Progress Energy

Serial: NPD-NRC-2009-110 10CFR52.79
June 15, 2009

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

LEVY NUCLEAR POWER PLANT, UNITS 1 AND 2
DOCKET NOS. 52-029 AND 52-030
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 036 RELATED TO HYDROLOGIC ENGINEERING

Reference: Letter from Brian C. Anderson (NRC) to Garry Miller (PEF), dated May 15, 2009, "Request for Additional Information Letter No. 036 Related to SRP Section 2.4.1 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 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 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 15, 2009.

Sincerely,

Garry D. Miller
General Manager
Nuclear Plant Development

Enclosure

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

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NRO

Levy Nuclear Power Plant Units 1 and 2
Response to 2.4.1 for the Combined License Application, dated May 15, 2009

NRC RAI #	Progress Energy RAI #	Progress Energy Response
02.04.01-1	L-0213	Response enclosed – see following pages
02.04.01-2	L-0214	Response enclosed – see following pages
02.04.01-3	L-0215	Response enclosed – see following pages

NCR Letter No.: LNP-RAI-LTR-036

NRC Letter Date: May 15, 2009

NRC Review of Final Safety Analysis Report

NRC RAI #: 02.04.01-1

Text of NRC RAI:

To meet the requirements of GDC 2, 10 CFR 52.17 and 10 CFR Part 100, the applicant should describe the process followed to determine the conceptual models of the interface of the plant with the hydrosphere and those of the hydrologic causal mechanisms to ensure that the most conservative of plausible conceptual models has been identified.

PGN RAI ID #: L-0213

PGN Response to NRC RAI:

Conceptual site models were developed for the LNP site to characterize the effects of the following:

- Flooding from local intense precipitation,
- Flooding in streams and rivers,
- Flooding due to failures of upstream dams,
- Flooding due to surges and seiches,
- Flooding due to tsunami,
- Subsurface characteristics, and
- Release of radioactive liquids.

During the initial phase of developing conceptual models for the site, a review of available information was performed to obtain documentation relating to the physiography, hydrology, geology, meteorology, topography, and demography of the LNP site and vicinity. The information that was reviewed included information published by local, state, and federal agencies, and research studies performed by universities. The purpose of that review was to identify an existing baseline of information that could be used to characterize the site.

In addition to the use of existing information, a comprehensive investigation of the LNP site was conducted to further characterize site conditions. This investigation included collection of site geological, hydrogeological, meteorological, and water quality data.

This information was used as a basis for the development of the site conceptual models, with the intent of formulating a realistically conservative estimate of the effects of flooding, subsurface characteristics, and release of radioactive liquids. The process followed to formulate the conceptual site models was as follows:

- The process followed to determine the conceptual models for floods from local intense precipitation, probable maximum flood in the drainage area upstream of the site, surges, seiche, tsunami, seismically-induced dam failures, landslides, and ice effects is discussed in the response to RAI 02.04.02-1.

- The process followed to determine the conceptual models for floods in streams and rivers and in the site drainage system is discussed in the response to RAI 02.04.03-1.

- The process followed to determine the conceptual models for flood waves from severe breaching of upstream dams, domino-type or cascading failures of dams, dynamic effects on safety-related SSCs, loss of safety-related water supplies, sediment deposition and erosion, and failure of on-site water control or storage structures is discussed in the response to RAI 02.04.04-1.

- The process followed to determine the conceptual models for probable maximum hurricane, probable maximum wind storm, seiche and resonance, wave runup, and sediment erosion and deposition is discussed in LNP FSAR Subsection 2.4.5. The primary information that was used to formulate these models is as follows:

  - Historical storm surge events,
  - Probable maximum surge levels estimated by the U.S. Nuclear Regulatory Commission (NRC),
  - Probable maximum surge levels predicted by the Sea, Lake, and Overland Surge from Hurricanes (SLOSH) model developed by the National Weather Service,
  - Probable maximum surge levels predicted by Hsu's empirical equation,
  - Wave setup estimated using the approach presented in the Coastal Engineering Manual (EM 1110-2-1100) by the U.S. Army Corps of Engineers, and
  - Monte Carlo Simulation results.

