Progress Energy

Serial: NPD-NRC-2009-211
October 27, 2009

10 CFR 52.79

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
SUPPLEMENT 3 TO RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 030 RELATED TO BASIC GEOLOGIC AND SEISMIC INFORMATION

References:

1. Letter from Manny Comar (NRC) to James Scarola (PEC), dated October 14, 2008, "Request for Additional Information Letter No. 030 Related to SRP Section 02.05.01 for the Harris Units 2 and 3 Combined License Application"

2. Letter from Garry D. Miller (PEC) to U. S. Nuclear Regulatory Commission (NRC), dated December 26, 2008, "Response to Request for Additional Information Letter No. 030 Related to Basic Geologic and Seismic Information," Serial NPD-NRC-2008-067

3. Letter from Garry D. Miller (PEC) to U. S. Nuclear Regulatory Commission (NRC), dated December 30, 2008, "Supplement 1 to Response to Request for Additional Information Letter No. 030 Related to Basic Geologic and Seismic Information," Serial NPD-NRC-2008-095

4. Letter from Garry D. Miller (PEC) to U. S. Nuclear Regulatory Commission (NRC), dated January 12, 2009, "Supplement 2 to Response to Request for Additional Information Letter No. 030 Related to Basic Geologic and Seismic Information," Serial NPD-NRC-2009-001

Ladies and Gentlemen:

Progress Energy Carolinas, Inc. (PEC) hereby submits a supplemental response to the Nuclear Regulatory Commission's (NRC) request for additional information provided in Reference 1.

A revised response to two of the NRC questions (02.05.01-10 and 02.05.01-16) is addressed in the enclosure. The enclosure also identifies changes that will be made in a future revision of the Shearon Harris Nuclear Power Plant Units 2 and 3 application.

If you have any further questions, or need additional information, please contact Bob Kitchen at (919) 546-6992, or me at (727) 820-4481.

Progress Energy Florida, Inc.
P.O. Box 14042
St. Petersburg, FL 33733

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NRO

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

Executed on October 27, 2009.

Sincerely,

John Elnitsky
Vice President
Nuclear Plant Development

Enclosure

cc : U.S. NRC Region II, Regional Administrator
U.S. NRC Resident Inspector, SHNPP Unit 1
Mr. Brian Hughes, U.S. NRC Project Manager

Shearon Harris Nuclear Power Plant Units 2 and 3
Supplement 3 to Response to NRC Request for Additional Information Letter No. 030
Related to SRP Section 02.05.01 for the Combined License Application,
Dated October 14, 2008

NRC RAI #	Progress Energy RAI #	Progress Energy Response
02.05.01-1	H-0138	December 26, 2008; NPD-NRC-2008-067
02.05.01-2	H-0139	December 26, 2008; NPD-NRC-2008-067
02.05.01-3	H-0140	December 26, 2008; NPD-NRC-2008-067
02.05.01-4	H-0141	December 26, 2008; NPD-NRC-2008-067
02.05.01-5	H-0142	December 26, 2008; NPD-NRC-2008-067
02.05.01-6	H-0143	December 26, 2008; NPD-NRC-2008-067
02.05.01-7	H-0144	December 26, 2008; NPD-NRC-2008-067
02.05.01-8	H-0145	December 26, 2008; NPD-NRC-2008-067
02.05.01-09	H-0146	December 30, 2008; NPD-NRC-2008-095
02.05.01-10	H-0147 & H-0494	January 12, 2009; NPD-NRC-2009-001 & supplemental response enclosed – see following pages
02.05.01-11	H-0148	January 12, 2009; NPD-NRC-2009-001
02.05.01-12	H-0149	January 12, 2009; NPD-NRC-2009-001
02.05.01-13	H-0150	December 26, 2008; NPD-NRC-2008-067
02.05.01-14	H-0151	December 26, 2008; NPD-NRC-2008-067
02.05.01-15	H-0152	December 30, 2008; NPD-NRC-2008-095
02.05.01-16	H-0153 & H-0495	January 12, 2009; NPD-NRC-2009-001 & supplemental response enclosed – see following pages
02.05.01-17	H-0154	December 30, 2008; NPD-NRC-2008-095
02.05.01-18	H-0155	December 30, 2008; NPD-NRC-2008-095
02.05.01-19	H-0156	December 30, 2008; NPD-NRC-2008-095
02.05.01-20	H-0157	December 26, 2008; NPD-NRC-2008-067
02.05.01-21	H-0158	December 26, 2008; NPD-NRC-2008-067
02.05.01-22	H-0159	December 26, 2008; NPD-NRC-2008-067
02.05.01-23	H-0160	December 26, 2008; NPD-NRC-2008-067
02.05.01-24	H-0161	December 26, 2008; NPD-NRC-2008-067
02.05.01-25	H-0162	December 26, 2008; NPD-NRC-2008-067
02.05.01-26	H-0163	December 26, 2008; NPD-NRC-2008-067
02.05.01-27	H-0164	December 26, 2008; NPD-NRC-2008-067
02.05.01-28	H-0165	December 26, 2008; NPD-NRC-2008-067
02.05.01-29	H-0166	December 26, 2008; NPD-NRC-2008-067
02.05.01-30	H-0167	December 26, 2008; NPD-NRC-2008-067
02.05.01-31	H-0168	December 26, 2008; NPD-NRC-2008-067

