

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Kristine L. Svinicki, Chairman  
Jeff Baran  
Stephen G. Burns

In the Matter of

FLORIDA POWER & LIGHT CO.

(Turkey Point Nuclear Generating Units 6 and 7)

Docket Nos. 52-040-COL  
52-041-COL

**CLI-18-01**

**MEMORANDUM AND ORDER**

On December 12, 2017, we held a hearing on Florida Power & Light Company's (FPL) application for combined licenses (COLs) to construct and operate two new nuclear power units at the existing Turkey Point site in Miami-Dade County, Florida. In this uncontested proceeding, we consider whether the review of the application by the NRC Staff has been adequate to support the findings set forth in 10 C.F.R. §§ 52.97(a) and 51.107(a). As discussed below, we conclude that the Staff's review was sufficient to support the regulatory findings, and we authorize issuance of the combined licenses.

## I. BACKGROUND

### A. Proposed Action

In June 2009, FPL applied to build two AP1000 advanced passive pressurized water reactor units at the Turkey Point site.<sup>1</sup> The proposed Units 6 and 7 would be built on the site that contains the existing Turkey Point Units 3 and 4.<sup>2</sup> The site also has two natural gas/oil steam electric generating units (Units 1 and 2) and one natural gas, combined-cycle, steam electric generating unit (Unit 5).<sup>3</sup>

Consistent with 10 C.F.R. Part 52, Appendix D, FPL's combined license application references Revision 19 of the AP1000 certified design.<sup>4</sup> The first combined license application for a given design is designated the "reference COL" application (RCOLA) and later applications referencing the same design are designated "subsequent COL" applications (SCOLA). Where the Staff has already resolved an issue with respect to the RCOLA, the Staff's review of the same issue (a "standard issue") in an SCOLA consists of confirming that the information is identical in both applications and that there are no site-specific issues that require further

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<sup>1</sup> Florida Power & Light Company; Acceptance for Docketing of an Application for Combined License for Turkey Point Units 6 & 7 Nuclear Power Plants, 74 Fed. Reg. 51,621 (Oct. 7, 2009).

<sup>2</sup> Ex. NRC-008, Florida Power and Light Company, Application for Combined Licenses for Turkey Point Units 6 and 7, Part 1, General and Financial Information, rev. 8 (Aug. 2016), at 1 (ADAMS accession no. ML17348A665) (Application).

<sup>3</sup> *Id.* Units 1 and 2 have been converted to operate in synchronous condenser mode, which helps stabilize and optimize grid performance rather than generate power to serve load. Tr. at 32 (Mr. Franzone); Ex. NRC-007, "Environmental Impact Statement for Combined Licenses for Turkey Point Nuclear Plant, Units 6 and 7" (Final Report), NUREG-2176, vols. 1-4 (Oct. 2016), at 2-1 (ML17348A663) (Final EIS).

<sup>4</sup> See Ex. NRC-008, Application, at 3; see *also* Westinghouse AP1000 Design Control Document, rev. 19 (June 20, 2011) (ML11171A500 (package)). The certified design is codified in 10 C.F.R. Part 52, Appendix D, "Design Certification Rule for the AP1000 Design."

consideration. The application for Vogtle Units 3 and 4 was designated as the RCOLA for the AP1000 design; the Turkey Point application is therefore considered an SCOLA.<sup>5</sup> The Staff's safety review did not address issues resolved in connection with the AP1000 design certification, except where FPL sought exemptions or departures from the certified design.<sup>6</sup> The Turkey Point application is the only remaining application referencing the AP1000 design currently before the Commission.<sup>7</sup>

FPL's application does not reference an early site permit. Therefore, all site characteristics, including site geology, hydrology, seismology, and man-made hazards, as well as the potential environmental impacts of the project, were considered during the review of the combined license application.

The Staff spent approximately 89,000 hours on the safety and environmental reviews of the application.<sup>8</sup> Over the course of its review, the Staff conducted approximately 80 public meetings and teleconferences.<sup>9</sup> FPL responded to 516 requests for additional information, 340

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<sup>5</sup> See Ex. NRC-001, "Staff Statement in Support of the Uncontested Hearing for Issuance of Combined Licenses for Turkey Point Units 6 and 7 (Docket Nos. 52-040 and 52-041)," Commission Paper SECY-16-0136 (Dec. 2, 2016), at 3-4 (ML17348A656) (Staff Information Paper).

