


United States Nuclear Regulatory Commission Official Hearing Exhibit	
In the Matter of: FLORIDA POWER & LIGHT CO. (Turkey Point Nuclear Generating Units 6 and 7)	
	Commission Mandatory Hearing
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FPL-011
January 9, 2018

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

Before the Commission

In the Matter of)	
)	
Florida Power & Light Company)	Docket Nos. 52-040-COL
)	52-041-COL
Turkey Point Units 6 and 7)	
(Combined License Application))	

FLORIDA POWER & LIGHT COMPANY’S RESPONSES TO POST-HEARING QUESTIONS

In accordance with the Commission’s Order (Transmitting Post-Hearing Questions) dated December 19, 2017, Florida Power & Light Company (“FPL”) submits the following responses to each of the post-hearing questions posed to it by the Commission. FPL has consulted with the NRC Staff and has been informed that the Staff has no objection to admitting this response as an exhibit into the record. Likewise, FPL has no objection to admitting the NRC Staff’s responses as an exhibit into the record.

Question 3: What is the status of the permit under Section 404 of the Clean Water Act?

Response: In correspondence dated June 29, 2009 (FPLNNP-09-0499), FPL submitted to the U.S. Army Corps of Engineers (“USACE”) a Joint Application for Environmental Resource Permit/Federal Dredge and Fill Permit (Section 404 of the Clean Water Act) associated with the Turkey Point 6 & 7 Project. In correspondence dated November 10, 2011 (L-2011-477), FPL submitted the Turkey Point Units 6 & 7 Section 404(b)(1) Alternatives Analysis, and in correspondence dated August 27, 2012 (FPLACE-12-0360), FPL submitted the Turkey Point Units 6 & 7 Mitigation Plan - USACE Supplement to compensate for unavoidable wetland impacts. Since 2009, FPL has responded to all USACE requests for additional information

(“RAIs”) and all required consultations have been completed including: U.S. Fish & Wildlife Service, State Historic Preservation Officer, Tribal Historic Preservation Officer, and National Marine Fisheries Service.

In accordance with the requirements of Section 14 of the Rivers and Harbor Act, 33 U.S.C. § 408, FPL applied for and received authorization for the placement of linear non-transmission line facilities (i.e. reclaimed water pipeline) adjacent to Central & South Florida Flood Control Structures. To complete the Section 408 authorizations, FPL intends to submit a Section 408 application for the transmission line facilities in early 2018.

Additional wetland avoidance and minimization efforts associated with the Project’s linear facilities have significantly reduced the acreage of impacts and resulting amount of mitigation required; a revised Mitigation Plan reflecting the reduction will be provided to the USACE in early 2018.

To date, these are the only outstanding submittals required. Following receipt of the outstanding 408 authorization and review of the revised wetland Mitigation Plan, FPL anticipates the USACE will issue the Section 404 permit.

Question 4: If Turkey Point was not an existing nuclear power plant site and the exclusionary criteria were applied to it, would the exclusionary criteria have been met?

If not, how do you propose the Commission weigh the failure to meet the exclusionary criteria against the benefits of the proposed project, as required under Subpart A of Part 51, in determining whether the COLs should be issued?

Response: Exclusionary criteria used in FPL’s siting process were designed for screening a large ROI as the first step in the search for potential greenfield sites. These criteria were neither designed nor implemented in a way that allows their use in determination of site suitability or regulatory status of any of the potential sites. In particular, the exclusionary criteria are not appropriate for evaluation of existing sites such as Turkey Point and have no bearing on the

subsequent evaluation of candidate sites and detailed comparison of the environmental impacts associated with the proposed and alternative sites.

Exclusionary criteria in FPL's site selection process were used solely to optimize the search for additional, greenfield potential sites through an initial screening of the region of interest ("ROI") as described in the Augmented Site Selection Report:

"...to identify candidate areas of higher suitability within which additional potentially favorable sites (in addition to the sites identified in the Siting Report) may be found; this step was accomplished by eliminating from consideration those areas that are expected to be less suitable than other potential siting areas. Exclusionary and avoidance criteria identified in the Siting Guide were reviewed to identify those regional screening criteria and related physical features that provide insights into site suitability on an areal basis within the FPL ROI."