NRC Letter No.: HAR-RAI-LTR-030

NRC Letter Date: October 14, 2008

NRC Review of Final Safety Analysis Report

NRC RAI #: 02.05.01-10

Text of NRC RAI:

FSAR section 2.5.1.1.4.2.5.5 provides a discussion about the three segments of East Coast Fault System (ECFZ). The FSAR states that most of the evidence in the literature is in support of the southern segment with increasingly less support for the central and northern segments.

In order to discount the central segment of the ECFS proposed by Marple and Talwani, provide an alternative, non-tectonic interpretation or additional data to the contrary of Marple and Talwani's interpretation similar to what was presented previously for the northern segment for the North Anna ESP. Please discuss the different types of evidence used to infer late Quaternary movement on all segments of the ECFZ but specifically the central segment and the possible alternative explanation for such evidence.

In addition please provide the following:

a) There are several statements in this section that are vague and made without listing or explaining the evidence for them and without appropriate references. Examples include: "any significant geomorphic changes", "it does not seem warranted base on review of the data", "performed in this study suggest that the postulated ECFS-C may not exist, or has very low probability of activity if is does exist". Please provide related specifics for these statements.

b) The FSAR presents a major conclusion about seismic activity on the ECFS based on an EIS and an ESP (FSAR ref 2.5.1-263; FSAR ref 2.5.1-264). Please provide specific details from those documents to justify the findings stated in this FSAR such as: "The evaluation for the Vogtle ESP (Rev2) judged the ECFS-S (FSAR ref 2.5.1-264) to have a relatively low likelihood of producing Charleston-type earthquakes." Please summarize why the ECFZ-S is a possible seismic source of low likelihood; include an explanation of what low likelihood means.

c) The FSAR (p. 2.5-44) cites a sensitivity analysis performed for the North Anna site on the ECFS-N. Please provide some specific results or conclusions in this FSAR.

d) Evaluate how the types of evidence have been used along the central fault segment to argue for recent movement.

e) The FSAR states that Wheeler stated that he found no evidence for sudden uplift anywhere along the fault system. Please provide information about what criteria would be used to determine sudden uplift. What is the implication of sudden uplift to seismicity rates or size of earthquakes along the ECFS.

f) The FSAR (p 2.5-42) states: "The feature that Marple and Talwani describe as a fault or flexure in basement appears to coincide with such a merged escarpment, and it is likely that the feature is related to shoreline erosion rather than faulting." Please describe and locate on a map which basement feature from Marple and Talwani is being correlated with a buried, merged escarpment. Where exactly is the merged escarpment and how did you determine that it was shoreline erosion and not faulting.

g) Provide a discussion of how the LiDAR data affects the evaluation of features used as evidence of the ECFS.

h) Text about new LiDAR data analysis on page 2.5-42 states that there are no river anomalies save the Cap Fear River observed in this data. Other river course changes at the boundary of the ECFS-C in other rivers or tributaries are not explained in this section:

- Unnamed river (sw of Lumbar River) has sharp river course change to NE.
- South River shows sinuosity greatly increased to the west of ECFS.
- Mill Creek shows an arc to SE and back to earlier trend.
- Neuse River shows the confluence of 4 rivers at the upstream boundary as well as a sharp turn to the SW along the upstream side of ECFS boundary.

Please explain these features.

i) FSAR (p. 2.5-43) provides a discussion of paleoliquefaction sites at the SC/NC state border. For Amick et al. (1990a; Reference 2.5.1-270) the areas searched are not specified nor how those sites were selected. There is no detail about the liquefaction susceptibility for those areas. The FSAR provides no detail for the Quaternary terrace mapping project by Owens et al. (1989; Reference 2.5.1-271). Please provide more specific details for these two investigations. To what degree do these two studies preclude large earthquakes near the Harris site?