<sup>6</sup> Safety matters resolved at the design certification stage are generally excluded from our review of FPL's combined license application. 10 C.F.R. § 52.63.

<sup>7</sup> Tr. at 54 (Ms. Ordaz). The Commission has issued eight COLs for units referencing the AP1000 design. *Id.* (Ms. Ordaz). These units are Vogtle Electric Generating Plant, Units 3 and 4; Virgil C. Summer Nuclear Station, Units 2 and 3; Levy Nuclear Plant, Units 1 and 2; and William States Lee III Nuclear Station, Units 1 and 2.

<sup>8</sup> *Id.* at 51 (Ms. Ordaz). Contractors working in collaboration with the Staff contributed over 16,000 hours to support the safety and environmental reviews. *Id.* (Ms. Ordaz).

<sup>9</sup> *Id.* (Ms. Ordaz).

of which were associated with the safety review and 176 of which were associated with the environmental review.<sup>10</sup>

Staff from across the agency contributed to the Office of New Reactors' technical review of FPL's application.<sup>11</sup> The U.S. Army Corps of Engineers (Corps) participated with the Staff as a cooperating agency in preparing the environmental impact statement associated with the application under the terms of an existing Memorandum of Understanding.<sup>12</sup> The Corps participated in site visits, consultations with other agencies, and development of the draft and final environmental impact statements.<sup>13</sup> The National Park Service also participated in the environmental review as a cooperating agency under a Memorandum of Agreement and provided special expertise for the areas in and around the adjacent Biscayne and Everglades National Parks.<sup>14</sup> Both the NRC and the Corps made the impact determinations in the Final Environmental Impact Statement (Final EIS).<sup>15</sup>

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<sup>10</sup> *Id.* (Ms. Ordaz).

<sup>11</sup> *Id.* at 52 (Ms. Ordaz).

<sup>12</sup> *Id.* at 59 (Ms. Dixon-Herrity); Ex. NRC-007, Final EIS, at 1-1; see Memorandum of Understanding Between U.S. Army Corps of Engineers and U.S. Nuclear Regulatory Commission on Environmental Reviews Related to the Issuance of Authorizations to Construct and Operate Nuclear Power Plants (effective Sept. 12, 2008) (ML082540354).

<sup>13</sup> Tr. at 60 (Ms. Dixon-Herrity).

<sup>14</sup> *Id.* at 53 (Ms. Ordaz), 60 (Ms. Dixon-Herrity); Ex. NRC-007, Final EIS, at 1-3; see Memorandum of Agreement Between the U.S. Army Corps of Engineers, Jacksonville District, the U.S. National Park Service, Southeast Region, and the U.S. Nuclear Regulatory Commission, Office of New Reactors on the Environmental Review Related to the Issuance of Authorizations to Build and Operate Turkey Point Nuclear Plant, Units 6 and 7 (effective July 15, 2013) (ML12172A375).

<sup>15</sup> Tr. at 60 (Ms. Dixon-Herrity); see *also* Ex. NRC-007, Final EIS, at 1-3.

In addition, the Staff consulted with federal, state, local, and tribal organizations and governments concerning a variety of issues, including those arising under the National Environmental Policy Act of 1969 (NEPA), the National Historic Preservation Act (NHPA), and the Endangered Species Act.<sup>16</sup> The Advisory Committee on Reactor Safeguards (ACRS), a committee of technical experts, provided us with an independent assessment of the safety aspects of FPL's application.<sup>17</sup>

## **B. Review Standards**

Section 189a. of the Atomic Energy Act of 1954, as amended (AEA) requires that we hold a hearing on each application to construct a nuclear power plant, regardless of whether an interested member of the public requests a hearing on the application.<sup>18</sup> With respect to safety matters, we must determine whether

- (1) the applicable standards and regulations of the AEA and the Commission's regulations have been met;
- (2) any required notifications to other agencies or bodies have been duly made;
- (3) there is reasonable assurance that the facility will be constructed and will operate in conformity with the licenses, the provisions of the AEA, and the Commission's regulations;
- (4) the applicant is technically and financially qualified to engage in the activities authorized by the licenses; and
- (5) issuance of the licenses will not be inimical to the common defense and security or to the health and safety of the public.<sup>19</sup>

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<sup>16</sup> Tr. at 52-53 (Ms. Ordaz); see Ex. NRC-007, Final EIS, apps. B & C.

