FPL

L-2011-318
10 CFR 52.3

August 17, 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. 028 (eRAI 5399) - Standard Review Plan Section 09.02.01 Station Service Water System

Reference:

1. NRC Letter to FPL dated July 6, 2011, Request for Additional Information Letter No. 028 Related to SRP Section 09.02.01 – Station Service Water System for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application

2. FPL Letter to NRC dated August 3, 2011, Schedule for Response to NRC Request for Additional Information Letter No. 028 (eRAI 5399) - Standard Review Plan Section 09.02.01 Station Service 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) 09.02.01-1 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 August 17, 2011.

Sincerely,

William Maher
Senior Licensing Director – New Nuclear Projects

WDM/ETC

D097
NRO

Attachment 1: FPL Response to NRC RAI No. 09.02.01-1 (RAI 5399)

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. 28 Dated July 6, 2011

SRP Section: 09.02.01 – Station Service Water System

Application Section: 9.2.1 – Service Water System

Question from Balance of Plant Branch 1 (SBPA)

NRC RAI Number: 09.02.01-1 (eRAI 5399)

Explain whether the cooling capability of the service water system (SWS) mechanical draft cooling towers for the PTN units could be adversely affected by interactions that exist between the SWS two mechanical draft cooling towers between units. In addition, explain whether interactions between different cooling towers (i.e., circulating water system (CWS) versus SWS may adversely affect the cooling capacity of the SWS. Since PTN is utilizing mechanical induced-draft towers for the CWS versus natural draft cooling towers as submitted by other COL applicants, explain whether interactions with the SWS cooling towers could occur due to the difference in height of the discharge plume. For example, consider whether adverse interactions could occur due to localized atmospheric influences caused by siting considerations, the locations of major structures, the locations of the mechanical draft cooling towers, mechanical draft cooling tower fan speed, and wind effects.

In PTN COL FSAR Section 9.2.1.2, the applicant addressed potential impacts due to yard equipment layout and tower operation in an adjacent unit. Provide the detailed analysis with respect to standard plant layout and siting criteria, standard plant design margin, site specific meteorological and siting considerations, interactions with CWS cooling towers, and interactions with adjacent units. In addition, in PTN COL FSAR Section 10.4.5.2.2, the applicant provided information on the site-specific phenomenon of cooling tower “interference” and stated that proper cooling tower placement and orientation can minimize the effect of the phenomenon. Further, the applicant stated that since the PTN SWS and CWS towers are located remotely to each other and the saturated effluent dissipates before it interferes with the intake of the SWS, the CWS towers would not adversely affect the performance of the SWS towers. Identify the detailed information in the PTN COL FSAR supporting these statements, or provide additional information to do so.

In summary, in order to confirm that the design meets GDC 4 criteria with respect to cooling tower interference, provide detailed justification in the FSAR to address potential adverse interactions between the mechanical draft SWS cooling towers and mechanical draft CWS cooling towers for the two PTN units, as well as adjacent Turkey Point Unit 5 mechanical draft cooling towers.

FPL RESPONSE:

The effect on the cooling capability of the Service Water System (SWS) mechanical draft cooling towers due to potential impacts from 1) interference and air restriction effects due to yard equipment layout and SWS tower operation in an adjacent unit, 2) Circulating Water System (CWS) cooling tower operation of the same and adjacent units, and 3) other cooling towers of nearby units have been considered. Based on unit spacing, yard equipment layout, and the margins inherent in the performance requirements and design conditions of the tower, no adverse impacts were identified.

The SWS provides cooling for the component cooling heat exchangers in support of normal plant operations. The SWS has no safety function; the SWS cooling towers and fans are identified as Equipment Class D in DCD Tier 2, Table 3.2-3; and fall under the scope of the regulatory treatment of non-safety systems (RTNSS) process.

DCD Table 16.3-2, Subsection 2.4, identifies the Investment Protection Short-Term Availability Controls for SWS as requiring both SWS cooling tower fans operable for component cooling water system cooling. This control is only applicable in Mode 5 with the RCS pressure boundary open and Mode 6 with the upper internals in place or cavity level less than full.

Adverse interactions with the potential to impact performance of the SWS cooling towers are between the SWS cooling tower and buildings on an adjacent unit.

