SummerRAIsPEm Resource

From: Patel, Chandu
Sent: Thursday, July 09, 2009 10:30 AM
To: SummerRAIsPEm Resource
Subject: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 056 RELATED TO SRP SECTION 2.5.4 FOR THE VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3 COMBINED LICENSE APPLICATION
Attachments: SUM-RAI-LTR-056.doc

Chandu Patel

Hearing Identifier: Summer_COL_eRAIs
Email Number: 59

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Subject: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 056 RELATED TO SRP SECTION 2.5.4 FOR THE VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3 COMBINED LICENSE APPLICATION
Sent Date: 7/9/2009 10:29:33 AM
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From: Patel, Chandu

Created By: Chandu.Patel@nrc.gov

Recipients:
"SummerRAIsPEm Resource" <SummerRAIsPEm.Resource@nrc.gov>
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Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

July 9, 2009

Mr. Alfred M. Paglia
Manager, Nuclear Licensing
MC P40
South Carolina Electric & Gas Company
PO Box 88
Jenkinsville, SC 29065

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 056 RELATED TO SRP SECTION 2.5.4 FOR THE VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3 COMBINED LICENSE APPLICATION

Dear Mr. Paglia:

By letter dated March 27, 2008, South Carolina Electric & Gas Company 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 301-415-3025 or at Chandu.Patel@nrc.gov via e-mail.

Sincerely,

/**RA**/

Chandu P. Patel, Senior Project Manager
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket Nos. 52-027
52-028

Enclosure:
Request for Additional Information

CC: see next page

If you have any questions or comments concerning this matter, you may contact me at 301-415-3025 or at Chandu.Patel@nrc.gov via e-mail.

Sincerely,

/**RA**/

Chandu P. Patel, Senior Project Manager
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket Nos. 52-027
52-028

eRAI Tracking No. 3017

Enclosure:
Request for Additional Information

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NRO-002

OFFICE	RGS2/BC	NWE1/PM	OGC	NWE1/L-PM
NAME	CMunson*	BHughes*	MSpencer*	CPatel*
DATE	6/2/09	6/3/09	6/24/09	7/9/09

*Approval captured electronically in the electronic RAI system.

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Virgil C. Summer Nuclear Station, Units 2 and 3
South Carolina Electric and Gas Company
Docket No. 52-027 and 52-028
SRP Section: 02.05.04 - Stability of Subsurface Materials and Foundations
Application Section: 2.5.4

QUESTIONS for Geosciences and Geotechnical Engineering Branch 2 (RGS2)

Note: Please note that RAI numbers have been changed by one from the draft version of these RAIs.

02.05.04-34
In response to RAI 02.05.04-2, you stated that saprolite soil column was used in site seismic response analysis to obtain peak ground acceleration and the generic EPRI soil degradation curves used in the SHAKE analysis agree well with the results of the three RCTS tests performed on saprolite soil samples. However, some RCTS test results show that the EPRI curves used in SHAKE analysis for saprolie soil give higher shear modulus and higher damping ratio for shear strain greater than 0.003, which indicates that the EPRI soil degradation curves used in site seismic response analysis are not conservative. Please verify the impact of using saprolite soil degradation property based on RCTS results instead of EPRI generic curves on SHAKE analysis results.

02.05.04-35
During the site audit of March 31 to April 1, 2009, we noted that (1) the settlement calculations were based on AP1000 DCD Revision 15 design parameters but the current revision 17 updated the parameters, such as maximum static foundation pressure and settlement design parameters; (2) the settlement was calculated using assumed rectangular shapes for nuclear island foundation although the foundation shape is irregular; (3) the settlement calculations were only performed at two points for each foundation – one at the center and one along one side with the shortest distance from the center; (4) the applicant mentioned during the site audit that high-strain modulus was used in the foundation settlement calculations, but the FSAR did not specify this; and (5) the turbine building is founded on deep soil at one end and hard rock on the other.

Since foundation settlement is an important parameter in structure and foundation stability and safety evaluation, please provide the following information: (1) re-evaluate foundation settlement in accordance with the parameters defined in AP1000 DCD Revision 17; (2) evaluate the impact of using actual nuclear island foundation shape, compared with using rectangular shape, in settlement calculation; (3) verify whether 2-location settlement calculation for a foundation can fully describe whole foundation total and differential settlements; (4) clarify the shear strain level at which the soil moduli under the foundation were determined, and describe how this shear strain level compared with the stain level corresponding to the site GMRS seismic loading; and (5) evaluate the potential impact of the non-uniform support condition on settlement of the turbine building.

02.05.04-36
We noted that (1) In your response to RAI 02.05.04-3, you stated that some portions of sound (non-rippable) rock left above foundation base level after excavation “will be removed down to foundation base level using controlled blasting.” But in response to RAI 02.05.04-14, you stated that “[h]owever, this [controlled blasting] would not be practical since the thickness of rock to be removed would not be known. In addition, even controlled blasting would have some impact, such as minor fracturing, on the immediately underlying rock, which would be less desirable than letting the thin transition zone remain

in place." Those two statements are inconsistent. (2) In your response to RAI 02.05.04-3, you stated that "where needed, the concrete placed between the top of sound rock and the base of the nuclear island will have a strength of about 5,000 psi. One reason for selecting this strength is that, according to Boone (2005), concrete with this strength has a shear wave velocity of around 9,000 fps [2,743 m/s], i.e., close to that of the in-situ rock." Based on our confirmatory calculations, in accordance with ACI 318-08, for unreinforced concrete with strength of 34,483 kPa (5,000 psi), the corresponding shear wave velocity is about 2,225 m/s (7,300 fps) – far less than that estimated by you. (3) In your response to RAI 02.05.04-4, you indicated that the concrete fill will have maximum thickness of 1.52 to 5.18 m (5 to 17 ft) underneath the nuclear island. For unreinforced concrete fill with such thickness, cracking will be a serious distress to be concerned about.

In order for us to fully evaluate the adequacy of the foundation, please explain (a) how the foundation base level will be reached to meet the "sound rock" criterion; (b) how you ensure that the proposed concrete fill will have properties to sound rock to meet the uniformity requirement; and (c) how the proposed concrete fill will be designed to reduce cracking distress and to ensure long term strength and stability.

02.05.04-37
In response to RAI 02.05.04-8, you stated that more detailed excavation and backfill plans are currently being developed, and you concluded that common fill at the site, based on the detailed plans, will not have adverse impact on the foundation stability. In order for us to better evaluate the foundation stability, please provide updated excavation and backfill plans.

02.05.04-38
In RAI 02.05.04-9, we asked for justification for the selected peak ground acceleration values and factors of safety used in the liquefaction analysis for saprolite soils. But in your response to this RAI, you did not address this issue. Please provide additional information so that we can complete our site liquefaction potential evaluation.