<sup>17</sup> Atomic Energy Act of 1954, as amended (AEA), § 182b., 42 U.S.C. § 2232(b); 10 C.F.R. §§ 1.13, 52.87; see Letter from Dennis C. Bley, ACRS, to Stephen G. Burns, NRC (Sept. 16, 2016) (ML16257A535) (generally recommending approval of the combined license application).

<sup>18</sup> AEA § 189a., 42 U.S.C. § 2239(a).

<sup>19</sup> 10 C.F.R. § 52.97(a)(1).

With respect to environmental matters, we must

- (1) determine whether the requirements of NEPA section 102(2)(A), (C), and (E), and the applicable regulations in 10 C.F.R. Part 51 (the NRC regulations implementing NEPA) have been met;
- (2) independently consider the final balance among conflicting factors contained in the record of the proceeding with a view to determining the appropriate action to be taken;
- (3) determine, after weighing the environmental, economic, technical, and other benefits against environmental and other costs, and considering reasonable alternatives, whether the combined licenses should be issued, denied, or appropriately conditioned to protect environmental values; and
- (4) determine whether the NEPA review conducted by the NRC Staff has been adequate.<sup>20</sup>

We do not review FPL's application *de novo*; rather, our inquiry is whether the Staff's review was sufficient to support these findings.<sup>21</sup>

### **C. Contested Proceeding**

To provide context for the mandatory hearing, this section recounts a brief history of the contested proceeding, which spanned from 2010 to 2017 and involved both site-specific litigation and petitions affecting multiple dockets. After the Staff accepted the combined license application for review, the NRC provided an opportunity to challenge the application in an adjudicatory hearing.<sup>22</sup> Three petitions to intervene were filed at that time by (1) Mark

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<sup>20</sup> *Id.* § 51.107(a).

<sup>21</sup> See, e.g., *Southern Nuclear Operating Co.* (Vogtle Electric Generating Plant, Units 3 and 4), CLI-12-2, 75 NRC 63, 74 (2012).

<sup>22</sup> Florida Power & Light Company, Combined License Application for the Turkey Point Units 6 & 7, Notice of Hearing, Opportunity To Petition for Leave To Intervene and Associated Order Imposing Procedures for Access to Sensitive Unclassified Non-Safeguards Information and Safeguards Information for Contention Preparation, 75 Fed. Reg. 34,777 (June 18, 2010).

Oncavage, Dan Kipnis, the Southern Alliance for Clean Energy, and the National Parks Conservation Association (collectively, the Joint Intervenors); (2) Citizens Allied for Safe Energy, Inc. (CASE); and (3) the Village of Pinecrest, a Florida municipality, which also requested, in the alternative, to participate as an interested local government under 10 C.F.R. § 2.315(c).<sup>23</sup> The Atomic Safety and Licensing Board granted a hearing to the Joint Intervenors and CASE.<sup>24</sup>

Joint Intervenors' NEPA Contention 2.1 was admitted in part, and the Board held an evidentiary hearing in May 2017 on that contention.<sup>25</sup> Joint Intervenors challenged the Staff's conclusion that the environmental impacts from the operation of FPL's proposed deep injection wells would be "small" and claimed that four chemical constituents in the wastewater may adversely impact the groundwater if they migrate to the Upper Floridan Aquifer.<sup>26</sup> The Board resolved the contention in favor of the Staff.<sup>27</sup> The Board concluded that the Staff demonstrated "that the environmental impacts . . . will be 'small' because (1) the wastewater is unlikely to migrate to the Upper Floridan Aquifer; and (2) even if it did, the concentration of each of the four

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<sup>23</sup> *[Joint Intervenors'] Petition for Intervention* (Aug. 17, 2010); *Citizens Allied for Safe Energy, Inc. [Revised] Petition to Intervene and Request for a Hearing* (Aug. 17, 2010); *Petition by the Village of Pinecrest, Florida, for Leave to Intervene in a Hearing on Florida Power & Light Company's Combined Construction and Operating License Application for Turkey Point Units 6 & 7, or in the Alternative, Participate as a Non-Party Local Government* (Aug. 16, 2010).

<sup>24</sup> LBP-11-6, 73 NRC 149, 165 (2011). The Village of Pinecrest participated in the contested proceeding as an interested local government.

<sup>25</sup> LBP-17-5, 86 NRC 1, 5, 13 n.17 (2017).

