Progress Energy

Serial: NPD-NRC-2009-160
July 29, 2009

10 CFR 52.79

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

**LEVY NUCLEAR PLANT, UNITS 1 AND 2**
**DOCKET NOS. 52-029 AND 52-030**
**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 049 RELATED TO PROBABILISTIC RISK ASSESSMENT AND SEVERE ACCIDENT EVALUATION**

Reference: Letter from Manny Comar (NRC) to Garry Miller (PEF), dated May 31, 2009, "Request for Additional Information Letter No. 049 Related to SRP Section 19-Probablistic Risk Assessment And Severe Accident Evaluation 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 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 July 29, 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

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NRO

**Levy Nuclear Plant Units 1 and 2**
**Response to NRC Request for Additional Information Letter No. 049 Related to SRP Section 19-Probablistic** Risk Assessment And Severe Accident Evaluation **for the Combined License Application, dated May 31, 2009**

| NRC RAI # | Progress Energy RAI # | Progress Energy Response |
|---|---|---|
| 19-1 | L-0417 | Response enclosed – see following pages |
| 19-2 | L-0418 | Response enclosed – see following pages |

**NRC Letter No.:** LNP-RAI-LTR-049

**NRC Letter Date:** May 31, 2009

**NRC Review of Final Safety Analysis Report**

**NRC RAI NUMBER:** 19-1

**Text of NRC RAI:**

Part of AP1000 DCD COL Information Item 19.59.10-2 calls for the following action by COL applicants:

> The Combined License applicant will confirm that the High Winds, Floods, and Other External Events analysis documented in Section 19.58 is applicable to the COL site. Further evaluation will be required if the COL site is shown to be outside of the bounds of the High Winds, Floods, and Other External Events analysis documented in Section 19.58.

The above requirement is replaced by the following words in STD COL 19.59.10-2:

> It has been confirmed that the High Winds, Floods, and Other External Events analysis documented in Section 19.58 is applicable to the site...

Please provide supporting information or appropriate references that ensure that all of the key site related assumptions in the Section 19.58 External Events analyses are valid for the Levy Nuclear Plant site.

**PGN RAI ID #:** L-0417

**PGN Response to NRC RAI:**

The LNP 1 and 2 specific event frequencies are provided in Table 19.58-201, External Event Frequencies.

The criteria used to screen external events are indicated through the notes provided in Table 19.58-201, External Event Frequencies, as follows:

Note 1: The initiating event frequency (IEF) is less than the IEF in DCD Tier 2 Section 19.58 or Table 19.58-3 for the event.

Note 2: IEF is less than 1.0E-07.

Note 3: Core damage frequency (CDF) is less than 1.0E-08.

Note 4: A specific event frequency for this event has not been determined. A deterministic quantitative consequence evaluation has been performed that has demonstrated that the event does not adversely impact the safe operation of LNP 1 and 2.

Note 5: The event is not physically possible for the site.

As shown in Table 19.58-201, more than one screening note may apply to a given type of event. This progressive risk screening process ensures that for LNP 1 and 2 the design represents reduction in risk compared to existing operating plants.

The events listed in ASME/ANS RA-S-2008 were reviewed. Additional external events applicable to the LNP 1 and 2 site are included in Table 19.58-201.

**References**:

None

**Associated LNP COL Application Revisions:**

The following changes will be made to the LNP FSAR in a future amendment:

1. COLA Part 2, FSAR Chapter 19, Section 19.58, add new Table 19.58-201.

**Table 19.58-201**
**External Event Frequencies**

| Category | Event | Evaluation Criteria | Explanation of Applicability Evaluation | Event Frequency |
|---|---|---|---|---|
| High winds | EF0 Tornado | Notes 1, 3 | From the data covering 57 years in FSAR Table 2.3.1-204, the number of each type of tornado as recorded by NOAA for the ten counties (total of 9230 $mi^2$) containing and surrounding the Levy site was identified. For each type of tornado, the event frequency was estimated from the product of the number of tornadoes divided by the number of years and the expected area of a tornado from Table 2-14 of NUREG/CR-4461 divided by the total area of the counties. | 7.72E-06 |
| | EF1 Tornado | Notes 1, 3 | | 3.56E-05 |
| | EF2 Tornado | Notes 1, 3 | | 5.21E-05 |
| | EF3 Tornado | Notes 1, 3 | | 4.13E-05 |
| | EF4 Tornado | Notes 1, 3 | There being no recorded occurrence of an EF4 or EF5 tornado in FSAR Table 2.3.1-204 or the NOAA National Climatic Data Center website, the event frequency was estimated to be the same as for an EF3 tornado. | 4.13E-05 |
| | EF5 Tornado | Notes 1, 3 | | 4.13E-05 |
| | Category 1 Hurricane | Note 3 | From data covering 142 years on the NOAA Coastal Services Center website, the number of hurricanes of each category coming within 50 nautical miles of the Levy site was identified. The event frequency was estimated from number of hurricanes divided by the number of years. | 1.06E-01 |
| | Category 2 Hurricane | Notes 1, 3 | | 1.41E-02 |
| | Category 3 Hurricane | Notes 1, 3 | | 2.82E-02 |
| | Category 4 Hurricane | Notes 1, 3 | There being no recorded occurrence of a Category 4 or Category 5 hurricane within 50 nautical miles of the Levy site in the data covering 142 years on the NOAA Coastal Services Center website, the event frequency was estimated based on the assumed occurrence of one such hurricane during the next 142 years. | 3.52E-03 |
| | Category 5 Hurricane | Notes 1, 3 | | 3.52E-03 |
| | Extratropical Cyclones | Note 3 | The risk associated with extratropical cyclones is loss of off-site power (LOSP) due to high winds. Extreme straight-line winds associated with extratropical cyclones are included in the NCDC database (1950 – 2008). The highest recorded wind speed for a thunderstorm in the NCDC database (1950 – 2008) is 80 knots (92 mph) for the ten county area around the LNP 1 and 2 site. The LOSP frequency, due to wind events, is | 4.0E-03 |

**Table 19.58-201**
**External Event Frequencies**

| Category | Event | Evaluation Criteria | Explanation of Applicability Evaluation | Event Frequency |
|---|---|---|---|---|
| | | | presented in the data reported in NUREG/CR-6890, Volume 1, "Reevaluation of Station Blackout Risk at Nuclear Power Plants - Analysis of Loss of Offsite Power Events: 1986-2004". That report shows eight LOSP events due to high winds (defined in this report as wind speed less than 125 mph) during 1,984.7 reactor-years (Including both Critical and Non-critical conditions for all reactors in the United States). This yields a frequency of 4.0E-03 LOSP events per reactor-year due to high wind events with speeds less than 125 mph (enveloping Extratropical cyclones, Category 1 and Category 2 hurricanes and, EF0 and EF1 tornados). Applying the 4.0E-03 LOSP events per reactor year probability to the "Extratropical Cyclone" subcategory of wind events in DCD Tier 2 Table 19.58-3 evaluation would reduce the CDF in DCD Tier 2 Table 19.58-3. The core damage frequency (CDF) is 3.9E-11 for a conditional core damage probability (CCDP) of 9.81E-09 which is below the 1.0E-08 CDF event screening criteria. | |
| External Flood | External Flood | Note 2 | The plant grade floor elevation is Elevation 51 feet NVAD88. As stated in FSAR Subsection 2.4.2.3 the maximum water level due to probable maximum precipitation (PMP) is below the plant grade floor elevation of 51 feet. Switchyard components are designed to be above the PMP flood level. Thus, plant structures, systems and components are not impacted by the PMP. The sensitivity analysis in DCD Tier 2 Subsection 19.58.2.2 for flooding-induced failure of the switchyard and non-safety structures was considered bounding for the LNP site. The initiating event frequency for the other potential flooding mechanisms are as follows:<br><br>• Probable maximum flood on streams and rivers is 1.04E-11 | 1.0E-07 |

