



L-2011-285
10 CFR 52.3

July 28, 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 2011001 (RAI 5770)
EIS 9.4 - System Design Alternatives, Environmental Report Section 9.4

Reference:

1. NRC Email to FPL dated June 13, 2011, Request for Additional Information Letter 2011001 (RAI 5770) EIS 9.4 System Design Alternatives, Environmental Report Section 9.4

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) 9.4-1 through 9.4-6 provided in the referenced letter. 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 July 28, 2011.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. Maher'.

William Maher
Senior Licensing Director – New Nuclear Projects

WDM/RFO

D097
MRO

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Attachment 1: FPL Response to NRC RAI No. 9.4-1 (RAI 5770)
Attachment 2: FPL Response to NRC RAI No. 9.4-2 (RAI 5770)
Attachment 3: FPL Response to NRC RAI No. 9.4-3 (RAI 5770)
Attachment 4: FPL Response to NRC RAI No. 9.4-4 (RAI 5770)
Attachment 5: FPL Response to NRC RAI No. 9.4-5 (RAI 5770)
Attachment 6: FPL Response to NRC RAI No. 9.4-6 (RAI 5770)

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. 2011001 Dated June 13, 2011

SRP Section: EIS 9.4 – System Design Alternatives

Question from Environmental Technical Support Branch

NRC RAI Number: EIS 9.4-1 (RAI 5770)

Provide information that supports the assertion in the ER Section 9.4.2.1.5, that using the Boulder Zone as a backup water supply in conjunction with reclaimed water is not environmentally preferable to using radial collector wells drawing water from Biscayne Bay/Biscayne Aquifer.

FPL RESPONSE:

FPL conducted a *Cooling Water Study* (FPL, 2009) to identify the alternatives for the makeup water supply to the mechanical draft cooling towers for the closed-cycle circulating water system (CWS) for Turkey Point Units 6 & 7. The alternatives were evaluated in relationship to their feasibility and a screening analysis was performed. This *Cooling Water Study* not only considered alternatives for the makeup water supply to the mechanical draft cooling towers, but also considered alternatives for the blowdown discharge from the cooling towers, and water supply to other plant systems of Turkey Point Units 6 & 7.

In consideration of NUREG-1555, this study first considered the technical feasibility of each identified potential makeup water supply. This feasibility analysis considered whether utilizing the supply source was:

- prohibited by federal, state, regional, local, and affected Native American tribal agreements;
- consistent with any Clean Water Act findings, including §316(b); and
- practical from a technical standpoint with respect to the proposed dates of plant construction and operation.

As indicated above and described in NUREG-1555, this study also included a review of (1) alternative intake designs and locations, (2) alternative discharge designs and locations, (3) alternative water supplies, and (4) alternative water treatment. Further, the evaluation of each alternative makeup water supply considered possible impacts/implications to other evaluated alternative systems such as the blowdown discharge.

As detailed in Table 3-1 of the *Cooling Water Study* and presented in ER subsection 9.4.2.3.4 and Table 9.4-2, during the determination of the technical feasibility of the Boulder Zone as a water supply, initial evaluations indicated a strong possibility for recirculation of wastewater into the cooling water supply if the Boulder Zone was to be used for discharge of CWS cooling tower blowdown. The initial evaluations described above in the *Cooling Water Study* show that injectate discharged at any location on the FPL property would likely reach and co-mingle with

the proposed Boulder Zone makeup water supply well field during the anticipated 60 year operational lifetime of Turkey Point Units 6 & 7.

Although the Boulder Zone posed potential technical feasibility issues as a water supply source, it was evaluated further because of its potential to be utilized as a water supply source if it was not also used for discharge for the CWS cooling tower blowdown. That is, it was only carried forward for further evaluation as a viable (feasible) option if the Boulder Zone is not used in conjunction as the blowdown discharge alternative. This evaluation included the feasibility aspects of a conceptual design for each alternative carried forward.

Additionally, the *Cooling Water Study* identified the following aspect characterizing the Boulder Zone which, in part, contributes to the conclusion stated in ER 9.4.2.1.5 that "Based on the analysis, the alternate intake structures (Boulder Zone and Card Sound Canal) are not environmentally preferable to the proposed intake structures.":

"The Boulder Zone has been used since 1977 to store vast quantities of treated sewage injected into it by Miami, Fort Lauderdale, and West Palm Beach. Currently, over 120 Class I injection wells are used to dispose of approximately 1.3×10^6 m³/day of liquid wastes in southeast Florida."