<sup>26</sup> See LBP-16-3, 83 NRC 169, 186 (2016). Aspects of FPL's proposed use of deep well injection for liquid radioactive waste disposal not covered by the Board's ruling are discussed further in section II.B.1.b.

<sup>27</sup> LBP-17-5, 86 NRC at 5.

contaminants would be below the applicable United States Environmental Protection Agency (EPA) primary drinking water standard and, accordingly, would pose no known health risk.”<sup>28</sup>

CASE’s Contentions 6 and 7 also were admitted in part. In Contention 6 CASE challenged the adequacy of FPL’s consideration, in its environmental report (ER), of the environmental impacts of long-term onsite storage of low-level radioactive waste at proposed Units 6 and 7, and in Contention 7 CASE challenged the application’s discussion of safety matters arising from such storage.<sup>29</sup> After FPL revised its application to address these issues, the Board dismissed both contentions.<sup>30</sup> Subsequently, the Board denied newly proffered contentions from CASE related to low-level radioactive waste storage and also dismissed CASE from the proceeding.<sup>31</sup>

In April 2011, Joint Intervenors, CASE, and the Village of Pinecrest joined several petitioners across multiple dockets in the filing of a petition to suspend reactor licensing and rulemaking decisions and for other relief in light of the March 2011 Fukushima Dai-ichi accident

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<sup>28</sup> *Id.* Joint Intervenors did not seek review of the Board’s decision.

<sup>29</sup> LBP-11-6, 73 NRC at 238, 243.

<sup>30</sup> Licensing Board Order (Granting FPL’s Motions to Dismiss Joint Intervenors’ Contention 2.1 and CASE’s Contention 6 as Moot) (Jan. 26, 2012), at 3 (unpublished) (January 2012 Board Order); LBP-12-4, 75 NRC 213, 217 (2012) (granting FPL’s motion for summary disposition of Contention 7). FPL’s revised ER analyzed and discussed the four wastewater chemical constituents that were omitted from the previous version of the ER. January 2012 Board Order at 4. FPL also revised its application to provide its plan, if needed, for controlling radiation exposures from extended onsite storage of low-level radioactive waste. LBP-12-4, 75 NRC at 220.

<sup>31</sup> LBP-12-7, 75 NRC 503, 504-05 (2012).



in Japan.<sup>32</sup> We denied the petitions in all but two respects: we granted the request for a safety analysis of the accident based on the NRC's plans for a short-term and long-term lessons-learned review, and we referred portions of the petition relating to pending design certification applications, including the AP1000 amendment, to the Staff as comments on the design certification rulemakings.<sup>33</sup>

CASE later sought reconsideration of three contentions based, in part, on new information related to the Fukushima accident; CASE also submitted two new contentions based on recommendations made by the NRC's Fukushima Near-Term Task Force.<sup>34</sup> The Board denied CASE's requests.<sup>35</sup> At that time Joint Intervenor and CASE also joined

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<sup>32</sup> *Emergency Petition to Suspend All Pending Reactor Licensing Decisions and Related Rulemaking Decisions Pending Investigation of Lessons Learned from Fukushima Daiichi Nuclear Power Station Accident* (revised Apr. 18, 2011).

<sup>33</sup> *Union Electric Co. d/b/a Ameren Missouri* (Callaway Plant, Unit 2), CLI-11-5, 74 NRC 141, 150 n.19, 175-76 (2011). The Staff responded to these comments in the Statement of Considerations for the final rules. See AP1000 Design Certification Amendment; Final Rule, 76 Fed. Reg. 82,079, 82,081 (Dec. 30, 2011); "NRC Responses to Public Comments, Final Rule: Amendment to AP1000 Design Certification Rule, 10 CFR Part 52, Appendix D" (Dec. 2011), at 9 n.1 (ML113480018); see also *Economic Simplified Boiling-Water Reactor Design Certification*; Final Rule, 79 Fed. Reg. 61,944, 61,946 (Oct. 15, 2014). The NRC has since taken significant action to enhance the safety of U.S. reactors based on the lessons learned from the Fukushima accident. See, e.g., *Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, EA-12-049 (Mar. 12, 2012) (ML12054A735); *Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, EA-12-051 (Mar. 12, 2012) (ML12056A044). See generally <https://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard.html> (last visited Mar. 19, 2018).

<sup>34</sup> *Citizens Allied for Safe Energy, Inc. Motion For Reconsideration of Amended Contentions 1, 2 and 5 And New Contentions Following Fukushima Near-Term Task Force Recommendations* (dated Aug. 11, 2011, filed Aug. 12, 2011). CASE had submitted the contentions, which pertained to emergency planning and climate-change-related sea-level rise, as part of its initial intervention petition.