**Table 19.58-201**
**External Event Frequencies**

| Category | Event | Evaluation Criteria | Explanation of Applicability Evaluation | Event Frequency |
|---|---|---|---|---|
| | | | • Seismically induced dam failure flooding is 9.0E-12<br>• Probable maximum surge (due to probable maximum hurricane) and seiche flooding is 2.4E-12<br>Probable maximum tsunami (PMT) flooding is described in FSAR Subsection 2.4.6. There is no impact of the PMT flood on the the LNP site. | |
| Transportation and Nearby Facility Accidents | Aviation Accident | Notes 2, 3 | The probability of small aircraft crashing on seismic Category I structures (i.e. Containment/Shield Building and Auxiliary Building) is calculated to be 7.01E-06 per year. This crash probability results a core damage frequency (CDF) of 0.41E-12 per year which is below the 1.0E-08 CDF event screening criteria. Therefore, small aircraft crash probability is acceptable.<br><br>The probability of large aircraft crashing on seismic Category I structures is calculated as 3.09E-8 per year. This meets the acceptance criteria of 1.0E-07 per year in Section 19.58.2.3.1 of DCD. Therefore, the probability of crash for large aircraft is acceptable. | 7.01E-06 (small aircraft)<br>3.09E-08 (large aircraft) |
| | Marine Accident | Note 5 | DCD Tier 2 Subsection 19.58.2.3.2 indicates that only sites with large waterways with ship and/or barge traffic that goes through or near the site need to consider marine accidents. FSAR Subsection 2.2.2.4 indicates that water traffic of the five navigable waterways near the site is limited to pleasure and/or fishing boats. Therefore, the key site-related assumptions in DCD section 19.58.2.3.2 concerning marine accidents are not applicable to the Levy site. | N/A |
| | Pipeline Accident | Note 2 | There are two natural gas pipelines in the area of the LNP site. As discussed in FSAR Subsection 2.2.3.2.3 the maximum downwind concentration of natural gas at LNP due to a postulated rupture of the pipeline is 1.16 percent. This is well below the lower flammability | 1.0E-07 |

**Table 19.58-201**
**External Event Frequencies**

| Category | Event | Evaluation Criteria | Explanation of Applicability Evaluation | Event Frequency |
|---|---|---|---|---|
| | | | limit for natural gas of 4.8 percent in air. Therefore, there are no adverse effects due to the unlikely rupture of the gas pipelines at their closest approach to LNP and the key site-related assumptions in DCD Section 19.58.2.3.3 concerning damage from explosive material released from nearby pipeline accidents are not applicable to the Levy site. The initial event frequency of 1.0E-07 per year assumed in DCD Section 19.58.2.3.3 is considered valid for the Levy site. | |
| | Railroad and Truck Accidents | Note 2 | FSAR Subsection 2.2.3.2.1 concludes that potential sources of explosions from nearby activities are limited to an explosion in highway transport. U.S. Highway 19/98 is located west of the center of the site and its nearest approach to the site is approximately 1974 m (6477 ft.). The highway is mainly used for local traffic and local commodity deliveries only. The safe distance for explosive material is 505 m (1658 ft.) for a pressure of 1 psi, this is well below the separation distance from U.S. Highway 19/98. Thus, there are no adverse effects on LNP due to the transport of explosives via roadway. | 1.0E-07 |
| Other Events | A number of external events beyond those evaluated in DCD Subsection 19.58 were evaluated for the LNP site. These events are discussed below. | | Based on the evaluations below, these events do not pose a credible threat to the safe operation of the station. Thus, these events are not considered to be risk-important and it can be concluded that the LNP 1 and 2 site is within the bounds of the Floods and Other External Events analysis documented in DCD Tier 2 Section 19.58 | |
| | External Fires | Note 2 | Fires originating from accidents at any facilities or transportation routes identified above do not have the potential to endanger the safe operation of LNP because the distances between potential accident locations and LNP are greater than 1.6 km (1 mi.). The closest potential source of a significant fire is the 76.2-cm (30-in.) natural gas line at | 1.0E-07 |