In practice, application of exclusionary criteria must recognize:

- Limits of data that are accessible, consistent and mappable across the large geographic area of the ROI, and
- Infeasibility of evaluating site conditions and regulatory requirements on a region-wide basis.

These limitations do not compromise the use of exclusionary criteria to focus on more suitable areas within the ROI, as described above, but the data do not support the detailed evaluation of site conditions and regulatory requirements necessary to factually establish the acceptability of individual land parcels. Because of these practical limitations, the exclusionary criteria cannot be considered dispositive as to a site's acceptability or unacceptability – they are appropriate only for optimizing the search for potential greenfield sites.

In particular, data available for regional screening does not supplant the vastly more detailed information available for existing sites such as Turkey Point, St. Lucie and Martin, where data from decades of site characterization and operational experience are available. Activities at these sites are also governed by established regulatory frameworks and the associated environmental

protection measures (e.g., limitations on further development, wildlife management plans) that do not apply to greenfield sites.

Finally, the use of exclusionary criteria in the initial screening of regions of interest has no bearing on the subsequent evaluation of candidate sites and detailed comparison of the environmental impacts associated with the proposed and alternative sites. Because the use of exclusionary criteria in the initial screening of candidate areas are not applied in evaluating and weighing the environmental impacts of the candidate, proposed, and alternative sites, it is irrelevant to “consider[ing] the final balance among conflicting factors” as required by 10 C.F.R. § 51.107(a)(2), and irrelevant to the “weighing the environmental, economic, technical and other benefits against environmental and other costs” required by 10 C.F.R. § 51.107(a)(3).

In summary, exclusionary criteria used in FPL’s siting process were designed for use in screening a large ROI as the first step in the search for potential greenfield sites. They are intended to assist in identifying additional potential site options - not to exclude options that are already known to provide satisfactory sites. In particular, they are not suitable for determination of whether sites are acceptable, relative site suitability or regulatory status, especially for existing sites such as Turkey Point. Additionally, the exclusionary criteria are not involved in evaluating and weighing the environmental impacts of candidate, proposed, and alternative sites.

Question 6: In response to the Staff’s RAI relating to the rationale for selecting Turkey Point as the preferred site, the applicant discussed five site features: ability to balance generation and load in Southeast Florida, unique cooling water supply source, land availability, existing nuclear power plant infrastructure, and emergency planning infrastructure.

Please provide additional detail on how these factors resulted in Turkey Point being selected as the preferred site.

Response: NRC RAI 02.01.03-3 (eRAI 7467) requested further information on the advantages that resulted in selection of Turkey Point over alternative sites with lower population density. In

its response (ADAMS Accession No. ML14336A347), FPL discussed the regulatory requirements and guidelines with respect to the siting of reactors close to populated areas, Turkey Point's ability to meet the requirements/guidelines, and the acceptability of the Turkey Point site with respect to the population density criterion in Regulatory Guide ("RG") 4.7. For background and context, a summary of these regulatory requirements/guidelines is included followed by a comprehensive discussion, as presented in the response to RAI 02.01.03-3, with respect to the acceptability of the Turkey Point site. This discussion includes greater detail with respect to the five site features pertaining to the rationale, justification, and clear advantages in selecting Turkey Point as the preferred site over the alternative sites.