<sup>35</sup> *Order (Denying CASE's Motion to Reconsider Rejection of Amended Contentions and to Admit Two Newly Proffered Contentions, and Denying FPL's Request to Impose Remedial*

petitioners from other dockets to file a new contention asserting that the Task Force's lessons-learned report had raised new and significant information concerning the environmental risks associated with nuclear power plants.<sup>36</sup> The Board rejected the motions.<sup>37</sup> Relatedly, in early 2014, several petitioners sought to suspend reactor licensing decisions pending the resolution of a petition for rulemaking concerning the environmental impacts of the expedited transfer of spent fuel from the spent fuel pool to dry cask storage. We denied the suspension petitions and provided direction on related requests.<sup>38</sup>

In response to the D.C. Circuit's vacatur and remand of the agency's Waste Confidence Decision Update and Temporary Storage Rule in 2012, "placeholder" contentions were filed on

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Measures on CASE) (Sept. 21, 2011), at 1-2 (unpublished); see LBP-11-15, 73 NRC 629 (2011).

<sup>36</sup> *Motion to Admit New Contention Regarding the Safety and Environmental Implications of the Nuclear Regulatory Commission Task Force Report on the Fukushima Dai-ichi Accident* (Aug. 11, 2011); *Contention Regarding NEPA Requirement to Address Safety and Environmental Implications of the Fukushima Task Force Report* (Aug. 11, 2011).

<sup>37</sup> LBP-11-33, 74 NRC 675, 677-78 (2011). The Commission also denied CASE's petition for rulemaking (filed by petitioners in multiple dockets) requesting that the NRC rescind its regulations that "reach generic conclusions about the environmental impacts of severe reactor and/or spent fuel pool accidents and therefore prohibit considerations of those impacts in reactor licensing proceedings." *Environmental Impacts of Severe Reactor and Spent Fuel Pool Accidents*; *Petition for rulemaking*; *Denial*, 80 Fed. Reg. 48,235, 48,235 (Aug. 12, 2015); *Rulemaking Petition to Rescind Prohibition Against Consideration of Environmental Impacts of Severe Reactor and Spent Fuel Pool Accidents and Request to Suspend Licensing Decision* (Aug. 12, 2011).

<sup>38</sup> See *DTE Electric Co. (Fermi Nuclear Power Plant, Unit 3)*, CLI-14-7, 80 NRC 1, 10 (2014) (directing the Staff to deny the rulemaking petitioners' collateral request to suspend licensing decisions on all other pending proceedings and directing the Staff to seek Commission approval if it determined that suspension of NRC rules or the environmental assessments considering severe accident mitigation design alternatives was necessary). The NRC later denied the petition for rulemaking. See *Generic Determinations Regarding the Environmental Impacts of Spent Fuel Storage and Disposal When Considering Nuclear Power Reactor License Applications*; *Petition for rulemaking*; *Denial*, 81 Fed. Reg. 31,532 (May 19, 2016).

multiple dockets, including this one, asserting that the agency could not issue licenses until it had resolved the deficiencies identified by the court. We granted the petitions in part—we suspended final licensing decisions until the court’s remand was appropriately addressed and held in abeyance any related contentions, including the proposed contention filed by both Joint Intervenors and CASE on this docket.<sup>39</sup> We lifted the suspension on final licensing decisions in August 2014, after we approved a generic environmental impact statement and final Continued Storage Rule that addressed the issues in the remand.<sup>40</sup> We dismissed the proposed contention as a challenge to the new rule and also dismissed, or directed the Boards to dismiss, the other pending contentions.<sup>41</sup> CASE, the Southern Alliance for Clean Energy, and the National Parks Conservation Association thereafter also joined in petitions, filed in multiple dockets, relating to both the safety aspects and environmental impacts of continued storage of spent fuel, which we denied.<sup>42</sup>

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<sup>39</sup> *Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC* (Calvert Cliffs Nuclear Power Plant, Unit 3), CLI-12-16, 76 NRC 63, 67-69 (2012).