These liquid wastes, which include industrial, hazardous (new hazardous waste wells were banned in 1983), non-hazardous and municipal and non-municipal wastes, in Florida present the potential for great variability in the biological/chemical constituent makeup of this water supply source. This would necessitate the sampling and analysis of Boulder Zone groundwater to characterize the water quality and evaluate whether water pretreatment may be needed and to support any treatment system design. This characterization may prove difficult as the water quality and constituents may vary over time which could make it difficult to determine pre-treatment requirements.

As detailed in the *Cooling Water Study*, several blowdown discharge alternatives were evaluated and a screening analysis was performed. In Table 4-1 of the *Cooling Water Study*, this evaluation was summarized. The Boulder Zone was identified as the only alternative that was feasible for discharging blowdown. Therefore, as summarized in ER Subsection 9.4.2.3.4 and Table 9.4-4 and detailed in the *Cooling Water Study*, because of the likelihood that injectate may reach Boulder Zone supply wells within the lifetime of the plant, the associated potential geochemical impacts from recirculation of injectate, and the extensive use of the Boulder Zone as a wastewater disposal source, the Boulder Zone supply wells were determined not to be environmentally preferable to the radial collector wells.

This response is PLANT SPECIFIC

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References:

FPL, 2009. Florida Power and Light Company, *Cooling Water Study*, May, 2009 (Reference FPL Letter L-2010-172, November 1, 2010).

ASSOCIATED COLA REVISIONS:

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

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter No. 2011001 Dated June 13, 2011

SRP Section: EIS 9.4 – System Design Alternatives

Question from Environmental Technical Support Branch

NRC RAI Number: EIS 9.4-2 (RAI 5770)

Work Order #2, Task 1, Initial Water Source Alternative Screening Technical Review Report, Section 5.0 (page 3 and 4) indicates that Reclaimed water ranked highest as a source of cooling water and the Boulder Zone ranked second. Use of radial collector wells ranked fourth. Provide the rationale for selecting the use of Radial Collector wells on Turkey Point as the backup water supply for the proposed units.

FPL RESPONSE:

The water source evaluation process included a number of steps, including identification of potential sources, conceptual design and costs, and the development of screening criteria. A total of 16 potential sources were identified. Based on this preliminary water source analysis, the top-ranked alternatives included reclaimed water, the Boulder Zone of the Lower Floridian Aquifer, as well as the radial collector wells.

The water supply source concepts of each top ranked alternative were further developed as part of the *Conceptual Engineering of Cooling Water Supply and Disposal for Turkey Point Units 6 & 7* report (HDR, 2008). Based on the conceptual designs, including costs, and with additional review, reclaimed water was selected as the primary source water option, and radial collector wells as the backup supply option. The Boulder Zone was not selected due to its planned use as an injection zone for wastewater and it was determined not to be economically prudent. (It should be noted that scope of the evaluation process included in Work Order #2, Task 1, Initial Water Source Alternative Screening Technical Review Report differs from the analysis conducted in ER 9.4 where the primary objective is to determine if an alternative is environmentally preferable.)

This response is PLANT SPECIFIC.

References:

(HDR, 2008) HDR Engineering, Inc., *Conceptual Engineering of Cooling Water Supply and Disposal for Turkey Point Units 6 & 7*, June 30, 2008 (Reference FPL Letter L-2010-172, November 1, 2010).

ASSOCIATED COLA REVISIONS:

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

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter No. 2011001 Dated June 13, 2011

SRP Section: EIS 9.4 – System Design Alternatives

Question from Environmental Technical Support Branch

NRC RAI Number: EIS 9.4-3 (RAI 5770)

Work Order #2, Task 1, Initial Water Source Alternative Screening Technical Review Report, Appendix A tables (for example Biscayne Bay Construction Footprint page 22) indicate that the evaluation of a radial collector well source was based on a location on Card Sound. Clarify how this location compares with the selected location on Turkey Point in terms of environmental impacts.

FPL RESPONSE:

When the radial collector well (RCW) concept was first considered, it was assumed that Card Sound would be the source of water. However, as the concept was developed in more detail, the goal became to construct the radial collector wells so that withdrawals would be approximately 1800 feet off shore to maximize the contribution of marine water and limit impact to the onshore water resource. Published data in the Biscayne Bay area (Langevin, 2000) indicates that, at this distance, the underlying bay bottom is saturated with saltwater with salinity similar to the Bay. During preparation of *Work Order #2 – Tasks 2 and 3, Water Source Alternative Characterization and Scope Technical Review Report* (HDR, 2008), a radial collector well design concept was presented that could avoid impacts to freshwater inflows to the Bay. The design concept called for the nearshore sections of the RCW laterals to be cased. The remaining lengths of the radial wells would be screened to allow withdrawals of saltwater. The length of the cased well sections would limit withdrawals to areas far enough offshore to avoid interference with fresh groundwater inflows. Since the design of the radial wells would prevent interception of freshwater, saltwater would be the water source and therefore, no water use permit would be required.