Regulatory/guidance background summary presented in FPL's response to RAI 02.01.03-3:

- The requirements of 10 C.F.R. 52.79(a)(1), 10 C.F.R. 100.20(a), and 10 C.F.R. 100.21(a) provide assurance that members of the public living in the proximity of an operating reactor can either be protected or safely evacuated such that they will not be subjected to excessive radiological doses in the unlikely event of a radiological emergency.
- 10 C.F.R. 100.21(b) states that the population center distance must be at least one and one-third times the distance from the reactor to the outer boundary of the low population zone ("LPZ").
- 10 C.F.R. 100.21(h) states that reactor sites should be located away from very densely populated centers. Areas of low population density are, generally, preferred. However, in determining the acceptability of a particular site located away from a very densely populated center but not in an area of low density, consideration will be given to safety, environmental, economic, or other factors, which may result in the site being found acceptable.
- As cited in RG 4.7, 10 C.F.R. 100.20 provides factors to be considered in determining the acceptability of a site for a nuclear power reactor. Population density is one factor evaluated to determine whether physical characteristics unique to the proposed site that could pose a significant impediment to the development of emergency plans are identified. (This supports NRC's defense-in-depth philosophy that locating reactors away from densely populated centers facilitates emergency planning and preparedness, as well as reduces potential doses and property damage in the event of a severe accident.) In determining whether a site is located in a low population density area, RG 4.7 recommends that: "a reactor should be located so that, at the time of initial plant approval within about 5 years thereafter, the population density,

including weighted transient population, averaged over any radial distance out to 20 mi (cumulative population at a distance), does not exceed 500 persons per square mile.” Further, if the population density of the proposed site exceeds, but is not well in excess of the criterion, RG 4.7 recommends the analysis of alternative sites should pay particular attention to alternative sites with lower population density. Additionally, RG 4.7 provides that consideration of other factors, such as safety, environmental, or economic concerns, may result in the site with the higher population density being found acceptable.

Turkey Point site’s ability to meet the requirements/guidelines as presented in response to RAI 02.01.03-3:

The evaluations presented in the Turkey Point Units 6 & 7 Final Safety Analysis (“FSAR”) document that the Turkey Point site meets the distance to populated centers requirement and the associated dose requirements. However, the Turkey Point site does not meet the guidance presented in RG 4.7 that the population density should not exceed 500 persons per square mile at all radii within 20 miles of the site.

Acceptability of Turkey Point site evaluation with respect to RG 4.7 criterion:

Consequently, and as presented in FPL’s response to pre-hearing question 4f, to provide assurance as indicated in 10 C.F.R. Part 100 that the population density did not pose a significant impediment to the development of emergency plans, FPL placed particular emphasis on demonstrating acceptable measures for public radiological safety when assessing accidents at the Turkey Point site. The principal accident safety measures supporting a determination that, on balance, Turkey Point is an acceptable site despite its surrounding population density are as follows:

- As documented in FSAR Subsection 15.6.5.3, and AP1000 Design Control Document (“DCD”) Table 15.6.5-3, the Turkey Point site characteristics meet the radiation dose reference values for the public established in 10 C.F.R. 50.34(a)(1)(ii)(D) and 10 C.F.R. 52.79(a)(1)(vi), such that:

- An individual assumed to be located at any point on the exclusion area boundary would not receive a radiation dose in excess of 25 rem total effective dose equivalent (“TEDE”) over any 2-hour period following a postulated fission product release into the containment;
- An individual located on the outer radius of the established low population zone for the course of the postulated accident would not receive a radiation dose in excess of 25 rem TEDE.
- The population density did not pose a significant impediment to the development of emergency plans. The Turkey Point Emergency Plan and associated Evacuation Time Estimate (“ETE”) account for consequences of radiological emergencies required by 10 C.F.R. 50.47 and 10 C.F.R. Part 50, Appendix E, and FPL demonstrated acceptable measures for public radiological safety when assessing accidents at the Turkey Point site, including compliance with the radiation dose requirements in 10 C.F.R. 52.79(a)(1)(vi).
- Emergency plans are also required to be continually maintained and updated, including accounting for changes in population characteristics in the region of a nuclear plant, in accordance with 10 C.F.R. Part 50, Appendix E, IV (5), (6), and (7) as summarized below:
 - Nuclear power reactor licenses shall estimate emergency planning zone (“EPZ”) permanent resident population changes once a year, using the most recent U.S. Census Bureau annual resident population.
 - If at any time during the decennial period, the EPZ permanent resident population increases such that it causes the longest ETE value for the 2-mile zone or 5-mile zone, including all affected Emergency Response Planning Areas, or for the entire 10-mile EPZ to increase by 25 percent or 30 minutes, whichever is less, from the nuclear power reactor licensee's currently NRC approved or updated ETE, the licensee shall update the ETE analysis to reflect the impact of that population increase.
 - After an applicant for a combined license under part 52 of this chapter receives its license, the licensee shall conduct at least one review of any changes in the population of its EPZ at least 365 days prior to its scheduled fuel load.