<sup>40</sup> *Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC* (Calvert Cliffs Nuclear Power Plant, Unit 3), CLI-14-8, 80 NRC 71, 74-75 (2014). *See generally* Continued Storage of Spent Nuclear Fuel; Final Rule, 79 Fed. Reg. 56,238 (Sept. 19, 2014); Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel, 79 Fed. Reg. 56,263 (Sept. 19, 2014); “Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel” (Final Report), NUREG-2157, vols. 1 & 2 (Sept. 2014) (ML14196A105 and ML14196A107).

<sup>41</sup> Joint Intervenors and CASE each sought to have admitted a waste confidence contention. Following our direction in CLI-14-8, the Board rejected their motions (and again dismissed CASE from the contested proceeding). Licensing Board Order (Denying Waste Confidence Contention Motions and Dismissing CASE) (Sept. 10, 2014), at 3 (unpublished). Thereafter, CASE submitted another petition to intervene and contentions challenging the adequacy of the Draft EIS, which the Board denied. Licensing Board Order (Denying CASE’s Petition to Intervene) (June 25, 2015), at 1 (unpublished).

<sup>42</sup> *DTE Electric Co.* (Fermi Nuclear Power Plant, Unit 3), CLI-15-4, 81 NRC 221, 240, 242 (2015) (finding that the Commission is not required, under the Atomic Energy Act, to make predictive

Petitioners continued to raise hydrology issues throughout the contested proceeding. The City of Miami filed a petition to intervene after the initial deadline and submitted three contentions, which the Board denied, but Miami was granted the right to participate as an interested local government under 10 C.F.R. § 2.315(c).<sup>43</sup> In late 2016, CASE proposed four new contentions based on the Final EIS; the Board denied its petition.<sup>44</sup>

Finally, in April 2017, three Florida municipalities—the City of Miami, Village of Pinecrest, and City of South Miami—jointly sought a hearing.<sup>45</sup> These petitioners proposed one contention challenging the financial qualifications of FPL, based primarily on Westinghouse

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findings regarding the technical feasibility of spent fuel disposal as part of its reactor licensing decisions).

<sup>43</sup> One of Miami's contentions was virtually identical to Joint Intervenors' Contention 2.1. See LBP-15-19, 81 NRC 815, 822 (2015), *appeal denied as premature* by CLI-16-1, 83 NRC 1, 9 (2016) (holding that the City of Miami could appeal its party status at the end of the proceeding pursuant to 10 C.F.R. § 2.341(b)). The City of Miami did not renew its appeal.

<sup>44</sup> The proposed contentions related to the use of reclaimed water for cooling; the possible use of injection wells that draw water from the Upper Floridan Aquifer; injecting effluent into the Boulder Zone; and the Staff's compliance with NEPA. *Citizens Allied for Safe Energy Petition to Intervene and Request for a Hearing in Opposition to the Final Report EIS Granting [Combined Licenses] for Turkey Point Units 6 & 7* (Nov. 28, 2016), at 4; see LBP-17-2, 85 NRC 14, 17 (2017). CASE did not appeal.

<sup>45</sup> *Petition for Leave to Intervene in a Hearing on Florida Power & Light Company's Combined Construction and Operating License Application for Turkey Point Units 6 & 7 and File a New Contention* (Apr. 18, 2017). The City of Miami and Village of Pinecrest, as noted above, already were participating in the contested proceeding as interested local governments. The City of South Miami had not previously intervened in the proceeding.

Both Miami and South Miami have submitted comments for the mandatory hearing raising issues similar to those in their intervention petition; we have taken these comments under advisement. See *The City of Miami's ("City") Statement of Issues or Questions for Consideration by the United States Nuclear Regulatory Commission at the Evidentiary Hearing in the Uncontested Portion of FPL's COLA for Turkey Point Units 6 and 7* (Jan. 4, 2017), at 3, ex. A, Affidavit of Mark W. Crisp, P.E., at 5-7 (ML17004A280); Letter from Philip K. Stoddard, City of South Miami, to Annette L. Vietti-Cook, NRC (Jan. 4, 2017), at 3-5 (ML17004A181).

Electric Company's declaration of bankruptcy the previous month.<sup>46</sup> The Board found that the petitioners' contention failed to satisfy the contention admissibility standards.<sup>47</sup> In short, the Board found that neither of the petitioners' two arguments supporting the contention—that FPL would be unable to recover construction costs from Florida and that Westinghouse's bankruptcy would make it more difficult for FPL to secure external sources of funding for construction costs—raised a genuine dispute on a material issue of law or fact.<sup>48</sup> With this decision, the Board terminated the contested proceeding.<sup>49</sup>

#### **D. The Uncontested Proceeding**

All safety and environmental matters relevant to the combined license application, except those resolved in the contested proceeding, are subject to our review in the uncontested proceeding.<sup>50</sup> The uncontested portion of the proceeding begins once the Staff has completed both its environmental and safety reviews. Here, the Final EIS was published in October 2016, and the Final Safety Evaluation Report was completed in November 2016.<sup>51</sup> We then received

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<sup>46</sup> LBP-17-6, 86 NRC 37, 41 (2017).

