



Serial: NPD-NRC-2009-103  
June 8, 2009

10 CFR 52.79

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

**LEVY COUNTY NUCLEAR POWER PLANT, UNITS 1 AND 2  
DOCKET NOS. 52-029 AND 52-030  
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 029 RELATED TO  
STABILITY OF SUBSURFACE MATERIALS AND FOUNDATIONS**

Reference: Letter from Brian C. Anderson (NRC) to Garry Miller (PEF), dated May 8, 2009,  
"Request for Additional Information Letter No. 029 Related to SRP Section 2.5.4 for  
the Levy County Nuclear Plant Units 1 and 2 Combined License Application"

Ladies and Gentlemen:

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

A partial response to the NRC request is addressed in the enclosure. The enclosure also  
identifies changes that will be made in a future revision of the Levy County Nuclear Power Plant  
Units 1 and 2 application.

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 June 8, 2009.

Sincerely,

Garry D. Miller  
General Manager  
Nuclear Plant Development

Enclosure

cc : U.S. NRC Region II, Regional Administrator  
Mr. Brian Anderson, U.S. NRC Project Manager

**Levy Nuclear Power Plant Units 1 and 2  
Response to NRC Request for Additional Information Letter No. 029 Related to  
SRP Section 2.5.4 for the Combined License Application, dated May 8, 2009**

<u>NRC RAI #</u>	<u>Progress Energy RAI #</u>	<u>Progress Energy Response</u>
02.05.04-10	L-0191	Response enclosed – see following pages
02.05.04-11	L-0192	Future submittal
02.05.04-12	L-0193	Response enclosed – see following pages
02.05.04-13	L-0195	Response enclosed – see following pages
02.05.04-14	L-0196	Response enclosed – see following pages

**NRC Letter No.:** LNP-RAI-LTR-029

**NRC Letter Date:** May 8, 2009

**NRC Review of Final Safety Analysis Report**

**NRC RAI NUMBER:** 02.05.04-10

**Text of NRC RAI:**

AP 1000 DCD, Revision 17, Table 2.5-1 provides the limits of acceptable settlement without additional evaluation. The table states that the total settlement for the nuclear island foundation mat is 3 inches and the differential settlement across the nuclear island foundation mat is limited to ½ inch in 50 ft. Additionally, Westinghouse response to RAI-TR85-SEB1-36 corrects Table 2.5-1 of Rev 17, to state that the differential settlement between the nuclear island and the turbine building is limited to 3 inches, and the differential settlement between the nuclear island and other buildings is also limited to 3 inches. The FSAR states that LNP1 and LNP2 nuclear island will be founded on the RCC bridging mat supported by Avon Park limestone, and the turbine building and other buildings surrounding the nuclear island on drilled piers socketed into the Avon Park limestone. The FSAR further states that the design of the drilled piers will be performed during detailed design based on borings located at each drilled pier. Estimates of settlement and monitoring plans for non-safety related structures were not provided in the FSAR, since it was submitted before the settlement criteria of Rev. 17.

Please provide estimates of non-safety related structure settlements and a description of the monitoring program that you will implement to ensure that the actual settlements and differential settlements of the structures relative to the nuclear island do not exceed the DCD settlement criteria.

**PGN RAI ID #:** L-0191

**PGN Response to NRC RAI:**

The estimated total settlements for non-safety related structures are presented in Table RAI 02.05.04-10-1 below:

**TABLE RAI 02.05.04-10-1  
SETTLEMENT OF NON-SAFETY RELATED STRUCTURES**

	Turbine Building		Annex Building		Radwaste Building		Diesel Generator Building	
	LNP 2	LNP 1	LNP 2	LNP 1	LNP 2	LNP 1	LNP 2	LNP 1
Total Settlement (in inches)	0.22	0.19	0.13	0.17	0.13	0.18	0.12	0.14

These estimated total settlements yield differential settlements with the nuclear islands that are within the tolerable limits assigned by the AP1000 DCD, Revision 17, Table 2.5-1, and adjusted by the Westinghouse response to RAI TR85-SEB1-36.

FSAR Section 2.5.4.10.3.5 provides information regarding the settlement program that will be developed prior to construction. While the current FSAR section refers to the monitoring of total settlement of the nuclear islands, a modification will be made that addresses the relative settlement between the nuclear islands and other adjacent structures. This modification will include the commitment to add settlement bench marks to the turbine buildings, annex buildings, and radwaste buildings to monitor the differential settlements between these buildings and the nuclear islands.

**Associated LNP COL Application Revisions:**

The following change will be made to the LNP COLA in a future revision:

The following text will be inserted in FSAR Subsection 2.5.4.10.3.5 following the bulleted list:

Settlement bench marks will be installed approximately 1 m (3 ft.) above site grade (at approximate elevation 16.5 m [54 ft.] NAVD88) on the turbine buildings, annex buildings, and radwaste buildings, at the corners of these buildings that abut the nuclear islands. These bench marks, used to measure the differential settlement between the nuclear islands and the adjacent buildings, will be monitored during and after the construction of the nuclear island and adjacent structures.

**Attachments/Enclosures:**

None.