  The conceptual site models developed for probable maximum hurricane, probable maximum wind storm, seiche and resonance, wave runup, and sediment erosion and deposition is based on current state of the practice and are therefore considered to be the most conservative plausible representation. Three approaches were used to estimate the probable maximum surge at the LNP site; the methodology described in Regulatory Guide 1.59, numerical modeling using the SLOSH model; and an empirical model. SLOSH is the primary model used by FEMA, NOAA, and the USACE. Ranges of values for the probable maximum surge parameters were estimated using these three approaches. The estimated ranges in values were combined, using a Monte Carlo Simulation, to determine the maximum probable surge stillwater elevation. As a final step, maximum wave setup was calculated and added to the maximum probable surge stillwater elevation to estimate the probable maximum surge elevation.

- The process followed to determine the conceptual models for probable maximum tsunami, tsunami propagation, wave runup, inundation and drawdown, hydrostatic and hydrodynamic forces, debris and water-borne projectiles, and sediment erosion and deposition is discussed in LNP FSAR Subsection 2.4.6. The primary information that was used to formulate the conceptual site models is as follows:

  - Historical tsunami events,
  - Historical earthquake events,

- Historical landslide events,
- Research regarding tsunamigenic sources in the Caribbean and Gulf of Mexico,
- Research regarding the efficiency of tsunami generation in the Caribbean and Gulf of Mexico,
- Efficiency of far-field tsunami generation,
- Research regarding linear and non-linear wave dynamics, and
- Numerical simulations of historic tsunami events.

The conceptual site models developed for probable maximum tsunami, tsunami propagation, wave runup, inundation and drawdown, hydrostatic and hydrodynamic forces, debris and water-borne projectiles, and sediment erosion and deposition are based on current state of the practice and are therefore considered to be the most conservative plausible representation. Tsunami waves recorded along the Gulf Coast have all been less than 1 meter [m] (3.28 feet [ft.]) in height. The nominal plant grade floor elevation of the LNP site is 51 ft. NAVD88. In addition, LNP 1 and 2 are located approximately 7.9 miles inland. No Caribbean tsunamis between 1498 and 2000 have caused damage or impacted (runup > 1 m) the United States Gulf Coast and no documented tsunami has originated within the Gulf of Mexico. Sources outside of the Gulf of Mexico will not likely produce a tsunami capable of damaging the Gulf Coast. Therefore, it is very unlikely that a tsunami will impact the north-central Florida coast west of the LNP site.

- The process followed to determine the conceptual model for subsurface site characteristics is discussed in the response to RAI 02.04.12-19.
- The process followed to determine the conceptual models for surface and subsurface pathways and for the site characteristics that affect transport of radioactive liquid effluents in surface and groundwater is discussed in the response to RAI 02.04.13-2.

Associated LNP COL Application Revisions:

None.

Attachments/Enclosures:

None.

NRC Letter No.: LNP-RAI-LTR-036

NRC Letter Date: May 15, 2009

NRC Review of Final Safety Analysis Report

NRC RAI #: 02.04.01-2

Text of NRC RAI:

To meet the requirements of GDC 2, 10 CFR 52.17 and 10 CFR Part 100, the applicant should include a complete description of all spatial and temporal datasets used in support of its conclusions regarding safety of the plant. Data and descriptions should be sufficiently detailed to allow the staff to review the applicant's conclusions regarding the safety of the plant and to determine of the design bases of safety-related SSC. Please provide input and output files associated with the HEC-HMS and HEC-RAS model simulations performed for the FSAR.

PGN RAI ID #: L-0214

PGN Response to NRC RAI:

The following files related to HEC-HMS and HEC-RAS have been provided:

1) HEC-HMS:

The HEC-HMS model files shown in Table 1 are provided in the "Withlacoochee-HECHMS" folder on CD (separate transmittal). The folder contains input data for the 10-year, 25-year, 50-year, 100-year, 500-year, SPF, and PMF events. The output file is named "Withlacoochee.dss" and contains input/output data for various flooding events, including the PMF event.

