L-2012-223
10 CFR 52.3

May 14, 2012

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

Re: Florida Power & Light Company
Proposed Turkey Point Units 6 and 7
Docket Nos. 52-040 and 52-041
Response to NRC Request for Additional Information Letter No. 056
(eRAI 6251) - SRP Section: 02.03.01 - Regional Climatology

Reference:

1. NRC Letter to FPL dated March 29, 2012, Request for Additional Information Letter No. 054 Related to SRP Section: 02.03.01 - Regional Climatology for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application

Florida Power & Light Company (FPL) provides, as attachment to this letter, its response to the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI) 02.03.01-3 provided in Reference 1. The attachment identifies changes that will be made in a future revision of the Turkey Point Units 6 and 7 Combined License Application (if applicable).

If you have any questions, or need additional information, please contact me at 561-691-7490.

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

Executed on May 14, 2012.

Sincerely,

William Maher
Senior Licensing Director – New Nuclear Projects
WDM/RFB

Attachment: FPL Response to NRC RAI No. 02.03.01-3 (eRAI 6251)

cc:
PTN 6 & 7 Project Manager, AP1000 Projects Branch 1, USNRC DNRL/NRO
Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant 3 & 4

D097
NRO

NRC RAI Letter No. PTN-RAI-LTR-056 Dated March 29, 2012

SRP Section: 02.03.01 - Regional Climatology

Questions from Hydrologic Engineering Branch (RHEB)

NRC RAI Number: 02.03.01-3 (eRAI 6251)

10 CFR 52.79(a)(1)(iii) states, in part, that the COL FSAR must include the meteorological characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated. 10 CFR 100.20(c)(2) states that the meteorological characteristics of the site that are necessary for safety analysis or that may have an impact upon plant design must be identified and characterized and 10 CFR 100.21(d) states, in part, that the meteorological characteristics of the site must be evaluated and site parameters established such that potential threats from such physical characteristics will pose no undue risk to the type of facility proposed to be located at the site.

Nuclear power plants must be designed so that they remain in a safe condition under extreme meteorological events, including those that could result in the most extreme wind events (tornadoes and hurricanes) that could reasonably be predicted to occur at the site. Initially, the U.S. Atomic Energy Commission (predecessor to the NRC) considered tornadoes to be the bounding extreme wind events and issued RG 1.76, "Design-Basis Tornado for Nuclear Power Plants," in April 1974. The design-basis tornado wind speeds were chosen so that the probability that a tornado exceeding the design basis would occur was on the order of 10-7 per year per nuclear power plant. In March 2007, the NRC issued Revision 1 of RG 1.76, "Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants." Revision 1 of RG 1.76 relied on the Enhanced Fujita Scale, which was implemented by the National Weather Service in February 2007. The Enhanced Fujita Scale is a revised assessment relating tornado damage to wind speed, which resulted in a decrease in design-basis tornado wind speed criteria in Revision 1 of RG 1.76. Since design-basis tornado wind speeds were decreased as a result of the analysis performed to update RG 1.76, it was no longer clear that the revised tornado design basis wind speeds would bound design-basis hurricane wind speeds in all areas of the United States. This prompted an investigation into extreme wind gusts during hurricanes and their relation to design basis hurricane wind speeds, which resulted in issuing RG 1.221, "Design-Basis Hurricane and Hurricane Missiles for Nuclear Power Plants," in October 2011.

The Turkey Point COLA incorporates by reference Revision 19 of the AP1000 Design Control Document (DCD). Section 3.5.4 of the DCD states, in part, that the COL applicant must show that missiles caused by external events separate from the tornado have energies less than the tornado missile spectrum energies that the AP1000 is

designed to withstand. Further, Section 3.5.4 of the DCD states that if missile energy is greater than the tornado missile spectrum energy evaluated in the DCD, the COL applicant must evaluate and show that it will not compromise the safety of AP1000 safety-related structures and components. In consideration of the guidance provided in RG 1.221, the applicant is requested to describe how the Turkey Point COLA satisfies the Combined License Information requirement of AP1000 DCD Section 3.5.4, or justify why this information is not needed. As appropriate, the applicant is also requested to provide proposed revisions to the Turkey Point FSAR that include the updated missile spectrum site characteristic values, or provide a justification as to why this is not necessary.