Additionally, as provided in RAI response 02.01.03-3 and summarized in the staff’s response to pre-hearing question 4e, FPL performed an assessment in accordance with the objectives outlined in 10 C.F.R. 100.21(h) and the guidance presented in RG 4.7 for sites exceeding the 500 persons per square mile criterion. The principal considerations influencing FPL’s selection of the Turkey Point site over other alternative sites with lower nearby population densities include several unique safety, economic, reliability and environmental attribute advantages that would not be realized if the plant was developed elsewhere. Specifically, the Turkey Point site is considered to have significant advantages over the

other alternative sites with respect to the following five project features:

1. **Ability to Balance Generation and Load in Southeast Florida** (economic, reliability attributes)
 - The Turkey Point site provides generation within Miami-Dade County, closer to the load than any other alternative site, and directly addresses the projected generation/load imbalance objective of the project. Turkey Point is the only site that fully addresses this project objective. The other alternative site locations are significantly less favorable, and would lead to increased costs to maintain the standard of reliability (e.g., transmission construction, transmission losses) compared to Turkey Point.
2. **Unique Cooling Water Supply Source** (safety, reliability, and environmental attributes) – Cooling water supply for the proposed units at Turkey Point will primarily utilize reclaimed water supplied by the Miami Dade Water and Sewer Department with groundwater from radial collector wells as a backup supply. This approach to water supply – feasible and available only at Turkey Point – provides significant advantages including:
 - Safety and reliability of a dedicated water source (reclaimed water) that assures water availability with reduced impacts from variances in, e.g., climate trends, regulatory policy, or competing water uses and that reduces potential safety concerns that could result from an interruption in cooling water availability.
 - Available backup in operational supply through availability of water from the radial well system.
 - Other potential cooling water sources that could be tapped with proper regulatory approvals in emergency conditions (e.g., Biscayne Bay, existing Turkey Point cooling canal system), should emergency supplies be necessary.
 - Use of reclaimed water will enable Miami-Dade County to meet approximately one-half of its water use permit and outfall elimination requirements. In the absence of reuse opportunities, all or a significant portion of this treated domestic wastewater would likely continue to be discharged to the ocean or deep injection wells.
 - Avoidance of costs and environmental impacts associated with developing conventional (i.e., surface water, groundwater) sources that are subject to existing high demand and restrictive regulatory policy.
 - Reduced land acquisition cost and environmental impacts for construction of large-acreage cooling water lakes that would be required at sites where only conventional water supplies are available.

A potentially licensable cooling water supply plan was identified for each of the alternative sites, which confirmed that the factors listed above only apply to the Turkey Point site.

3. **Land Availability** (economic and environmental attributes) – Turkey Point is an existing nuclear power plant site with room for expansion. As such, the costs associated with procurement of new lands and/or gaining new land use approvals is minimized. Additionally, any cooling water storage reservoir at the Turkey Point site would be significantly smaller than would be required at greenfield sites, thereby avoiding both additional cost and environmental impacts.
4. **Existing Nuclear Power Plant Infrastructure** (safety, economic, and environmental attributes) – As an operating nuclear power plant site, Turkey Point has a fully developed nuclear plant infrastructure that can be utilized for development of the new units, thus minimizing the costs associated with new infrastructure development. Specific aspects of the existing Turkey Point infrastructure that benefit new unit development are:
 - Heavy haul access identified within the existing FPL property boundary requiring reduced infrastructure development due to the presence of existing features necessitating upgrades/improvements.
 - Road transportation infrastructure that would require limited non-permanent improvements to accommodate the additional site workforce.
 - Security program and infrastructure common to areas outside of the proposed Turkey Point Units 6 & 7 protected area.
 - Existing nuclear workforce of construction, maintenance, and operations personnel available to support the construction, testing, and operation of Turkey Point Units 6 & 7.