TABLE 1
HEC-HMS Model Input, Output, and Model Generated Files

File Name	File Description
Control_100.control	Control specification for the 100-yr event
Control_PMF.control	Control specification for the PMF event
Met_100_Yr.met	Meteorological data for the 100-yr event
Met_10_Yr.met	Meteorological data for the 10-yr event
Met_25_Yr.met	Meteorological data for the 25-yr event
Met_500_Yr.met	Meteorological data for the 500-yr event
Met_50_Yr.met	Meteorological data for the 50-yr event
Met_PMF.met	Meteorological data for the PMP event
Met_SPF.met	Meteorological data for the SPF event

TABLE 1
HEC-HMS Model Input, Output, and Model Generated Files

File Name	File Description
Run_100_Yr.log	Log file for the 100-yr event run
Run_10_Yr.log	Log file for the 10-yr event run
Run_25_yr.log	Log file for the 25-yr event run
Run 500_Yr.log	Log file for the 500-yr event run
Run_50_Yr.log	Log file for the 50-yr event run
Run_PMF.log	Log file for the PMP event run
Run_SPF.log	Log file for the SPF event run
Withlacoochee.dss	HEC-HMS Output Database file (HECDssVue); in this file, all input/output data are saved permanently.
Withlacoochee.gage	Gage specification file
Withlacoochee.hms	HEC-HMS EXE File
Withlacoochee.log	HEC-HMS Log File
Withlacoochee.out	HEC-HMS Output File; this is a temporary output file in which only the current run is saved.
Withlacoochee.pdata	HEC-HMS Project File
Withlacoochee.run	HEC-HMS Run File
Withlacoochee_1.basin	HEC-HMS Basin File

2) HEC-RAS:

The HEC-RAS model files shown in Table 2 are provided in the "Withlacoochee-HECRAS" folder on CD (separate transmittal). The folder contains the model input and output files. The output file for the HEC-RAS model is named "Run_Number3.dss".

TABLE 2
HEC-RAS Model Input, Output, and Model Generated Files

File Name	File Description
500xBounds.geo	Geometric data imported from AutoCad with X-section of 500-ft interval

TABLE 2
HEC-RAS Model Input, Output, and Model Generated Files

File Name	File Description
500xBounds2.geo	Geometric data imported from AutoCad with Extended X-sections of 500-ft interval
background.jgw	Background JGW File
background.jpg	Background JPG File
Backup.f01	Backup flow data file
Backup.g01	Backup geometric data file
Backup.u01	Backup flow data file
Boundaries.dxf	DXF File (Auto Cad) for project boundary
Boundaries.prj	HEC-HMS Model Boundary File
RunNumber2.g01	Geometric data imported from 500xBounds.geo
RunNumber2.prj	HEC-RAS project file using 500xBounds.geo
Run_Number3.b02	HEC-RAS model system file using 500xBounds2.geo
Run_Number3.bco	HEC-RAS model system file using 500xBounds2.geo
Run_Number3.c01	HEC-RAS model system file using 500xBounds2.geo
Run_Number3.dss	HEC-RAS Output Database file; in this file, all input/output data are saved permanently.
Run_Number3.dss.msg	Log file containing warning, notes etc.
Run_Number3.f01	Flow data file
Run_Number3.g01	Geometric data file
Run_Number3.IC.O02	HEC-RAS model system file
Run_Number3.O01	HEC-RAS model system file
Run_Number3.O02	HEC-RAS model system file
Run_Number2.O03	HEC-RAS model system file
Run_Number3.p01	HEC-HMS model Plan1
Run_Number3.p02	HEC-HMS model Plan2
Run_Number3.p02.blf	HEC-RAS model system file
Run_Number3.p03	HEC-HMS model Plan3
Run_number3.prj	HEC-HMS model project file

TABLE 2
HEC-RAS Model Input, Output, and Model Generated Files

File Name	File Description
Run_Number3.r01	HEC-HMS model Run1
Run_Number3.r02	HEC-HMS model Run2
Run_Number3.r03	HEC-HMS model Run3
Run_Number3.rep	HEC-RAS model system file
Run_Number3.u01	HEC-RAS model system file
Run_Number3.x01	HEC-RAS model system file

Associated LNP COL Application Revisions:

None.