FPL RESPONSE:

Regulatory Guide (RG) 1.221 hurricane wind velocities are based on an annual exceedance probability of 1.0E-07, the same as that for tornado wind velocities in RG 1.76, Revision 1. The 1.0E-07 annual exceedance probability hurricane wind speed of 260 mph at the Turkey Point site based on Regulatory Guide 1.221 is bounded by the design tornado wind speed given in DCD Subsection 3.3.2.1. Thus, using the tornado wind and missile structural acceptance criteria for the RG 1.221 hurricane wind and missile evaluations is appropriate.

The maximum wind speed for the Turkey Point site has been re-evaluated, considering the guidance of RG 1.221, to include the 3-second wind gust that corresponds to the 1.0E07 year return period hurricane. Using the methodology specified in RG 1.221, the 3-second wind gust was determined by digitizing the contours from Figure 1 of RG 1.221 and overlaying the Turkey Point site location. The 3-second wind gust was determined to be 260 mph. The hurricane generated missile velocities are based on this maximum speed and Table 2 from RG 1.221. The Auxiliary Building was selected for the analysis since its elevation and wall thickness (24-inches) bound the shield building. The evaluation for the site specific hurricane generated missiles can be summarized as follows:

- The vertical velocity per RG 1.221 is less than the vertical tornado missile velocities in all cases in DCD Tier 1 Table 5.0-1. The Schedule 40 pipe vertical hurricane kinetic energies are enveloped by those associated with the armor piercing artillery shell tornado kinetic energies.
- For the 1.0-inch diameter sphere, the Turkey Point site specific hurricane generated missile horizontal velocity is 128.5 mph. For this Turkey Point site specific sphere missile velocity, the concrete perforation or scabbing is calculated to be 0.86 inches and 1.86 inches, respectively. Per DCD Subsection 3.5.3 the minimum thicknesses of the nuclear island exterior walls above grade is 24 inches. Based on the evaluation, it was concluded that the nuclear island is adequately protected against the hurricane generated 1.0-inch diameter sphere missile impact.

- For the 6.625-inch diameter pipe, the Turkey Point site specific hurricane generated missile horizontal velocity is 144.5 mph. For this Turkey Point site specific missile velocity, the concrete perforation or scabbing is calculated to be 16.4 inches and 23.1 inches, respectively. Per DCD Subsection 3.5.3 the minimum thicknesses of the nuclear island exterior walls above grade is 24 inches. Therefore it was concluded that the nuclear island is adequately protected against the hurricane generated 6.625-inch diameter pipe missile impact.
- For the 4,000 lbs automobile missile, the Turkey Point site specific hurricane generated missile horizontal velocity is 180 mph. For the hurricane generated automobile horizontal missile, an evaluation was performed to determine whether the nuclear island exterior walls are adequate to withstand the effect of the automobile impact. The evaluation used the same methodology for determining the shear stress and ductility used for the evaluation of the tornado generated automobile missile in DCD (Reference 1) Subsection 3.5.2. The evaluation determined the maximum shear stress on the walls is 109.1 psi, below the allowable stress of 112.77 psi; and the largest ductility factor is 1.10, well below the allowable of 10. Thus it was concluded that the nuclear island is adequately protected against the hurricane generated automobile missile impact.

The Units 6 & 7 FSAR and ER will be revised to reflect the previously discussed wind speed.

This response is PLANT SPECIFIC.

References:

1. Westinghouse, 2011. *AP1000 Design Control Document (DCD)*, Revision 19.

ASSOCIATED COLA REVISIONS:

Table 1.8-202 will be revised in a future COLA revision as follows:

Table 1.8-202 (Sheet 3 of 9)
COL Item Tabulation

COL Item	Subject	DCD Subsection	FSAR Section(s)	COL Applicant (A), Holder (H), Or Both (B)
3.3-1	Wind and Tornado Site Interface Criteria	3.3.3	1.2.2 2.2.1 3.3.1.1 3.3.2.1 3.3.2.3 3.3.3 **3.5.1.4** 3.5.1.5 3.5.1.6	A
3.4-1	Site-Specific Flooding Hazards Protective Measures	3.4.3	3.4.1.3 3.4.3	A
3.5-1	External Missile Protection Requirements	3.5.4	1.2.2 2.2.1 3.3.1.1 3.3.2.1 3.3.2.3 **3.5.1.4** 3.5.1.5 3.5.1.6 **3.5.2** 3.5.4	A