Using current technologies, the distance a lateral can be installed from a radial collector well caisson is approximately 900 feet. As a result, the goal of pumping water from approximately 1800 feet offshore would not have been possible at the Card Sound location. Additionally, the Card Sound radial collector well option required the caissons to be installed along the coastline of the Sound. Except for a limited area of uplands adjacent to the remnant Card Sound Canal mouth, the coastline is predominately wetlands. Therefore, the installation of the caissons and their footprint would result in unavoidable impact to coastal wetlands.

Biscayne Bay was also included as a potential source of radial collector well water. If Biscayne Bay is the source of RCW water, construction impacts would be limited to small previously disturbed upland areas (Turkey Point peninsula) on FPL property. There would be no construction impacts within Biscayne Bay. Locating the RCW on this peninsula allows the laterals to be installed approximately 1800 feet or greater from the bay coastline, therefore meeting the goal of approximately 1800 feet seaward of the regional shoreline (the shoreline excluding the Turkey Point peninsula).

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This response is PLANT SPECIFIC.

References:

HDR, 2008. HDR Engineering, Inc., *Work Order #2 – Tasks 2 and 3, Water Source Alternative Characterization and Scope Technical Review Report*, March, 2008 (Reference FPL Letter L-2010-172, November 1, 2010).

Langevin, 2000. Langevin, Chris, Patterson, P., Wolfert, M., 2000. Ground-water discharge to Biscayne Bay, Greater Everglades Ecosystem Restoration (GEER) Open File Report, USGS.

ASSOCIATED COLA REVISIONS:

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

ASSOCIATED ENCLOSURES:

None

Proposed Turkey Point Units 6 and 7
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NRC RAI Letter No. 2011001 Dated June 13, 2011

SRP Section: EIS 9.4 – System Design Alternatives

Question from Environmental Technical Support Branch

NRC RAI Number: EIS 9.4-4 (RAI 5770)

The table on Biscayne Bay Habitat Impacts in Work Order #2, Task 1, Initial Water Source Alternative Screening Technical Review Report Appendix A, indicates no impact to Biscayne Bay because the radial collector wells would be constructed on Card Sound. How would the radial collector well impact ranking change if the location on Turkey Point was the location evaluated?

FPL RESPONSE:

The scoring of the radial collector wells (RCW) on Turkey Point would be less than the Card Sound RCW option (Note: in the screening analysis, the lower score is better), resulting in a higher ranking for the RCW on Turkey Point option. The caissons and access to the proposed RCW are to be constructed on the upland areas of the Turkey Point Peninsula. The construction of the RCW pipeline from the peninsula to the plant will result in temporary impact to approximately 3 acres of mangrove wetlands during pipeline installation. The potential wetland impact will be limited to areas immediately adjacent to the existing access path to the Turkey Point peninsula. The proposed construction of the RCW, access and pipeline will avoid impacts to Biscayne Bay. Additionally, the Card Sound radial collector well option required the caissons to be installed along the coastline of the Sound. Except for a limited area of uplands adjacent to the remnant Card Sound Canal mouth, the coastline is predominately wetlands. Therefore, the installation of the caissons and their footprint would result in unavoidable impacts to coastal wetlands.

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

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SRP Section: EIS 9.4 – System Design Alternatives

Question from Environmental Technical Support Branch

NRC RAI Number: EIS 9.4-5 (RAI 5770)

The table assessing Card Sound Habitat Impacts in Work Order #2, Task 1, Initial Water Source Alternative Screening Technical Review Report, Appendix A gives a lower score (2) to the radial collector well system because the location would be near shore in close proximity to fresh water inflows. Clarify the environmental impact of locating the radial collector wells on Turkey Point relative to fresh water inflows.

FPL RESPONSE:

Locating the radial collector wells (RCW) on the Turkey Point peninsula allows the RCW caissons to be installed as far from the bay coastline as possible. The approximate separation – approximately 1800 feet from the main coastline – would maximize the contribution of marine water.