Attachments/Enclosures:

The HEC-HMS and HEC-RAS model files will be provided on a CD in a separate transmittal to the NRC.

NCR Letter No.: LNP-RAI-LTR-036

NRC Letter Date: May 15, 2009

NRC Review of Final Safety Analysis Report

NRC RAI #: 02.04.01-3

Text of NRC RAI:

To meet the requirements of GDC 2, 10 CFR 52.17 and 10 CFR Part 100, the applicant should include a complete description of all spatial and temporal datasets used by PEF in support of its conclusions regarding safety of the plant. Data and descriptions should be sufficiently detailed to allow the staff to review the applicant's conclusions regarding the safety of the plant and to determine of the design bases of safety-related SSC. Please provide clarification regarding the use of the term MSL in the FSAR and clearly state the units of measurements and the contour interval on all the pertinent figures in the FSAR.

PGN RAI ID #: L-0215

PGN Response to NRC RAI:

This response is divided into two discussions, namely clarifying the use of the term "msl" and clarifications for figures (i.e., units of measurements and contour intervals).

__Clarification of the Use of MSL__

LNP FSAR Subsection 2.4.5.2.1 describes the types of vertical datums that are used in the FSAR. Datums are of two types: tidal and fixed. For example, the mean sea level (msl) datum pertains to the local msl, which is a tidal datum based on astronomical tides. A tidal datum is determined over a 19-year National Tidal Datum Epoch. North American Vertical Datum of 1988 (NAVD88) and National Geodetic Vertical Datum of 1929 (NGVD29) are fixed geodetic datums whose elevation relationship to local msl and other tidal datums may not be consistent from one location to another. NAVD88 replaced NGVD29 as the national standard geodetic reference for elevations.

The nearest tidal datum to the LNP site is located at Cedar Key, Florida. Elevations of the Cedar Key tidal datum are provided in LNP FSAR Table 2.4.5-204 based on 1983 – 2001 Epoch (LNP FSAR Reference 2.4.5-209). Based on elevation data from the National Geodetic Society at the Cedar Key Florida Station, the NAVD88 datum is 0.23 ft. higher than the msl datum and the NGVD29 datum is 0.46 ft. lower than the msl datum. It should be noted that the difference between the NAVD88 datum and NGVD29 datum is location specific. As described in LNP FSAR Subsection 2.4.1.1, the NGVD29 datum at the LNP site is approximately (averaged over the site) 1 ft. higher than the NAVD88 datum.

The vertical datum used in LNP FSAR Subsection 2.4.1 for elevations related to the Inglis Bypass Channel and Inglis Dam was indicated to be msl because this was the vertical datum provided in the reference documents (LNP FSAR Reference 2.4.1-222 and LNP FSAR Reference 2.4.1-223) authored by the Southwest Florida Water Management District (SWFWMD). However, SWFWMD has since confirmed that the elevations provided in these documents are actually based on a vertical datum of NGVD29. Based on this confirmation, the following changes will be made to LNP FSAR Subsection 2.4.1:

- The third paragraph of LNP FSAR Subsection 2.4.1.2.7 will be revised to read (changes are shown in ***bold, italicized*** typeface):