Each of these factors favor the Turkey Point site because of reduced or avoided costs for new infrastructure development, as well as providing the ability to take advantage of staff institutional knowledge and experience developed over the years of existing unit operation at Turkey Point.

5. **Emergency Planning Infrastructure** (safety and economic attributes) – As an operating nuclear power plant site, Turkey Point has in place an approved emergency plan, with associated established agreements and relationships with local emergency response agencies. FPL notes that this existing infrastructure already takes into account the population densities and distributions in the vicinity of the Turkey Point site. Significant safety and cost advantages accrue from the ability to use a proven emergency planning infrastructure for the new units, versus developing and demonstrating programs at a new site.

Project features one and two are critical to achieving FPL's project objectives, with the

accompanying safety, reliability, economic and environmental attribute advantages applying solely to the Turkey Point site. Project features three through five apply to some degree at multiple alternative sites (e.g., project feature four applies at the St. Lucie alternative site). However, all project features and their associated attribute advantages are available only at the Turkey Point site. This superlative result is the reason FPL selected the Turkey Point site above other alternative sites, when considering population density.

In FPL's site selection process, these factors were functionally taken into account in an analysis conducted by a multi-disciplinary team of FPL professionals with specific expertise, experience, and ongoing involvement in the areas being evaluated as described in the Augmented Site Selection Report, Section 7.1. In this point-scored analysis, Turkey Point ranked equal to or better than all of the other candidate sites and so was the obvious choice as the preferred site, as detailed above. Further, in the subsequent evaluation and comparison of the environmental impacts of the preferred and alternative sites, none of the alternatives was found to be environmentally preferable to Turkey Point.

Question 8: Please identify each conservatism in the design basis flood calculation and the associated storm surge margins they provide.

Response: As summarized in FSAR Section 2.4.5, the design basis flood ("DBF") elevation at Turkey Point Units 6 & 7 is governed by the probable maximum storm surge ("PMSS") due to a probable maximum hurricane ("PMH") approaching the Units 6 & 7 site from the Atlantic Ocean. The DBF elevation is evaluated following NRC regulations and guidance (e.g., 10 C.F.R. 50, Appendix A, General Design Criteria 2, Regulatory Guide 1.59, NUREG-0800 Section 2.4.5 and Interim Staff Guidance JLD-ISG-2012-06) and considers various components contributing to the PMSS elevation.

The approach adopted in the determination of the DBF elevation for the Turkey Point Units 6 &

7 site documented in FSAR Section 2.4.5 includes a number of conservatisms and associated margins that are described below:

PMH Parameters:

The PMSS resulting from a PMH event is estimated following a deterministic approach where the PMH parameters were selected from the NOAA Technical Report NWS 23 (FSAR Section 2.4.5 Reference 201). Following the guidance in NUREG-0800 Section 2.4.5, the analysis used a combination of the PMH parameters including hurricane peripheral pressure, central pressure, radius of maximum winds, forward speed and track direction that resulted in the highest storm surge level at the Units 6 & 7 site.