<sup>47</sup> *Id.*

<sup>48</sup> *Id.* at 49-50.

<sup>49</sup> *Id.* at 54. The City of South Miami appealed the decision; we affirmed. CLI-17-12, 86 NRC \_\_, \_\_ (Dec. 11, 2017) (slip op. at 1).

<sup>50</sup> See, e.g., *Vogtle*, CLI-12-2, 75 NRC at 68.

<sup>51</sup> Tr. at 50 (Ms. Ordaz). After publication of the Final EIS, the Staff identified fifty-nine comment letters received during the comment period that were inadvertently excluded from consideration in the Final EIS. Tr. at 62 (Ms. Dixon-Herrity); Ex. NRC-007A, "Environmental Impact Statement for Combined Licenses for Turkey Point Nuclear Plant, Units 6 and 7," NUREG-2176, supp. 1 (Dec. 2016), at iii-iv (ML17348A664) (Supplemental EIS). The Staff considered each of these comments and determined that each was either (1) identical or similar to other comments to which the Staff responded in Appendix E of the Final EIS, or (2) did not raise a significant environmental matter. Ex. NRC-001, Staff Information Paper, at 33 n.5. While none of these

the Staff's statement in support of the uncontested hearing, which serves as the Staff's initial testimony and provides an overview of its safety and environmental review of the application.<sup>52</sup> Consistent with the design-centered review approach, the Staff's statement focused on "[n]on-routine matters . . . that relate to any unique features of the facility or novel issues that arose as part of the review process."<sup>53</sup>

In its statement, the Staff indicated that its required consultations pursuant to section 7 of the Endangered Species Act with the U.S. Fish and Wildlife Service (FWS) and with the National Marine Fisheries Service (NMFS) had not yet concluded.<sup>54</sup> We therefore rescheduled the hearing to take place after the Staff had completed those consultations.<sup>55</sup> We further extended the mandatory hearing schedule to account for the interruption in FPL's hearing activities caused by Hurricane Irma.<sup>56</sup> We issued a revised Notice of Hearing on October 10, 2017, which set a schedule for pre-hearing filings.<sup>57</sup> In the notices of hearing, we invited

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comments changed the review team's analyses or conclusions in the Final EIS, the Staff nonetheless issued a supplement to the Final EIS. Tr. at 62-63 (Ms. Dixon-Herrity); Ex. NRC-007A, Supplemental EIS, at iii.

<sup>52</sup> See Ex. NRC-001, Staff Information Paper, at 2.

<sup>53</sup> *Id.*

<sup>54</sup> *Id.* at 5-6, 26.

<sup>55</sup> See CLI-17-1, 85 NRC 1, 2 (2017); see also Florida Power and Light Company; Turkey Point, Units 6 and 7; Combined License Application; Hearing, 81 Fed. Reg. 89,995 (Dec. 13, 2016); Florida Power and Light Company; Turkey Point, Units 6 and 7, Combined License Application; Revised Notice of Hearing, 82 Fed. Reg. 34,995 (July 27, 2017).

<sup>56</sup> Order of the Secretary (Sept. 12, 2017), at 1 (unpublished).

<sup>57</sup> Florida Power and Light Company; Turkey Point, Units 6 and 7; Combined License Application; Revised Notice of Hearing, 82 Fed. Reg. 47,044 (Oct. 10, 2017); see also Order of the Secretary (Oct. 11, 2017) (unpublished).

interested states, local government bodies, and federally recognized Indian tribes to provide a statement of issues for us to consider as part of the uncontested proceeding.<sup>58</sup> We also issued pre-hearing questions to both the Staff and FPL and received their written responses prior to the hearing.<sup>59</sup>

The hearing presentations were made by witness panels.<sup>60</sup> The first panel of witnesses for FPL and the Staff gave an overview of the license application and the Staff's review, respectively. The second panel focused on safety issues, and the third panel focused on environmental issues. Overall, the Staff made available sixty-nine witnesses at the hearing,