  The Inglis Bypass Channel and associated spillway are located just north of the Inglis Lock in Levy County (Figure 2.4.1-208). These structures discharge freshwater from Lake Rousseau to the Lower Withlacoochee River to sustain the prevailing environment, prevent saltwater intrusion, maintain the optimum pool level of the lake, and to accommodate navigation interests in the river. The maximum capacity of the spillway is 43.6 m^3/s (1540 cfs). The spillway is a reinforced concrete, U-shaped, two-gate spillway with an ogee weir and a baffled stilling basin. The crest elevation of the spillway is 8.5 m (28.0 ft.) ***NGVD29***. Two hydraulically operated vertical lift gates (0.6 m x 4.3 m x 2.1 m [2 ft. x 14 ft. x 7 ft.]) are fitted to the structure to regulate the outflows. The structure is provided with an operating platform to accommodate the gate operating equipment and a service bridge that crosses the structure at an elevation of 9.1 m (30.0 ft.) ***NGVD29*** (Reference 2.4.1-222). ***To convert to NAVD88 at this location, add a conversion quantity of -0.305 m (-1.00 ft.) to NGVD29 elevations (Reference 2.4.1-202).***

- The fourth paragraph of LNP FSAR Subsection 2.4.1.2.7 will be revised to read (changes are shown in ***bold, italicized*** typeface):

  During high inflow conditions, when the operating capacity of the spillway is exceeded, the Inglis Dam is used to control the elevation of Lake Rousseau. Inglis Dam is located at the west end of Lake Rousseau, south of the Inglis Lock and Inglis Bypass Channel Spillway, in Citrus County (Figure 2.4.1-208). The dam has a reinforced concrete, U-shaped, two-bay, gated spillway with an ogee-type weir. The crest elevation of the spillway is 8.5 m (28.0 ft.) ***NGVD29***. Each bay has a 12.2-m- (40-ft.-) wide by 5.1-m- (16.7-ft.-) high vertical lift gate, installed on the crest of the weir. The gate operating equipment is mounted on a reinforced concrete platform at an elevation of 15.8 m (52.0 ft.) ***NGVD29***. The structure is configured with a reinforced concrete service bridge at an elevation of 10.1 m (33.0 ft.) ***NGVD29***. The maximum allowable headwater elevation at the dam is 8.5 m (28 ft.) ***NGVD29*** (Reference 2.4.1-223). ***To convert to NAVD88 at this location, add a conversion quantity of -0.315 m (-1.03 ft.) to NGVD29 elevations (Reference 2.4.1-202).***

For consistency, the changes described above for LNP FSAR Subsection 2.4.1 will be made to LNP FSAR Subsections 2.4.2 and 2.4.3, as identified below:

- The first paragraph of LNP FSAR Subsection 2.4.2.1 will be revised to read (changes are shown in ***bold, italicized*** typeface):

  The Inglis Dam and Inglis Bypass Channel Spillway are the two main structures near the LNP site that control the flow of water in Lake Rousseau and the Withlacoochee River. The gates of the Inglis Dam are typically closed and the Inglis Bypass Channel Spillway is used to control the pool elevation at Lake Rousseau. During periods of flow that exceed the operating capacity of the bypass spillway, the Inglis Dam gates are opened to control the pool elevation of Lake Rousseau. Maximum allowable headwater elevation at both the bypass spillway and Inglis Dam is 8.5 m (28.0 ft.) ***NGVD29***. Operating capacity of the bypass spillway is 43.6 m^3/s (1540 cfs). (References 2.4.1-222 and 2.4.1-223)

- The first and second paragraphs of LNP FSAR Subsection 2.4.3.3.4.2.1 will be revised to read (changes are shown in ***bold, italicized*** typeface):

The Inglis Dam Spillway is a reinforced concrete, U-shaped, two-bay, gated spillway with an ogee-type weir (crest elevation of 3.4 m [11.3 ft.] ***NGVD29***, this is also the invert elevation of the structure) and reinforced concrete wingwalls. Each bay is provided with a 12.2-m (40-ft.) wide by 5.1-m (16.7-ft.) high vertical lift gate, installed on the crest of the weir. The gate operating equipment is mounted on a reinforced concrete operating platform at an elevation of 15.8 m (52 ft.) ***NGVD29***. The structure is configured with a reinforced concrete service bridge at an elevation of 10.1 m (33 ft.) ***NGVD29***. Riprap has been provided upstream and downstream of the spillway to protect against eroding velocities. (Reference 2.4.1-223)

