Progress Energy

Serial: NPD-NRC-2008-098
December 30, 2008

10CFR52.79

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

SHEARON HARRIS NUCLEAR POWER PLANT, UNITS 2 AND 3
DOCKET NOS. 52-022 AND 52-023
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 045 RELATED TO SOIL STRUCTURE INTERACTION

Reference: Letter from Brian C. Anderson (NRC) to James Scarola (PEC), dated November 3, 2008, "Request for Additional Information Letter No. 045 Related to SRP Section 03.07.02 for the Shearon Harris Units 2 and 3 Combined License Application"

Ladies and Gentlemen:

Progress Energy Carolinas, Inc. (PEC) hereby submits our response to the Nuclear Regulatory Commission's (NRC) request for additional information provided in the referenced letter.

A response to the NRC request is addressed in the enclosure.

If you have any further questions, or need additional information, please contact Bob Kitchen at (919) 546-6992, or me at (919) 546-6107.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on December 30, 2008.

Sincerely,

Garry D. Miller
General Manager
Nuclear Plant Development

Enclosure

cc : U.S. NRC Director, Office of New Reactors/NRLPO
U.S. NRC Office of Nuclear Reactor Regulation/NRLPO
U.S. NRC Region II, Regional Administrator
U.S. NRC Resident Inspector, SHNPP Unit 1
Mr. Manny Comar, U.S. NRC Project Manager

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Shearon Harris Nuclear Power Plant Units 2 and 3
Response to NRC Request for Additional Information Letter No. 045 Related to SRP Section 03.07.02 for the Combined License Application, dated November 3, 2008

NRC RAI #	Progress Energy RAI #	Progress Energy Response
03.07.02-1	H-0254	Response enclosed – see following pages

Attachments/Enclosures	Associated NRC RAI #	Pages Included
Westinghouse calculation HAG-1000-S2C-802	03.07.02-1	44

NRC Letter No.: HAR-RAI-LTR-045

NRC Letter Date: November 3, 2008

NRC Review of Final Safety Analysis Report

NRC RAI #: 03.07.02-1

Text of NRC RAI:

Harris FSAR Section 3.7.1.1.2 states that the Harris Unit 3 NI, the site-specific FIRS exceed the Westinghouse CSDRS in the frequency range of 33-35 Hz. and were considered in a 3D SASSI site-specific soil structure interaction (SSI) analysis (Westinghouse Seismic Bounding Study). It is further stated that the resulting Harris floor response spectra do not exceed the AP1000 spectra at the AP1000 six key NI locations. However, FSAR Section 3.7.1.1.2 does not describe the details of the site-specific SSI analysis which relate to seismic loading assumptions, NI structural modeling, material damping, and analysis results.

Please provide the following information:

1. Details regarding how the Harris site-specific FIRS was considered in the "Westinghouse Seismic Bounding Study" and why it is determined to be adequate.
2. Details should include, but not be limited to, determination of the following:
   a. Spectrum compatible time histories
   b. Soil modulus/damping degradation curves
   c. The development of the lower-bound (LB), upper-bound (UB), and best-estimate (BE) soil profiles
   d. A comparison of the site-specific GMRS to the envelope of the results for the LB, UB, and BE free-field site analyses.
3. Details relating to the modeling of the AP1000 NI (e.g., benchmarking, structural damping, constitutive models, etc.)
4. A comparison of 3D SSI model results to the AP1000 six key NI locations.
5. Details relating to the specific parameters used to employ incoherency effects in the response analysis.
6. Calculation details of the development of the impedance functions (i.e., complex valued frequency dependent functions) so that the stiffnesses and damping of the soil-structure system can be readily assessed.

PGN RAI ID#: H-0254

PGN Response to NRC RAI:

1. The details on how the Harris site specific FIRS was considered are provided in the attached Westinghouse assessment HAG-1000-S2C-802, entitled "Site Specific SSI Analysis of Shearon Harris Site," dated January 28, 2008. The Harris site specific FIRS was applied at the AP1000 foundation elevation in the SSI model. The SSI analysis is a single 3D SSI analysis with site-specific shear wave velocity and damping profiles. However, the normal suite of simulations was not performed. Additionally, side soils were not considered in the analysis. They were judged to have insignificant impact on the results. The nuclear island is embedded in sound rock at least to the top of the basemat on all sides. The assessment used the AP1000 NI20 model and HAR site parameters to develop in-structure spectra for comparison to AP1000 design spectra at six key locations. At all six locations, the HAR in-

structure spectra are fully enveloped by the AP1000 design. These comparisons reveal a significant margin between site-specific seismic loading and AP1000 design. The Westinghouse assessment concludes: "The Shearon Harris Site is enveloped by the AP1000 Generic Design."

Note: Spectra used by Westinghouse in this assessment were preliminary and the final spectra are lower for all frequencies.

2. SSI model details are presented in attached HAG-1000-S2C-802 as follows:
   a. The spectrum compatible time histories used for the assessment are presented in Section 4.5.
   b. Harris nuclear island is founded on sound rock. Strain compatible dynamic properties consistent with the FIRS are shown in Table 4-1.
   c. The best estimate (BE) soil profile was used. Lower bound (LB) and upper bound (UB) soil profiles were not considered due to the considerable margin between site-specific seismic loading and AP1000 design.
   d. Harris site specific FIRS was applied at the nuclear island foundation elevation. Side soils were not modeled and further free field site response was not developed. The GMRS is compared to the CSDRS in FSAR Figures 2.5.2-306 and 307. Due to the small exceedence identified in these figures, further analysis to compare in-structure response at six key locations was performed.
3. The analysis was performed with the NI20 model modified with site specific parameters. The SSI model and SSI analysis approach is described in Section 4 in the attached HAG-1000-S2C-802.
4. The comparison of the 3D SSI model results to the AP1000 six key node locations are provided in section 5 of attached HAG-1000-S2C-802.
5. The ACS SASSI incoherent SSI analysis was used as described in Section 4.2 of attached HAG-1000-S2C-802.
6. Harris nuclear island is founded on sound rock and SSI effects are small. The seismic analyses used the soil structure interaction code ACS SASSI. This is discussed further in Section 4 of the attached HAG-1000-S2C-802.

Associated HAR COL Application Revisions:

No COLA revisions have been identified associated with this response.

Attachments/Enclosures:

HAG-1000-S2C-802, entitled "Site Specific SSI Analysis of Shearon Harris Site," dated January 28, 2008.