SummerRAIsPEm Resource

From: Patel, Chandu
Sent: Thursday, July 30, 2009 3:29 PM
To: SummerRAIsPEm Resource
Subject: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 060 RELATED TO SRP SECTION 2.5. 2 FOR THE VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3 COMBINED LICENSE APPLICATION
Attachments: SUM-RAI-LTR-060.doc

Chandu Patel

Hearing Identifier: Summer_COL_eRAIs
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Subject: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 060 RELATED TO SRP SECTION 2.5. 2 FOR THE VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3 COMBINED LICENSE APPLICATION
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From: Patel, Chandu

Created By: Chandu.Patel@nrc.gov

Recipients:
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Reply Requested: No
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July 30, 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. 060 RELATED TO SRP SECTION 2.5. 2 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. 3132

Enclosure:
Request for Additional Information

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DATE	6/29/09	6/30/09	7/20/09	7/30/09

*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: 02.05.02 - Vibratory Ground Motion
Application Section: 2.5.2

QUESTIONS for Geosciences and Geotechnical Engineering Branch 1 (RGS1)

02.05.02-20
In response to RAI 2.5.2-1, the applicant provided an electronic data file containing the mean seismic hazard by source for each of the EPRI teams, for 1 Hz and 10 Hz spectral acceleration. In addition, the applicant provided a file which consisted of the total mean hazard curves for 1, 2.5, 5, 10, 25, and 100 Hz structural frequencies. The staff is trying to determine the contribution to the total mean hazard (1 and 10 Hz) from the updated Charleston seismic source zone, the New Madrid seismic source zone, as well as the ETSZ seismic sources as defined by the Nuclear Energy Institute (NEI) (ML#081720144) study. For this reason, please also provide an additional file that contains the total mean hazard values for 1 Hz and 10 Hz spectral accelerations as well as the actual weighting of each source, the corresponding contributions from the updated Charleston seismic source zone, the New Madrid seismic source zone, the ETSZ seismic sources as defined by the Nuclear Energy Institute (NEI) (ML#081720144) study, as well as the remaining hazard.

02.05.02-21
In response to RAI 2.5.2-3, the applicant stated that: “It should be noted that discarding the Dames & Moore team's contribution incorporates not only any effects from alternative characterization of Pa for Dames & Moore source Zones 41 and 53, but also any relative differences between the Dames & Moore's model for the Charleston source and the Charleston source models of the remaining ESTs." However, FSAR Section 2.5.2.4.4 (page2.5.2-38) states that “these EPRI team Charleston sources were removed from the seismic hazard analysis.” The FSAR also states that the EPRI team Charleston sources were then replaced by the applicant's Updated Charleston Seismic Source (UCSS) model.

Please address the above discrepancy between the response to RAI 2.5.2-3 and the FSAR text. Specifically, please explain why the original EPRI-SOG EST Charleston seismic sources were not removed from the hazard model and instead replaced by the UCSS model in the sensitivity study results presented in response to RAI 2.5.2-3. Please re-evaluate the response to RAI 2.5.2-3 without using the EPRI-SOG Charleston seismic source models. In addition, please provide an electronic data file containing the contribution to the total mean hazard (1 and 10 Hz) from each of the EPRI-SOG ESTs as well as updated Charleson and New Madrid seismic sources, separately. Please also verify that the final hazard results (and resulting GMRS) reflect the inclusion of the UCSS rather than the original EPRI-SOG Charleston seismic source models.

02.05.02-22
In response to RAI 2.5.2-4, the applicant stated that it obtained values for smb from the original 1988 EPRI catalog. However, the response did not contain a discussion as to whether these smb values are appropriate to use for the new catalog data. Please provide justification for the use of the $\beta\mu\sigma$ values from the original 1988 EPRI catalog. Please also provide the updated seismicity catalog with the original magnitude values, as well as the converted magnitude values, in order for the staff to verify these conversions.