Flow of groundwater into Biscayne Bay is very limited regionally due to the presence of L31-E, which intercepts seaward flowing groundwater. In addition, Langevin (2000) reports that most groundwater flow into the Bay takes place north of Structure S-123, which is well north of the Turkey Point peninsula. Locally, groundwater inflow to the Bay is limited due to the presence of L31-E, the cooling canal system and the potentiometric low created within the cooling canal system by the intake to the Plant (Figure 37 of the *Groundwater Modeling Report* [FPL, 2011]). In addition, the groundwater modeling results show that the RCWs will not measurably impact regional fresh water flows.

This response is PLANT SPECIFIC.

References:

FPL, 2011. Florida Power and Light Company, Groundwater Model Development and Analysis: Units 6 & 7 Dewatering and Radial Collector Well Simulations, Revision 1, February, 2011 (Reference FPL Letter L-2011-082, February 28, 2011).

Langevin, 2000. Langevin, Chris. Simulation of Ground-Water Discharge to Biscayne Bay, Southeastern Florida. Water-Resources Investigations Report 00-4251, USGS.

ASSOCIATED COLA REVISIONS:

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

ASSOCIATED ENCLOSURES:

None

NRC RAI Letter No. 2011001 Dated June 13, 2011

SRP Section: EIS 9.4 – System Design Alternatives

Question from Environmental Technical Support Branch

NRC RAI Number: EIS 9.4-6 (RAI 5770)

One alternative water source considered in the Work Order #2, Task 1, Initial Water Source Alternative Screening Technical Review Report, is the Boulder Zone. The Cooling Water Supply and Conceptual Design report (March 2009) indicates on page 32 that it would take over 250 years for water injected through the blowdown injection well (assuming reclaimed water as the source) to travel to production wells located 5 miles away on the Turkey Point site. Clarify why the use of the Boulder Zone as a backup water supply is not environmentally preferable to the use of radial collector wells extending beneath Biscayne Bay.

FPL RESPONSE:

The calculation of the movement of the injected blowdown water in the HDR report, *Cooling Water Supply and Disposal Conceptual Design Report* (HDR, 2009), page 32, is a theoretical calculation based on the conditions of an injection rate of 19 mgd, the injection water penetrating the full thickness of the injection zone (300 feet), and no operating production (withdrawal) wells in the Boulder Zone. Additional theoretical calculations of the potential movement of the injected water for various conditions are presented in Section 8 of the HDR report, *Conceptual Engineering of Cooling Water Supply and Disposal for Turkey Point Units 6 & 7* (HDR, 2008). These calculations were performed assuming that no Boulder Zone production wells are operating. Section 4.2.2 of that report points out that determining the potential for injection water to reach Boulder Zone production wells “is a function of a number of complex factors regarding the use of this zone”. Given the complexities of using the Boulder Zone for both production and injection, a comprehensive pilot program as described in the report would be required.

The distance between the proposed injection wells and the closest potential Boulder Zone production well field alternatives is approximately 2 miles. The distance between an alternative production well field location and the injection wells is approximately 4 miles (the well field locations are conceptually presented in Section 4 of *Conceptual Engineering of Cooling Water Supply and Disposal for Turkey Point Units 6 & 7*). The movement of injected water at a rate of 19 mgd with a 100 foot injection zone would reach the nearest wells of the two potential Boulder Zone well fields within 20 and 75 years, respectively. With an effective injection zone thickness of 50 feet, injected water would reach the nearest wells of the two potential Boulder Zone well fields within 10 and 40 years, respectively. These calculated movements of the injected water are without any operation of Boulder Zone production wells. Pumping from the Boulder Zone production wells will significantly reduce the travel time from the injection wells to the production wells. The Boulder Zone has been used as an injection zone for reclaimed water and other water streams in south Florida. The Boulder Zone has not

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been used as an injection zone and a withdrawal zone for water supply, especially in close proximity as would be required for this project. Given the potential for the decreasing reliability of the Boulder Zone as a source of supply with nearby injection wells, coupled with its cost, the Boulder Zone production well field was not selected as the backup cooling water source.

This response is PLANT SPECIFIC.

References:

HDR, 2008. HDR Engineering, Inc., *Conceptual Engineering of Cooling Water Supply and Disposal for Turkey Point Units 6 & 7*, June 30, 2008 (Reference FPL Letter L-2010-172, November 1, 2010).

HDR, 2009. HDR Engineering, Inc., *Cooling Water Supply and Disposal Conceptual Design Report*, March, 2009 (Reference FPL Letter L-2010-172, November 1, 2010).

ASSOCIATED COLA REVISIONS:

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

ASSOCIATED ENCLOSURES:

None