FPL.

L-2011-246
10 CFR 52.3

June 24, 2011

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. 023 (eRAI 5492) -
Standard Review Plan Section 09.02.02 Reactor Auxiliary Cooling Water System

Reference:

1. NRC Letter to FPL dated May 19, 2011, Request for Additional Information Letter No. 023 Related to SRP Section 09.02.02 – Reactor Auxiliary Cooling Water System for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application

2. FPL Letter to NRC dated June 14, 2011, Schedule for Response to NRC Request for Additional Information Letter No. 023 (eRAI 5492) - Standard Review Plan Section 09.02.02 Reactor Auxiliary Cooling Water System

Florida Power & Light Company (FPL) provides, as an attachment to this letter, its response to the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI) 09.02.02-2 provided in the referenced letter (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 June 24, 2011.

Sincerely,

William Maher
Senior Licensing Director – New Nuclear Projects

WDM/ETC

D097
NRO

Attachment 1: FPL Response to NRC RAI No. 09.02.02-2 (RAI 5492)

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

NRC RAI Letter No. 23 Dated May 19, 2011

SRP Section: 09.02.02 – Reactor Auxiliary Cooling Water System

Application Section: 9.2.7 - Central Chilled Water System

Question from Balance of Plant Branch 1 (SBPA)

NRC RAI Number: 09.02.02-2 (eRAI 5492)

In PTN COL FSAR Section 9.2.7.2, "System Description," and Section 9.2.7.2.4, "System Operation," the applicant has proposed changes to the VWS. The changes refer to Table 9.2.7-1R, "Component Data – Central Chilled Water System," which indicates "PTN DEP 2.0-2," in the margin near the title of the table. PTN DEP 2.0-2 is described as a Tier 2 departure from the AP1000 DCD site parameters as summarized in PTN COL FSAR Table 2.0-201, "Comparison of DCD Site Parameters and Turkey Point Units 6 & 7 Site Characteristics."

The AP1000 DCD site parameter value for the air temperature maximum normal wet bulb (noncoincident) in DCD Tier 2, Table 2-1 is 80.1°F, and the PTN site value was revised to 81.5°F, as identified in PTN COL FSAR Section 2.3.1.5. Although the proposed change has been evaluated in PTN Part 7, Departures and Exemption Requests, it is not clear what aggregate effects there may be on other affected systems. Accordingly, provide analysis of the aggregate effects on integrated plant operation due to the implementation of PTN DEP 2.0-2.

FPL RESPONSE:

AP1000 DCD Revision 19 Table 5.0-1 Tier 1 and Table 2-1 (sheet 1 of 3) Tier 2 provide listings of standard values for site environmental parameters. The maximum safety wet bulb (noncoincident) air temperature for the Turkey Point Units 6 & 7 site was calculated for expected conditions at the site and increased from the standard value of 86.1°F to 87.4°F. The maximum normal wet bulb (noncoincident) air temperature for Turkey Point was also increased from 80.1°F to 81.5°F.

These changes required an evaluation of the various plant performance requirements and commitments affected by each parameter to confirm that the performance of the plant's safety and non-safety systems remain within the bounds described in the AP1000 DCD, and if necessary, identify changes to the design that are needed to ensure that performance is restored to within acceptable bounds.

The following sections in the AP1000 DCD describe areas that could be affected by an increase in the maximum normal wet bulb (noncoincident) air temperature.

- DCD Section 5.4.7.1.2.1, Normal Residual Heat Removal System – Shutdown Heat Removal

- DCD Section 9.1.3.1.3.1, Spent Fuel Pool Cooling – Partial Core – Plant Shut Down
- DCD Section 9.1.3.1.3.2, Spent Fuel Pool Cooling – Full Core Off-load at 120 hours
- DCD Section 9.2.1.2.3.4, Service Water System – Plant Cooldown/Shutdown
- DCD Section 9.2.2.1.2.2, Component Cooling Water – Normal Plant Cooldown
- DCD Section 9.2.2.1.2.3, Component Cooling Water – Refueling
- DCD Section 9.2.7.2.4, Central Chilled Water System – Normal Operation