PGN RAI ID #: H-0494

PGN Response to NRC RAI:

This RAI was previously responded to in NPD-NRC-2009-001 (January 12, 2009). In response to an NRC Teleconference held on September 10, 2009, further clarification was requested on the proposed FSAR revisions shown on page 23 of 66 under the heading "River Incision and Upwarped Displaced Fluvial Surface."

The proposed revisions shown in the previous response to RAI 02.05.01-10 have been implemented into Rev 1 of the HNP COLA. The proposed changes based on the teleconference will be made in a future revision.

Associated HAR COL Application Revisions:

The following changes will be made to HAR FSAR Chapter 2 in a future revision:

Revise the third paragraph of the section on *"River Incision and Upwarped Displaced Fluvial Surfaces"* in FSAR Section 2.5.1.1.4.2.5.2.2 from:

"A map denoting the reach of anomalous river incision and representative topographic profiles across the Cape Fear River and its youngest terrace (Wando, early Pleistocene) shown by Marple and Talwani (Figure 8 in Reference 2.5.1-243) indicates that incision occurs well upstream and downstream of the ZRA-C. The pattern of incision, which occurs over a reach of the river approximately 50 km (30 mi.) upstream and at least 7 km (4.3 mi.) downstream as mapped by Marple and Talwani to possibly 35 km (22 mi.) based on profile 7, shows incision into the Wando terrace at a location downstream of Elizabethtown. This pattern is more consistent with simple tilting of the Coastal Plain along the valley length (up from the direction of the Piedmont that caused deep entrenchment of the Cape Fear River into the Wando terrace in the upper valley concurrent with subsidence in the lower valley), as proposed by Soller (Reference 2.5.1-266), than is localized deformation along a strike-slip or oblique slip fault centered on the postulated ECFS-C. Soller (Reference 2.5.1-266) further suggests that the terrace pattern in the upper Cape Fear River valley, which may indicate a more localized zone of higher uplift, is related to a small-scale flexure that is parallel to and superimposed on the southern flank of the Cape Fear arch. Most of the Cape Fear River valley lies over the local bulge, which is inferred from a bulge in the basement structure contours (Figure 2.5.1-218). This localized uplift lies in the correct position relative to the Cape Fear River valley to account for the uplift history of the valley, and is therefore considered by Soller to be the source of the uplift that shaped the valley."

To read:

"A map denoting the reach of anomalous river incision and representative topographic profiles across the Cape Fear River and its youngest terrace (Wando, early Pleistocene) shown by Marple and Talwani (Figure 8 in Reference 2.5.1-243) indicates that incision occurs well upstream and downstream of the ZRA-C. The pattern of incision occurs over a reach of the river extending approximately 50 km (30 mi.) upstream and at least 7 km (4.3 mi.) downstream of the ZRA-C as mapped by Marple and Talwani (Reference 2.5.1-243). Incision may extend as far as 35 km (22 mi.) downstream based on profile 7 of Marple and Talwani (Reference 2.5.1-243), which shows minor incision into the Wando terrace at a location downstream of Elizabethtown. This pattern is more consistent with simple tilting of the Coastal Plain along the valley length (up from the direction of the Piedmont that caused deep entrenchment of the Cape Fear River into the Wando terrace in the upper valley concurrent with subsidence in the lower valley), as proposed by Soller (Reference 2.5.1-266), than is localized deformation along a strike-slip or oblique slip fault centered on the postulated ECFS-C. Soller (Reference 2.5.1-266) further suggests that the terrace pattern in the upper Cape Fear River valley, which may indicate a more localized zone of higher uplift, is related to a small-scale flexure that is parallel to and superimposed on the southern flank of the Cape Fear arch. Most of the Cape Fear River valley lies over the local bulge, which is inferred from a bulge in the basement structure contours (Figure 2.5.1-218). This localized uplift lies in the correct position relative to the Cape Fear River valley to account for the uplift history of the valley, and is therefore considered by Soller to be the source of the uplift that shaped the valley. "

Attachments/Enclosures:

None.

