherokee engineered fill is representative for determining that the proposed backfill around the nuclear island placed to 95% standard Proctor density would produce a fill capable of resisting liquefaction or strength degradation based on the results presented?

02.05.04-12

The nuclear island rocking mode of failure and sliding stability are partially dependent on uniform and stable backfill. The liquefaction analysis presented in the May 2008 supplement to the COL application points out the fact that clean sand was incorporated in an otherwise silty sand/sandy silt engineered fill. The SPT tests in the clean sand resulted in an unacceptable factor of safety (FS=1.0) against liquefaction. An additional six (6) data points fell between factors of safety of 1.1 and 1.4, which represents a range where strength degradation is likely. The supplement states that clean sand is not typical of the Group 1 fill soils. FSAR Section 2.5.4.5 states that the specification prepared for the Cherokee nuclear station project is used as the basis for development of the placement, compaction and quality control requirements for the Lee Nuclear Station. The backfill for the Lee construction will be obtained from the engineered fill placed during the Cherokee construction.

Please demonstrate to the staff how material uniformity and backfill density will be controlled to provide a stable backfill around the nuclear island that will not liquefy or lose strength.

02.05.04-13

The May 2008 liquefaction supplement to the COL application states that the presence of clean sands was an anomaly and that only silty sands and sandy silts having greater than 35% passing the No. 200 sieve will be used as backfill. It is the staff's understanding that the engineering behavior of soil having 35% fines is controlled by the properties of the fines. Saturation of the fines in the backfill following groundwater rebound may reduce the density and shear strength of backfill materials having certain mineral content or plasticity characteristics.

In order for the staff to evaluate the suitability of the silty sands and sandy silts as backfill around the nuclear island, please demonstrate that the fines content of the proposed backfill will not result in density reduction or strength degradation after saturation.

02.05.04-14

The May 2008 supplement to the COL application presents the results of a liquefaction analysis based on in-situ shear wave velocity measurements. The shear wave velocity liquefaction analysis in the engineered fill produced a minimum factor of safety of 17 compared to the minimum factor of safety of 1.0 obtained from the SPT N-value analysis. The staff understands that the two methods normally produce very similar results.

Please provide a detailed explanation of the very significant difference in minimum factors of safety between the two methods, and provide a sample calculation of the liquefaction analysis based on the shear wave velocity. Also provide a side by side comparison of the SPT based analysis and shear wave velocity based analysis for a common point to show that the computed factors of safety for both methods are meaningful.