As defined by application of the RTNSS process, the availability controls for the SWS cooling towers are only applicable during Modes 5 and 6. This defines the scenarios for discussing the potential for interference conditions between SWS cooling towers on adjacent units. The largest plume would form during maximum heat load on the tower, which would occur during Mode 4 cooldown. Therefore, the limiting interference interaction would occur when one unit is in Mode 4 cooldown and the adjacent affected unit is in Mode 5 or 6 under the conditions described in the DCD Chapter 16 short-term availability controls.

Standard Plant Layout and Siting Criteria:

Each AP1000 unit at Turkey Point conforms to the standard AP1000 plant design which locates the SWS cooling towers immediately adjacent to the turbine building of the associated unit. For a two-unit site, the SWS cooling towers are separated by a distance greater than 800 feet and are separated by a turbine building structure. To create a cross-unit interference condition, an SWS cooling tower plume would not only be required to travel the 800 feet separating the cooling towers, but also circumvent the large turbine building structure separating the towers of both units. The separation distance and obstructing buildings would provide ample opportunity to disperse the plume and minimize interference effects.

Unit separation also minimizes any effects from air restriction on a two-unit site. The standard plant yard layout for a single unit locates the SWS cooling tower much closer to the associated unit's buildings than the distances separating the tower from the buildings on an adjacent unit. It should be noted that air restriction conditions between a SWS cooling tower and building structures associated with that AP1000 unit are within the scope of the standard AP1000 design.

Standard Plant Design Margins:

The SWS cooling tower has two cells, each capable of independent operation to provide 50 percent of the tower's ultimate cooling capacity. During power operation, only one cell of the tower is required to be in service to remove heat loads, and tower maintenance is anticipated to occur when the unit is on-line. The BASES section of Table 16.3-2, Subsection 2.4, states that while both SWS cooling tower cells are required to be available, only one cell is required to be operating to provide the necessary heat removal during the identified Mode 5 and 6 conditions. The RTNSS function of the CCS and SWS is to remove decay heat during Mode 5 and Mode 6 reduced RCS inventory operations. Heat removal performance is reduced by increases in ambient wet bulb temperature that cause increases in SWS cold water temperature and CCS supply temperature. However, the total heat duty of the CCS and SWS is significantly lower during this mode of operation, as compared to the normal power or cooldown modes, because there is essentially no sensible heat to remove from the RCS and the core decay heat level is low. Primary plant component heat loads (e.g, from RCPs and VFDs) are also very small. Therefore, only a small fraction of the heat removal capacity of the operating SWS cooling tower cell is required to maintain the necessary RTNSS function, thus providing a substantial margin to accommodate any potential for adverse effects on tower performance due to an interference condition.

Site Specific Meteorological and Siting Considerations:

Westinghouse Technical Report TR-108 (APP-GW-GLN-108) states that the SWS cooling tower is designed to support Normal Residual Heat Removal System (RNS) heat removal during plant shutdown at the maximum normal wet-bulb temperature of 80.1°F. The maximum normal wet-bulb temperature for Turkey Point Units 6 and 7 is identified in FSAR Table 2.0-201 as 81.5°F. This is a departure from the standard value of the parameter for AP1000 (PTN DEP 2.0-2). The SWS cooling tower design heat load is 3.46×10^8 Btu/h during plant cooldown, with ambient wet bulb temperature at the maximum normal non-coincident wet bulb temperature at the site and both cells of the cooling tower in operation. The actual SWS heat duty at peak cooldown heat load is approximately 75 percent of this value. Analyses using the higher Turkey Point site maximum normal wet bulb temperature of 81.5°F demonstrate that the plant can be cooled from 350°F to 125°F within 96 hours after reactor shutdown, while maintaining CCS temperature below the maximum allowable value of 100°F during the cooldown.

All other decay heat removal performance requirements (e.g., maintaining the temperature of the Spent Fuel System storage pool) can also be met with the higher Turkey Point site maximum normal wet bulb temperature. Thus, there is significant margin provided in the design of the SWS for decay heat removal during plant shutdown and cooldown. The effects of any type of interference due to adverse meteorological conditions are therefore unlikely to degrade SWS performance to the extent that any one of the performance requirements or commitments stated in the AP1000 DCD could not be met.