Each of these areas has been reviewed in detail and quantitative evaluations have been performed to determine the impact of the increases in the value of maximum normal wet bulb (noncoincident) air temperature on the aggregate performance of all affected AP1000 systems. The increase in maximum normal wet bulb (noncoincident) air temperature requires a modification to the design of the certified AP1000 Central Chilled Water System (VWS) design to augment the total refrigeration capacity per train in the high capacity portion of the system by 100 tons. This will be accomplished by increasing the capacity of the two air-cooled chiller units in the high capacity portion of the VWS from 300 tons to 400 tons.

The impacts of the increase in the value of the maximum normal wet bulb (noncoincident) air temperature were evaluated on a system by system basis. The same type of analyses have been performed twice previously for two required increases in AP1000 standard site temperature conditions, and once to justify a departure for a specific site whose site temperature conditions exceeded standard site temperature conditions documented in the DCD.

Performance areas discussed in the DCD that can be affected by the increase in the maximum normal wet bulb (noncoincident) air temperature include:

- Plant cooldown with the normal residual heat removal system (RNS) from 350 °F to 125 °F within 96 hours
- Maximum SWS cold water temperature at peak system heat load conditions associated with the beginning of RNS cooldown
- Normal high capacity chilled water system design and performance
- Spent fuel pool cooling and design for maximum normal wet bulb temperature cases (full core off-loading and normal refueling cases 150 hours after shutdown)
- Steam and power conversion systems performance

Plant Cool down with the Normal Residual Heat Removal System (RNS) (FSAR Sections 5.4.7.1.2.1, 9.2.2.1.2.2, and 9.2.2.1.2.3)

Cool down from 350°F to 125°F must be accomplished within 96 hours after reactor shut down, using both trains of RNS, CCS, and SWS. This evolution produces the peak heat duty on the cooling water systems. The basis temperature for plant cool down performance is the maximum normal wet bulb (noncoincident) air temperature.

Calculation note APP-RNS-M3C-093, Revision 0, *AP1000 Plant Cooldown Performance Calculation Considering the Higher Florida Power & Light Wet Bulb Temperature* demonstrates that the Turkey Point Units 6 & 7 plants can achieve a reactor coolant temperature of 120°F within 83.5 hours after plant shutdown, with constant wet bulb temperature of 81.5°F.

This performance satisfies the DCD requirement to reach 125°F within 96 hours at an ambient wet bulb temperature equal to the maximum normal wet bulb (noncoincident) air temperature for the site.

SWS Cold Water Temperature at Beginning of Cool down (FSAR Section 9.2.1.2.3.4)

The DCD states that the maximum value of SWS cold water temperature (supply temperature to CCS heat exchangers) will be equal to or less than 88.5°F at the beginning of cool down, 4 hours after reactor shutdown. This performance is based on the use of the maximum normal wet bulb (noncoincident) air temperature as the basis for determining SWS cooling tower performance.

Calculation note APP-SWS-M3C-009, Revision 1, *Service Water Temperature Variation During RNS Cooldown*, provides a detailed analysis of the time dependence of SWS cold water temperature for several different ambient wet bulb temperatures at the expected cool down peak heat duty. The calculated cold water temperature at 4 hours after reactor shutdown, for an ambient wet bulb temperature of 81.5°F, is 87.94°F. This value satisfies the DCD commitment.

No design changes are necessary for Turkey Point Units 6 & 7 to allow the SWS to produce a cold water temperature of 88.5°F or less at the beginning of cool down, with a wet bulb temperature of 81.5°F.

Normal HVAC and High Capacity Chilled Water System (HCCWS) Design and Performance (FSAR Section 9.2.7.2.4)

The High Capacity Chilled Water System supplies chilled water to non-safety related HVAC cooling components throughout the plant, including the Containment Recirculation Cooling System (VCS).