Antecedent Water Level:

Following RG 1.59, the 10 percent exceedance high spring tide, which is defined as the high tide level equaled or exceeded by 10 percent of the maximum monthly tides over a continuous 21-year period, shall be used to establish the antecedent water level. The 10 percent exceedance high spring tide at the Virginia Key, Florida station is calculated to be 1.43 feet NAVD 88 and at Key West, Florida station is calculated to be 0.97 foot NAVD 88 based on available data records (15 years of record for Virginia Key station from 1994 to 2008 and 38 years of record for Key West station from 1971 to 2008). Additionally, RG 1.59 provides a water level of 2.6 feet NAVD 88 for Miami Harbor Entrance that includes the 10 percent exceedance high spring tide level and the initial rise. The PMSS evaluation for the Units 6 & 7 site adopted an antecedent water level of 2.6 feet NAVD 88, which is 1.2 feet higher than the 10 percent exceedance high spring tide level at the Virginia Key, Florida station.

Storm Surge Height:

The storm surge levels at the Units 6 & 7 site are simulated by the NOAA Sea, Lake, and Overland Surge from Hurricanes (“SLOSH”) model. The simulated maximum storm surge level was then adjusted by an additional 20 percent of calculated surge height. The 20 percent adjustment is based on the uncertainty assessment of SLOSH model predictions reported in NOAA Technical Report NWS 48, "SLOSH: Sea, Lake, and Overland Surges from Hurricanes" (FSAR Section 2.4.5 Reference 205). FSAR Figure 2.4.5-211 presents a comparison of observed storm surge heights and SLOSH predictions. This figure, which is adopted from NWS 48 (FSAR Section 2.4.5 Reference 205), shows that the SLOSH model mostly over predicts the storm surge height for large storm surges. The 20 percent adjustment of surge height for the site, equal to 2.9 feet, therefore, constitutes an additional conservatism to the PMSS estimate.

Wave Run-up:

The PMH storm surge is combined with coincidental wind-wave actions to obtain the PMSS elevation. The wave run-up on the plant finish grade elevation is estimated assuming the waves approaching the site would correspond to the maximum storm surge water depth and would be at breaking wave height when impacting the retaining wall surrounding the site. This assumption conservatively precludes wave dissipation that likely would reduce wave height prior to reaching the retaining wall.

Sea Level Rise:

The above conservatisms are provided in addition to the nominal 1 foot sea level rise included in the PMSS determination. Extrapolation of the historical tide gage observations near the site yielded a sea level rise of 0.78 foot over 100 years, which was rounded up to 1 foot, considering

the plant life of 60 years.

Plant Grade Elevation:

The selected plant grade elevation for Turkey Point Units 6 & 7 is 26.0 feet NAVD 88, providing a margin of 1.2 feet above the conservatively estimated PMSS elevation of 24.8 feet NAVD 88.

In conclusion, the conservatisms and margin applied in the selection of the plant grade elevation are; 1.2 feet on the antecedent water level, 2.9 feet on simulated storm surge height, and 1.2 feet on the plant grade elevation, totaling 5.3 feet. These quantified conservatisms are in addition to the selection of PMH parameters that resulted in the highest storm surge level at the Units 6 & 7 site and conservatism in the wave run-up calculation. To put the overall conservatism into perspective, the design basis PMSS elevation of 24.8 feet NAVD 88 is more than 9 feet higher than the highest observed storm surge produced in Florida by the Category 5 Hurricane Andrew.

Respectfully submitted,

/Signed electronically by Anne R. Leidich/

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Dated: January 9, 2018

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CERTIFICATION

I, William Maher, am responsible for the responses to the above questions. I certify that these answers were prepared by me or under my direction, and I adopt the answers as part of my sworn testimony in this proceeding. I hereby certify under penalty of perjury that the forgoing is true and complete to the best of my knowledge, information, and belief.

/Executed in Accord with 10 C.F.R. § 2.304(d)/

William Maher

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Dated at Juno Beach, FL
this 9th day of January, 2018

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

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CERTIFICATE OF SERVICE

I hereby certify that the foregoing Florida Power & Light Company's Responses to Post-Hearing Questions, and accompanying Certification, have been served through the E-Filing system on the participants in the above-captioned proceeding, this 9th day of January, 2018.

/Signed electronically by Anne R. Leidich/

Anne R. Leidich