**NRC Letter No.:** LNP-RAI-LTR-029

**NRC Letter Date:** May 8, 2009

**NRC Review of Final Safety Analysis Report**

**NRC RAI NUMBER:** 02.05.04-12

**Text of NRC RAI:**

Cross-sections are not indicated on Figure 201A as stated in FSAR Section 2.5.4.1.1

Please correct this inconsistency.

**PGN RAI ID #:** L-0193

**PGN Response to NRC RAI:**

The locations for each of the geologic cross sections are shown within the legend of each cross section. The FSAR will be modified to reference the figure legend.

**Associated LNP COL Application Revisions:**

The following change will be made to the LNP COLA in a future revision:

The last sentence in the first paragraph of LNP FSAR Section 2.5.4.1.1 will be revised in a future amendment from:

The cross sections locations are indicated on Figure 2.5.4.2-201A.

to:

The cross section locations for each of these Figures are provided in the legend on each Figure.

**Attachments/Enclosures:**

None

**NRC Letter No.:** LNP-RAI-LTR-029

**NRC Letter Date:** May 8, 2009

**NRC Review of Final Safety Analysis Report**

**NRC RAI NUMBER:** 02.05.04-13

**Text of NRC RAI:**

Section 2.5.4.2.1.3 states "An aquifer pumping test was performed in one well (PW-1), and the locations of the pumping and observation wells are shown on FSAR Figure 2.4.12-223.

Please note that this figure does not show the location of the pump test well and observation wells. Please correct this apparent inconsistency.

**PGN RAI ID #:** L-0195

**PGN Response to NRC RAI:**

The location of the pump test wells and observations wells are provided on FSAR Figure 2.4.12-225. The FSAR will be modified to indicate the well locations.

**Associated LNP COL Application Revisions:**

The following change will be made to the LNP COLA in a future revision:

Revise the following text in FSAR Section 2.5.4.2.1.3 from:

An aquifer pumping test was performed in one well (PW-1), and the locations of the pumping and observation wells are shown on FSAR Figure 2.4.12-223.

to:

An aquifer pumping test was performed in one well (PW-1), and the locations of the pumping and observation wells are shown on FSAR Figure 2.4.12-225.

**Attachments/Enclosures:**

None

**NRC Letter No.:** LNP-RAI-LTR-029

**NRC Letter Date:** May 8, 2009

**NRC Review of Final Safety Analysis Report**

**NRC RAI NUMBER:** 02.05.04-14

**Text of NRC RAI:**

The Hoek-Brown method was used to obtain Mohr-Coulomb strength parameters for stability analyses. The Hoek-Brown methodology differentiates between carbonate limestone and micritic limestone as options in determining the value of  $m_i$ . You selected a value of  $m_i$  equal to 0.8 from a range of micritic limestone values of 0.5 to 0.11.

Please provide justification for selecting  $m_i = 0.8$ .

**PGN RAI ID #:** L-0196

**PGN Response to NRC RAI:**

As indicated in Table C1 from RAI response 02.05.04-2(c) (Reference 1), the material constant  $m_i$  used in stability analyses was 8. As defined in the Hoek-Brown methodology, micritic limestones are a carbonate, non-clastic sedimentary rock with a fine texture.

The recommended values of the  $m_i$  constant for micritic limestones have evolved from 8 (Hoek & Brown, 1997) to  $9 \pm 2$  (Marinos & Hoek, 2000) to  $8 \pm 3$  (Hoek & RocScience, 2009). Micritic limestone represents the lower bound  $m_i$  value when compared to other carbonate limestones identified by Hoek et al (crystalline limestone and sparitic limestone). More recent recommendations for  $m_i$  constants (Marinos & Hoek, 2000) include recommendations for dolomites as  $9 \pm 3$ .

These references include the disclaimer that the value of  $m_i$  will be significantly different if failure occurs along a weakness plane. As discussed in LNP FSAR Section 2.5.4.1.1.2, the dip of bedding planes is approximately horizontal at LNP 1 and LNP 2. Shear failure along these planes is not regarded as an expected failure mechanism; thus, the values estimated in these references are considered to be valid for the Levy County site.

Since micritic limestone is presented as having the lower bound carbonate limestone  $m_i$  value, with values ranging from 8 to 9 (plus or minus), selecting a value of 8 for the  $m_i$  constant was deemed to be sufficiently conservative.

**References:**

- 1) Letter from Garry D. Miller (PEF) to U.S. Nuclear Regulatory Commission, dated November 20, 2008, "Levy Nuclear Plant Units 1 and 2 NRC Docket Numbers 52-029 and 52-030 LNP COLA Request for Additional Information"; Serial NPD-NRC-2008-064

- 2) Hoek, E., and Brown, E.T., "Practical estimates of rock mass strength," Intl. J. Rock Mech. & Mining Sci. & Geomechanics Abstracts, 1997.
- 3) Marinos, P., and Hoek, E., "GSI: A Geologically Friendly Tool for Rock Mass Strength Estimation," Proc. GeoEng2000 Conference, Melbourne, 2000.
- 4) Hoek, E., "RocLab v1.0," RocScience, Inc., Toronto, Ontario, 2009.

**Associated LNP COL Application Revisions:**

No COLA revisions have been identified associated with this response.

**Attachments/Enclosures:**

None.