Calculation note APP-GW-M1C-002 Revision A, *AP1000 High Humidity HVAC Systems Design Evaluation* assesses the impact of an increase in the value of the maximum normal wet bulb (noncoincident) air temperature on the design and performance of the HCCWS. The performance of the HCCWS is affected by the increased humidity and temperature associated with an increase in the value of this wet bulb temperature parameter from 80.1°F to 81.5°F at the Turkey Point site. The calculation note demonstrates that an increase in the refrigeration capacity of the HCCWS of approximately 100 tons per train will be required to restore HCCWS performance to the same level as achieved by the standard AP1000 HCCWS with a design basis wet bulb temperature of 80.1°F. This increased capacity will be obtained by changing the design capacity of the air-cooled chillers in the HCCWS from 300 tons to 400 tons.

Spent Fuel Pool Cooling Design and Performance for Maximum Normal Wet Bulb Temperature Cases (FSAR Sections 9.1.3.1.3.1 and 9.1.3.1.3.2)

Calculation note APP-SFS-M3C-042, Revision 0, *SFS HX Sizing Calculation Using Florida Power and Light (Turkey Point) Increased Wet Bulb Temperatures* documents the anticipated SFS performance for these cases, which use maximum normal wet bulb (noncoincident) air temperature as the basis for evaluation. They include a full core off-loading case at 150 hours after shutdown, and a normal (fuel shuffle) refueling 120 hours after shutdown.

The calculations assumes that the spent fuel pool holds 15 years (10 cycles) of spent fuel assemblies from operation of the plant with an 18-month refueling cycle, as well as the freshly discharged assemblies consistent with the respective type(s) of refueling operations just completed. For the full core off-loading case the performance requirement is to maintain SFS pool water temperature below 140°F with a single train of SFS cooling and a CCS supply temperature consistent with wet bulb temperature at the maximum normal (noncoincident) value. The calculation demonstrates that SFS pool temperature remains below 130°F for this case. For the partial core off-loading case at 120 hours, the requirement is that SFS pool temperature remain below 120°F with 2 trains of SFS heat removal operating and CCS temperature consistent with maximum normal wet bulb temperature. In this case SFS temperature remains below 114°F.

All DCD case SFS performance requirements are satisfied with ambient wet bulb temperature at the Turkey Point site elevated value of 81.5°F. Therefore, no changes to the plant design are required.

Steam and Power Systems Design and Performance

Westinghouse has undertaken, with the NuStart utilities, an effort to optimize the turbine generator and condenser designs and evaluate their performance over a range of Circulating Water System (CWS) flow rates and inlet temperatures. The optimized standard condenser that has been developed for the AP1000 will adequately accommodate the site conditions for Turkey Point Units 6 & 7 because the design cold water inlet temperature used for condenser and cooling tower sizing and CWS design was chosen to be 91°F. This cold water temperature is equivalent to an ambient wet bulb temperature of between 77°F and 84°F for most cooling tower designs that are compatible with potential AP1000 sites.

Therefore, no changes to the standard AP1000 steam and power conversion systems are anticipated as a result of the increased value of the maximum normal wet bulb (noncoincident) air temperature at the Turkey Point site.

CONCLUSION:

PTN RAI 09.02.02-2 states:" *[Provide] analysis of the aggregate effects on integrated plant operation due to the implementation of PTN DEP 2.0-2."*

Each of the areas discussed in departure PTN DEP 2.0-2 has been reviewed in detail and the results of the individual evaluations are described above.

The analyses indicate that one change to the certified AP1000 design is required to ensure that Turkey Point Units 6 & 7 meet the performance requirements and commitments potentially affected by an increase in the value of the site maximum normal wet bulb (noncoincident) air temperature from 80.1°F to 81.5°F. This change is an increase in the refrigeration capacity per train for each of the two high capacity trains of the Central Chilled Water System (VWS). Each train's chiller capacity must be increased by 100 tons. This capacity increase will be implemented by increasing the size of each of the two air-cooled chillers in the HCCWS from 300 tons to 400 tons.

This response is PLANT SPECIFIC.

References:

None

ASSOCIATED COLA REVISIONS:

No COLA changes have been identified as a result of this response.

ASSOCIATED ENCLOSURES:

None