The gates of the Inglis Dam are normally closed while the Inglis Bypass Channel Spillway is used to maintain optimum pool levels and pass its discharge to the Lower Withlacoochee River. During periods of increased inflow to Lake Rousseau that exceed the operating capacity of the Inglis Bypass Channel Spillway, the Inglis Dam is operated to discharge the excess inflow. To meet the structural and stability requirements of the Inglis Dam, the maximum allowable headwater elevation on the structure should not be allowed to exceed the elevation of 8.5 m (28 ft.) ***NGVD29***. All gates should be operated at the same gate opening and should be opened gradually to allow tailwater stages to rise before large releases are made. The pool may be routinely lowered up to 0.15 m (0.5 ft.) in advance of predicted heavy rainfall depending on reservoir conditions and river flow. (Reference 2.4.1-223)

- The second paragraph of LNP FSAR Subsection 2.4.3.3.4.2.2 will be revised to read (changes are shown in **bold, *italicized*** typeface):

The Inglis Bypass Channel Spillway is a reinforced concrete, U-shaped, two-gate spillway with an ogee weir and a baffled stilling basin with an invert elevation of 6.4 m (21 ft.) ***NGVD29***. The structure is fitted with two hydraulically operated vertical lift gates that measure 0.61 m x 4.27 m x 2.13 m (2 ft. x 14 ft. x 7 ft.) to regulate outflows. The structure is provided with an operating platform to accommodate the gate operating equipment and a service bridge that crosses the structure at an elevation of 9.1 m (30 ft.) ***NGVD29***. Steel sheet pile wing walls are constructed at 45° angles from the direction of flow at the upstream and downstream ends of the spillway. Bulkhead slots are provided upstream of the vertical lift gates for temporary closure for maintenance and gate repairs. (Reference 2.4.1-222)

A vertical datum of msl was used in LNP FSAR Subsection 2.4.5 for maximum reported flood elevations for the towns of Inglis and Yankeetown because msl was the vertical datum provided in the reference document (LNP FSAR Reference 2.4.5-203). Conversions between msl and NGVD29/NAVD88 are not available for these locations.

Clarifications for Figures

LNP FSAR Figure 2.4.1-203 was developed from a United States Geologic Survey (USGS) topographic map with a vertical datum of NGVD29 and a contour interval of 5 ft. (Note: the vertical datum is incorrectly identified as NAVD 1929 on Figure 2.4.1-203). LNP FSAR Figures 2.4.1-204 and 2.4.1-205 were developed from the site grading and drainage plans which were created with a vertical datum of NAVD88 and a contour interval of 1 foot (Note: the vertical datum was not identified on Figure 2.4.1-204 and Figure 2.4.1-205). These figures were developed from different sources because LNP FSAR Figure 2.4.1-203 shows topographic contours beyond the site and therefore beyond the area encompassed by the site grading and drainage plan. A 2-foot contour interval was used on LNP FSAR Figures 2.4.1-204 and 2.4.1-205 for clarity and readability.

Associated LNP COL Application Revisions:

In addition to the revisions described above, the following revisions will be made to FSAR Chapter 2:

The note on LNP FSAR Figure 2.4.1-203 refers to a vertical datum of NAVD 1929, which is a typographical error. The note on LNP FSAR Figure 2.4.1-203 will be revised to read "Contours in feet NGVD 1929". In addition, a note will be added to LNP FSAR Figure 2.4.1-203 that states "Contour Interval = 5 feet" and the data source for the figure will be identified.

A note will be added to LNP FSAR Figure 2.4.1-204 and LNP FSAR Figure 2.4.1-205 that reads "Contours in feet NAVD88, contour interval = 2 feet".

Attachments/Enclosures:

None.