**Table 19.58-201**
**External Event Frequencies**

| Category | Event | Evaluation Criteria | Explanation of Applicability Evaluation | Event Frequency |
|---|---|---|---|---|
| | | | 1769 m (5803 ft.) from LNP. The evaluation of the pipeline failure, discussed in FSAR Subsection 2.2.3.2.3, concludes that there are no adverse effects due to the unlikely rupture of the gas pipelines at their closest location to LNP. Therefore, because no risk important consequences were identified, the potential for hazards from external fires are minimal and will not adversely affect the safe operation of LNP 1 and 2. | |
| | Toxic Chemical Release | Note 4 | Based on the discussion in FSAR Subsection 2.2.2.2, there are no manufacturing facilities in the vicinity that utilize or store products that are considered hazardous. The Town of Inglis water treatment plant (WTP) is located 3 miles from the LNP site. FSAR Table 2.2.2-202 provides the chemicals and quantities stored and used by the WTP. Per FSAR Subsection 2.2.3.3, the quantities are small and are not significant sources of airborne contamination even in the event of an accidental failure of the storage containers. Therefore, there are no sources of toxic chemicals within 8 km (5 mi.) of LNP that could pose a threat to LNP. There are no site-specific sources of hazardous materials stored on the site in sufficient quantity to affect control room habitability (FSAR Subsections 2.2.3.3 and 6.4.4.2). Thus, these events are not considered risk important. | N/A |
| | Major Depots and Storage Areas Releases | Note 5 | Based on the discussion in FSAR Subsection 2.2.2.2, there are no manufacturing facilities in the vicinity that utilize or store products that are considered hazardous. The Town of Iglis water treatment plant (WTP) is located 3 miles from the LNP site. FSAR Table 2.2.2-202 provides the chemicals and quantities stored and used by the WTP. Per FSAR Subsection 2.2.3.3, the quantities are small and are not significant sources of airborne | N/A |

**Table 19.58-201**
**External Event Frequencies**

| Category | Event | Evaluation Criteria | Explanation of Applicability Evaluation | Event Frequency |
|---|---|---|---|---|
| | | | contamination even in the event of an accidental failure of the storage containers. Per FSAR Subsection 2.2.3.6, there is no safety-related equipment located at the intake structure. Therefore, spills drawn into the intake structure do not pose a nuclear safety hazard. Per FSAR Subsection 2.2.1, there are no active military facilities within 8 km (5 mi.) of the LNP site. The only significant military facility is for a National Guard unit located 67.6 km (42 mi.) from the LNP site. | |

Note 1: The initiating event frequency (IEF) is less than the IEF in DCD Tier 2 Section 19.58 or Table 19.58-3 for the event.

Note 2: IEF is less than 1.0E-07.

Note 3: Core damage frequency (CDF) is less than 1.0E-08.

Note 4: A specific event frequency for this event has not been determined. A deterministic quantitative consequence evaluation has been performed that has demonstrated that the event does not adversely impact the safe operation of LNP 1 and 2.

Note 5: The event is not physically possible for the site.

More than one screening note may apply to a given type of event.

2. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised from:

   "This section of the referenced DCD is incorporated by reference with no departures or supplements."

   To read:

   "This section of the referenced DCD is incorporated by reference with the following departures and/or supplements."

3. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to add new Subsection 19.58.3, that reads:

   19.58.3 Conclusion

   Add the following information at the end of DCD Subsection 19.58.3:

   LNP SUP 19.58-1 Table 19.58-201 documents the site-specific external events evaluation that has been performed for LNP 1 and 2. This table provides a general explanation of the evaluation and resultant conclusions and provides a reference to applicable sections of the COL where more detailed supporting information (including data used, methods and key assumptions) regarding the specific event is located. Based upon this evaluation, it is concluded that the LNP 1 and 2 site is bounded by the High Winds, Floods and Other External Events analysis documented in DCD Section 19.58 and APP-GW-GLR -101 (Reference 201) and no further evaluations are required at the COL application stage.

4. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to add new Subsection 19.58.4, that reads:

   19.58.4 References

   201. Westinghouse Electric Company LLC, "AP1000 Probabilistic Risk Assessment Site-Specific Considerations," Document Number APP-GW-GLR-101, Revision 1, October 2007

   202. NUREG/CR-4461, "Tornado Climatology of the Contiguous United States," Revision 2, February2007

   203. Texas Tech University, Wind Science and Engineering Center, "A Recommendation for an Enhanced Fujita Scale (EF-Scale)," June 2004

   204. ASCE Standard ASCE/SEI 7-05, "Minimum Design Loads for Buildings and Other Structures,"2006

   205. NUREG/CR-6890, Volume 1, "Reevaluation of Station Blackout Risk at Nuclear Power Plants - Analysis of Loss of Offsite Power Events: 1986-2004

5. COLA Part 2, FSAR Chapter 19, Subsection 19.59.10.5, fourth paragraph will be revised from:

| | |
|---|---|
| STD COL 19.59.10-2 | "It has been confirmed that the Winds, Floods, and Other External Events analysis documented in DCD Section 19.58 is applicable to the site. The site-specific design has been evaluated and is consistent with the AP1000 PRA assumptions. Therefore, Chapter 19 of the AP1000 DCD is applicable to this design." |

To read:

| | |
|---|---|
| STD COL 19.59.10-2 | "As discussed in Section 19.58.3, it has been confirmed that the Winds, Floods, and Other External Events analysis documented in DCD Section 19.58 is applicable to the site. The site-specific design has been evaluated and is consistent with the AP1000 PRA assumptions. Therefore, Section 19.58 of the AP1000 DCD is applicable to this design." |

**Attachments/Enclosures:**

None

**NRC Letter No.:** LNP-RAI-LTR-049

**NRC Letter Date:** May 31, 2009

**NRC Review of Final Safety Analysis Report**

**NRC RAI NUMBER:** 19-2

**Text of NRC RAI:**

STD COL 19.59.10-2 states that "The PRA will be updated to reflect these differences (between the asbuilt plant and design used as the basis for the AP1000 PRA and DCD Table 19.59-18) if they potentially result in a significant increase in core damage frequency or large release frequency."

(a) Please clarify how the Levy Nuclear Plant PRA (to be completed by fuel load ) will be updated to account for Levy Nuclear Plant site-specific information per 10 CFR 52.79(d)(1) and 10 CFR 50.71(h)(1) as well as as-built information.

(b) Please define "significant increase."

**PGN RAI ID #:** L-0418

**PGN Response to NRC RAI:**

(a) The PRA will be updated as described in FSAR Subsection 19.59.10.6. The process for development of the plant specific PRA will include evaluation of plant as-built differences, departures from certified design and the results of the plant specific review of DCD Table 19.59-18. The update process described in FSAR Subsection 19.59.10.6 is consistent with the requirements of 10 CFR 52.79(d)(1) and 10 CFR50.71(h)(1).

(b) Any difference in the AP1000 PRA-based insights of DCD Table 19.59-18 could potentially result in an increase in core damage frequency (CDF) or large release frequency (LRF). Plant specific PRA-based insight differences will be evaluated and the plant specific PRA model modified as necessary to reflect the plant specific design and the PRA-based insight; as such, the FSAR will be revised to remove "significant increase."

**References**:

None

**Associated LNP COL Application Revisions:**

Revise the second paragraph of FSAR Subsection 19.59.10.5 from:

> "A review of the differences between the as-built plant and the design used as the basis for the AP1000 PRA and DCD Table 19.59-18 will be completed prior to fuel load. The PRA will be updated to reflect these differences if they potentially result in a significant increase in core damage frequency or large release frequency."

To read:

> "A review of the differences between the as-built plant and the design used as the basis for the AP1000 PRA and DCD Table 19.59-18 will be completed prior to fuel load. The plant specific PRA-based insight differences will be evaluated and the plant specific PRA model modified as necessary to account for plant-specific design and any design changes or departures from the design certification PRA."

**Attachments/Enclosures:**

None