Circulating Water System Cooling Towers Interactions:

Turkey Point Units 6 and 7 each have three circulating water system (CWS) cooling towers which are located to the south of their associated unit (FSAR Figure 1.1-201). Each Turkey Point Unit's SWS and CWS cooling towers are separated by greater than 1000 feet. Additionally, each unit's SWS cooling tower is separated from the other unit's CWS cooling towers by greater than 1000 feet. Since the location of Unit 5 is further away (over 2500 ft to the SWS and over 3000 ft to the CWS cooling towers), it is unlikely that plume interactions would occur between Unit 5 and the Units 6 and 7 cooling towers.

The CWS cooling towers for each Turkey Point AP1000 Unit are mechanical induced draft towers. The plumes from the CWS cooling towers are directed upward by their fans and the buoyant effect of warm air. During normal power operation, the stack exit velocity is expected to be approximately 22.5 miles per hour (10.1 m/s). Based on the site arrangement (FSAR Figure 1.1-201), interactions of the CWS cooling towers with the SWS cooling towers may potentially result from winds from the south-southwest through south-southeast directions. The proposed design of the CWS cooling towers, including the circular shape and high stack exit velocity, in conjunction with the buoyant effect of the warm stack exhaust air, will tend to elevate and disperse the plume at elevations greater than the intakes of the SWS cooling towers, making it unlikely any significant interaction would occur. Strong SSW-SSE winds with velocities equal to or greater than the CWS cooling tower stack exit velocity would be necessary to have potential for interaction, but these winds occur less than 0.09 percent of the time based on site meteorological data (FSAR Table 2.3.2-205). Further, the SWS cooling towers are shielded by the larger and higher plant structures from winds from the south-southwest creating higher likelihood of dispersion of a plume from that direction. The low occurrence of winds from these directions and the large separation distances make any significant interaction unlikely under lower wind conditions; with higher wind velocities, greater dispersion is effected.

As stated above under "Site Specific Meteorological and Siting Considerations", degraded SWS performance, to the extent that any one of the performance requirements or commitments stated in the AP1000 DCD could not be met, is unlikely as a result of the effects of any type of interference due to adverse meteorological conditions at the Turkey Point site.

Further, as discussed above under "Standard Plant Design Margins", only a small fraction of the heat removal capacity of the operating SWS cooling tower cell is necessary to maintain the necessary RTNSS function, thus providing a substantial margin to accommodate any potential for adverse effects on tower performance due to an interference condition. When an SWS cooling tower of one unit is operating at the highest heat loads, the CWS cooling tower of that unit would be operating at a much reduced heat load, and therefore the potential impact would be from the adjacent unit's CWS cooling tower. As discussed previously, the interaction of the CWS cooling towers with the SWS cooling towers is unlikely due to dispersion of the plume by distance and path and the limited amount of time that the wind direction and velocity is such that interaction could occur.

<u>Conclusion:</u>

It is unlikely that a SWS cooling tower plume could travel to the vicinity of a SWS cooling tower on an adjacent unit. Distance and interfering structures in the path of the plume will disperse the plume, greatly minimizing any adverse effect on cooling tower performance. Due to the separation between Turkey Point Units 6 and 7 (greater than 800 feet), each SWS cooling tower is in much closer proximity to the building and structures within its own unit than to those located in the adjacent unit. Therefore, there are no site specific features and conditions between Units 6 and 7 that could result in adverse impacts from air restriction.

During conditions where the SWS cooling tower is subject to RTNSS requirements, the cooling tower is only operating at a small fraction of its operational heat load, leaving a substantial margin available to accommodate site specific adverse interactions, if they were to exist. Therefore, site specific performance degradation resulting from an interaction with a second unit would be minimal and would be readily accommodated by the design margins available to support RTNSS capability.

It is unlikely that a CWS cooling tower plume would interact with the SWS cooling towers such that a significant degradation in performance would occur. The distance and path of the plumes would provide dispersion, greatly minimizing any adverse effect on SWS cooling tower performance. Further, it is unlikely that any adverse plume interactions between Unit 5 and the Units 6 and 7 towers would occur due to the greater distances.

The FSAR was reviewed and no change is required. The level of detail in the FSAR is consistent with that of other applicants with respect to the environmental effects of cooling tower interactions.

This response is PLANT SPECIFIC.

References:

None

ASSOCIATED COLA REVISIONS:

None

ASSOCIATED ENCLOSURES:

None