02.05.02-23
In response to RAI 2.5.2-6, the applicant stated the following: "In addition, although Emb values for earthquakes in the updated portion of the catalog are derived from several directly reported magnitude scales, all have been assumed to have uncertainties represented by standard deviations between 0.1 and 0.41. For σ values in this range, and for b-values between 0.95 and 1.1, the correction to Emb from Equation 2.5.2-3 of the FSAR is 0.02 or less indicating that the use of a b-value of 1.0 is not critical."

Please clarify the above statement, since the Emb is derived from FSAR Equations 2.5.2-1 and 2.5.2-2, and not FSAR Equation 2.5.2-3 as stated above in the applicant's response. In addition, please clarify what is meant by "…Emb values for earthquakes in the updated portion of the catalog are derived from several directly reported magnitude scales…".

02.05.02-24
Please provide data and or documentation to support Dr Talwani's conclusion that water level changes in the Monticello Reservoir have not been correlated with any reservoir-induced seismicity.

02.05.02-25
Please provide additional discussion regarding other possible differences between the computer software used in the 1989 EPRI analysis and Risk Engineering, Inc.'s FRISK88 software, which may be the source of the observed differences in hazard.

02.05.02-26
In your response to RAI 2.5.2-13, you stated that: "The seismic hazard analysis for the Summer site used the weights given in EPRI (2004) for all clusters and all equations within a cluster." Please clarify whether or not you used the ground motion model clusters, individual models, and weights recommended for hazard calculations incorporating multiple source types (i.e. shown in Figure RAI-13C).

02.05.02-27
The staff reviewed your response to RAI 2.5.2-14. However, the figures provided by you in your response (i.e. Figure RAI-14A and RAI-14B) are difficult to read. Please provide electronic versions of the data used to plot these figures in order for the staff to verify your conclusions that the two more recent equations, published since the EPRI (2004) study, are consistent with the EPRI (2004) study. In addition, please clarify whether the "weighted average" of Equations 1 through 12 in RAI response Figure RAI-14A and RAI-14B reflects the actual weights of these equations as represented in the EPRI 2004 ground motion model (i.e. ground motion model clusters, individual models, and weights recommended when multiple source types are used for hazard calculations) or whether it reflects an equally weighted average. If an equally weighted average was used, please provide justification for not using the actual EPRI weights. Furthermore, in Figure RAI-14B, which plots predicted ground motions for M=5.7, the EPRI models EQ10, EQ11, and EQ12 should not be included because they are only for earthquakes with magnitudes larger than 6.0.

In your response, you provided a plot of ground motion amplitudes for 1 Hz spectral acceleration for M=7 earthquakes versus distance for the 12 equations used from EPRI (2004), and for the Tavakoli and Pezishk (2005) and Atkinson and Boore (2006) references (i.e. Figure RAI-14A). You also provided a plot of ground motion amplitudes for 10 Hz spectral acceleration for M=5.7 (i.e. Figure RAI-14B). Since FSAR Table 2.5.2-218 shows that the controlling earthquakes for the VCSNS site range from M 6.1 to 7.3, please also provide additional plots for M=5.2, 6.1, and 7.3 in addition to those provided in response to RAI 2.5.2-14. You also stated in your response that the Petersen et al. (2008) ground motion model, which was used in the latest version of the USGS National Seismic Hazard

Maps, does not constitute an independent ground motion model because it involves a weighting of many of the equations used in the EPRI (2004). However, it is the weights, not the particular set of models, that are crucial in determining the particular ground-motion values (as they are in the EPR 2004 model). Therefore, please provide further justification for not considering the Peterson et al. (2008) model as a separate and new ground-motion model.

In addition, please explain why the controlling earthquake for 5 and 10 Hz at 10^{-5} annual frequency of exceedance is not M ~ 5.0 to 5.5 at a distance of approximately 0 to 20 km (i.e. based on FSAR Figure 2.5.2-239), instead of M 6.1 at 70 km as listed in FSAR Table 2.5.2-218? FSAR Figure 2.5.2-239 shows that small, local earthquakes dominate the high frequency, and also that some contribution also occurs for low frequency motions from large, distant earthquakes in the Charleston SC region (i.e. closest distance to the Charleston seismic source zone is slightly greater than 100 km).