NRC Letter No.: HAR-RAI-LTR-030

NRC Letter Date: October 14, 2008

NRC Review of Final Safety Analysis Report

NRC RAI #: 02.05.01-16

Text of NRC RAI:

FSAR Section 2.5.1.1.4.3 (p. 2.5-51) concludes:

"Based on our independent evaluation of the geomorphic, seismic reflection, and seismicity data, our confidence in the existence and activity of the ECFS is low to moderate. In our judgment, all of the geomorphic "anomalies" have credible nontectonic (i.e., fluvial geomorphic) explanations. Our three-dimensional (3-D) analysis of microseismicity in the vicinity of the ECFS does not clearly define a discrete structure (Figure 5) [Figure 2.5.1-225]. Available seismic reflection data do not unambiguously delineate a through-going structure in the vicinity of the ECFS."

a) This conclusion about the ECFS is not supported by the analysis provided in the text. More details about specifically what data was examined and how it supports or refutes previous investigator's conclusions needs to be provided. Specifically, more details on the analysis of the seismic reflection data and the 3-D analysis of microseismicity. Figure 2.5.2-225 does not present a 3-D analysis of microseismicity, it only provides the x, y 2-D expression of seismicity.

b) In the section for the Adams Run fault, (p 2.5-52) reference is made to a 3-D microseismicity analysis. Please explain the 3-D microseismcity analysis.

c) In the section for the Sawmill Branch Fault, (p 2.5-52) please define the 3 features that Talwani and Katuna used in their paper. Please explain the 3-D microseismcity analysis and how the applicant reached the conclusion that the Ashley river fault and the Sawmill Branch fault are the same fault. Please discuss the errors associated with earthquake locations in the Ashley River area and provide figures of cross-sectional views of the microseismicity in relation to the local faults.

d) In the discussion of the Helena Banks fault zone, (p 2.5-53) there is no explanation why Crone and Wheeler, 2000 classified the zone as C. Please clarify. Why did Wheeler 2005 eliminate the zone? It has been 6 years since the earthquake. No references are provided. Have any papers been published?

PGN RAI ID #: H-0495

PGN Response to NRC RAI:

This RAI was previously responded to in NPD-NRC-2009-001 (January 12, 2009). In response to an NRC Teleconference held on September 10, 2009, further clarification was requested on the proposed FSAR revisions shown on page 60 of 66 under the heading "Association with Mesozoic Basins."

The proposed revisions shown in the previous response to RAI 02.05.01-16 have been implemented into Rev 1 of the HNP COLA. The proposed changes based on the teleconference will be made in a future revision.

Associated HAR COL Application Revisions:

The following changes will be made to HAR FSAR Chapter 2 in a future revision:

Revise the section on *"Association with Mesozoic Basins"* FSAR Section 2.5.1.1.4.3.1 from:

"Association with Mesozoic Basins

Johnston et al. (Reference 2.5.1-295) evaluated the correlation of large-magnitude intraplate earthquakes to specific tectonic environments throughout the world. They concluded that large-magnitude earthquakes generally occur in tectonic environments characterized by Mesozoic and younger rifted crust. The Charleston meizoseismal region occurs in a region of Mesozoic extended crust along the southeastern margin of the North American craton (Reference 2.5.1-295). Several Mesozoic basins are defined in the region. The location, structural orientation (i.e., northeast-southwest), and spatial correlation of possible Mesozoic basins and structures was used by Southern Nuclear Company in the Vogtle ESP assessment of the updated Charleston seismic source to characterize alternative models of the source zone geometry (Reference 2.5.1-264). The spatial correlation of the northern segment of the Woodstock fault to the southeast margin fault of the Mesozoic Jedberg basin shows reactivation as an oblique right-lateral-slip fault with up to the northwest displacement (Reference 2.5.1-370)."

To read:

"Association with Mesozoic Basins

Johnston et al. (Reference 2.5.1-295) evaluated the correlation of large-magnitude intraplate earthquakes to specific tectonic environments throughout the world. They concluded that large-magnitude earthquakes generally occur in tectonic environments characterized by Mesozoic and younger rifted crust. The Charleston meizoseismal region occurs in a region of Mesozoic extended crust along the southeastern margin of the North American craton (Reference 2.5.1-295). Several Mesozoic basins are defined in the region. The location, structural orientation (i.e., northeast-southwest), and spatial correlation of possible Mesozoic basins and structures was used by Southern Nuclear Company in the Vogtle ESP assessment of the updated Charleston seismic source to characterize alternative models of the source zone geometry (Reference 2.5.1-264). Talwani and Durá-Gómez (Reference 2.5.1-370) inferred that the northern segment of the Woodstock fault correlates spatially to the southeast margin fault of the Mesozoic Jedberg basin, suggesting that a Mesozoic basin-bounding fault has been reactivated as an oblique right-lateral-slip fault with up to the northwest displacement."

Attachments/Enclosures:

None.