Table 1.9-201 will be revised to add RG 1.221 in a future COLA revision as follows:

Table 1.9-201 (Sheet 8 of 9)
Regulatory Guide/FSAR Section Cross-References

Regulatory Guides		FSAR Chapter, Section, or Subsection[a]
1.221	**Design-Basis Hurricane and Hurricane Missiles for Nuclear Power Plants**	**2.3.1.3.1** **3.3.2.1** **3.5.1.4** **3.5.2**

Appendix 1AA will be revised to add RG 1.221 in a future COLA revision as follows:

Criteria Selection	Referenced Criteria	FSAR Position	Clarification/ Summary Description of Exceptions
Regulatory Guide 1.221, Rev. 0, 10/11 – Design-Basis Hurricane and Hurricane Missiles for Nuclear Power Plants			
This Regulatory Guide is not applicable to the AP1000 certified design.			

The fourth paragraph of FSAR Subsection 2.3.1.3.1 will be revised in a future revision as indicated below:

For the period of record (1851–2007), there were two Category 5 hurricanes (the unnamed hurricanes of 1935 and 1947). Both hurricanes had maximum 1-minute wind speeds of 140 knots (161 mph) (Reference 209). Hurricane Andrew occurred in 1992 was classified as Category 4 with a 1-minute average wind speed of 130 knots (150 mph) (Reference 225). However, in a post event reanalysis (References 238 and 239) Hurricane Andrew was upgraded to Category 5. The winds at landfall were assigned a sustained 1-minute wind speed of 145 knots (167 mph). The associated 3-second gust wind speed would be 204 mph using a conversion factor from Figure C6-4 of ASCE/SEI 7-05 (Reference 208). **Additionally, using the guidance of RG 1.221 (Reference 240), it was determined that the nominal 3-second wind gust speed that can be expected to occur at the Turkey Point site with a return period of 1.0E07 years is 260 mph. The 3-second gust wind speed was determined by digitizing the contours from Figure 1 of RG 1.221, and overlaying the Turkey Point site location.**

The following reference will be added to FSAR Subsection 2.3.1.8:

240. U.S. NRC, *Design-Basis Hurricane and Hurricane Missiles for Nuclear Power Plants*, Regulatory Guide 1.221, Revision 0, October 2011.

The following paragraph will be added to the end of FSAR Subsection 3.3.2.1:

The 1.0E-07 annual exceedance probability hurricane wind speed of 260 mph at the Turkey Point site based on Regulatory Guide 1.221 is bounded by the design tornado wind speed given in DCD Subsection 3.3.2.1.

The following new Subsection will be added to FSAR Section 3.5:

3.5.1.4 MISSLES GENERATED BY NATURAL PHENOMENON

Add the following text to the end of DCD Subsection 3.5.1.4: (with LMAs of PTN COL 3.3-1 and PTN COL 3.5-1)

Hurricane missiles are defined in accordance with Regulatory Guide 1.221. The hurricane missile parameters considered for Units 6 & 7 are summarized in Table 3.5-201.

The following new table will be added to FSAR Subsection 3.5, with an LMA of PTN SUP 3.3-1:

Table 3.5-201
Comparison Between DCD Tornado and Site-Specific Hurricane Missile Parameters

Missile Description	DCD Tornado Missile Velocity[(a)]	Units 6 & 7 Hurricane Missile Velocity[(b)]
Automobile (4,000 lbs)	105 mph horizontal 74 mph vertical	180 mph horizontal 58 mph vertical
8-in. Shell (275 lbs)	105 mph horizontal 74 mph vertical	-
6.625-in. diameter pipe (287 lbs)	-	144.5 mph horizontal 58 mph vertical
1-in. diameter steel sphere (0.147 lbs)	105 mph in most Damaging direction	128.5 mph horizontal 58 mph vertical

(a) DCD Tier 1 Table 5.0-1
(b) Based on RG 1.221 Table 2 and Figure 2

The following new Subsection will be added to FSAR Section 3.5:

3.5.2 PROTECTION FROM EXTERNALLY GENERATED MISSILES

Add the following text to the end of DCD Subsection 3.5.2: (with an LMA of PTN COL 3.5-1)

Regulatory Guide 1.221 hurricane wind velocities are based on an annual exceedance probability of 1.0E-07, the same as that for tornado wind velocities in RG 1.76, Revision 1. The 1.0E-07 annual exceedance probability hurricane wind speed of 260 mph at the Turkey Point site based on Regulatory Guide 1.221 is bounded by the design tornado wind speed given in DCD Subsection 3.3.2.1. Thus, using the tornado wind and missile structural acceptance criteria for the RG 1.221 hurricane wind and missile evaluations is appropriate.

The comparison between the DCD Tier 1 Table 5.0-1 tornado generated missile parameters and Regulatory Guide 1.221 site-specific hurricane generated missile parameters are summarized in Table 3.5-201. The site-specific hurricane generated missiles evaluation can be summarizes as follows:

- **The vertical velocity per RG 1.221 is less than the vertical tornado missile velocities in all cases in DCD Tier 1 Table 5.0-1. The Schedule 40 pipe vertical hurricane kinetic energies are enveloped by those associated with the armor piercing artillery shell tornado kinetic energies.**
- **For the 1.0-inch diameter sphere, the Turkey Point site specific hurricane generated missile horizontal velocity is 128.5 mph. For this Turkey Point site specific sphere missile velocity, the concrete perforation or scabbing is calculated to be 0.86 inches and 1.86 inches, respectively. Per DCD Subsection 3.5.3 the minimum thicknesses of the nuclear island exterior walls above grade is 24 inches. Based on the evaluation, it was concluded that the nuclear island is adequately protected against the hurricane generated 1.0-inch diameter sphere missile impact.**
- **For the 6.625-inch diameter pipe, the Turkey Point site specific hurricane generated missile horizontal velocity is 144.5 mph. For this Turkey Point site specific missile velocity, the concrete perforation or scabbing is calculated to be 16.4 inches and 23.1 inches, respectively. Per DCD Subsection 3.5.3 the minimum thicknesses of the nuclear island exterior walls above grade is 24 inches. Therefore, it was concluded that the nuclear island is adequately protected against the hurricane generated 6.625-inch diameter pipe missile impact.**
- **For the 4,000 lbs automobile missile, the Turkey Point site specific hurricane generated missile horizontal velocity is 180 mph. Therefore, for the hurricane generated automobile horizontal missile, evaluation was performed to determine whether the nuclear island exterior walls are adequate to withstand the effect of the automobile impact. The evaluation used the same methodology for determining the shear stress and ductility used for the evaluation of the tornado generated automobile missile in DCD (Reference 1) Subsection 3.5.2. The evaluation determined the maximum shear stress on the walls is 109.1 psi, below the allowable stress of 112.77 psi; and the largest ductility factor is 1.10, well below the allowable of 10. Thus it was concluded that the nuclear island is adequately protected against the hurricane generated automobile missile impact.**

ER Subsection 2.7.3.2 will be revised in a future revision as follows:

> From a probabilistic standpoint, this value is associated with a mean recurrence interval of 50 years. Section C6.0 (Table C6-3) of the ASCE-SEI design standard provides conversion factors for estimating 3-second-gust wind speeds for other recurrence intervals (ASCE 2005). Based on this guidance, the 100-year return period value is determined by multiplying the 50-year return period value by a scaling factor of 1.07, which yields a 100-year return period 3-second-gust wind speed of approximately 161 mph. **Additionally, using the guidance of RG 1.221 (U.S. NRC Oct 2011) it was determined that the nominal 3-second-gust wind speed that can be expected to occur at the Turkey Point site with a return period of 1.0E07 years is 260 mph. The 3-second-gust wind speed was determined by digitizing the contours from Figure 1 of RG 1.221, and overlaying the Turkey Point site location.**

The following will be added to the ER Subsection 2.7 references:

> **U.S. NRC Oct 2011, U.S. Nuclear Regulatory Commission, *Design-Basis Hurricane and Hurricane Missiles for Nuclear Power Plants*, Regulatory Guide 1.221, Revision 0, October 2011.**

ASSOCIATED ENCLOSURES:

None