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<sup>58</sup> In response to the original notice of hearing's solicitation for comments from affected state, local, and tribal governments, a number of entities, including sister federal agencies, local government entities, and a tribal government, submitted comments related to FPL's combined license application. We received and took under advisement letters from Miami-Dade County (ML17003A357, resubmitted on Aug. 23, 2017), the Florida Keys Aqueduct Authority (ML17003A428, resubmitted on Aug. 7, 2017), the Seminole Tribe of Florida (ML17006A140), the City of Miami (ML17004A280), the City of South Miami (ML17004A181 and ML17242A185), and Monroe County (ML17243A336 and ML17006A141), as well as State Senator José Javier Rodríguez (ML17235B122). Monroe County's second submission attached the comments of Miami Dade-County and the Florida Keys Aqueduct Authority. Additionally, the EPA provided comments on the Final EIS (ML17010A034), and NPS provided comments on both the Final EIS and the Final Safety Evaluation Report (ML17006A137).

<sup>59</sup> Order of the Secretary (Transmitting Pre-Hearing Questions) (Sept. 1, 2017) (unpublished); Ex. NRC-005-R, *NRC Staff Responses to Commission Pre-Hearing Questions* (Jan. 23, 2018) (ML18031A309) (Staff Pre-Hearing Responses); Ex. FPL-003, *Florida Power & Light Company's Responses to Pre-Hearing Questions* (Nov. 7, 2017) (ML17348A648) (FPL Pre-Hearing Responses).

<sup>60</sup> A scheduling note set forth the topics and order of presentations for the hearing. Scheduling Note, "Hearing on Combined Licenses for Turkey Point, Units 6 and 7: Section 189a. of the Atomic Energy Act Proceeding (Public Meeting)" (revised Dec. 4, 2017) (ML17338A947).

including scheduled panelists.<sup>61</sup> Six witnesses offered testimony on behalf of FPL at the hearing and in pre-filed testimony.<sup>62</sup>

Among other things, FPL's overview panelists discussed the general qualifications and nuclear experience of FPL,<sup>63</sup> the selection of the AP1000 certified design, and the site selection process; they also provided an overview of the site.<sup>64</sup> The Staff panelists provided background on the AP1000 design certification and the Staff's review of FPL's application, as well as a summary of the Staff's safety and environmental findings.<sup>65</sup>

The safety panel focused on two novel issues related to Turkey Point Units 6 and 7: (1) probable maximum storm surge, including sea level rise; and (2) deep well injection for liquid radioactive waste disposal.<sup>66</sup> The environmental panel discussed novel issues associated with cooling water sources, alternative sites, critical habitat, and consultations with the FWS and

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<sup>61</sup> Tr. at 11-12 (Ms. Wright).

<sup>62</sup> See *Florida Power & Light Company's Witness List* (Nov. 7, 2017); Tr. at 163 (Mr. Turner); Ex. FPL-001, *Applicant's Pre-Filed Testimony in Support of the Mandatory Hearing for the Turkey Point, Units 6 and 7 Combined License* (Nov. 7, 2017) (FPL Pre-Filed Testimony).

<sup>63</sup> FPL is a wholly owned subsidiary of NextEra Energy, Inc. Ex. FPL-001, FPL Pre-filed Testimony, at 3; Tr. at 16-17 (Mr. Nazar). FPL operates four nuclear units, two units at the St. Lucie site and two units at the Turkey Point site. Tr. at 18 (Mr. Nazar). NextEra Energy Resources, an FPL-affiliated entity, also owns and operates the Seabrook, Point Beach, and Duane Arnold nuclear plants. *Id.* (Mr. Nazar).

<sup>64</sup> See Ex. FPL-004, Florida Power & Light Company's Presentation Slides: Overview (Dec. 5, 2017) (ML17348A649); Tr. at 15-48.

<sup>65</sup> See Ex. NRC-009, Staff Presentation Slides – Overview Panel (Dec. 5, 2017) (ML17348A684) (Staff Overview Presentation); Tr. at 48-82.

<sup>66</sup> See Tr. at 83-133; Ex. FPL-005, Florida Power & Light Company's Presentation Slides: Safety Panel (Dec. 5, 2017) (ML17348A650); Ex. NRC-010, Staff Presentation Slides – Safety Panel (Dec. 5, 2017) (ML17348A685).



NMFS pursuant to the Endangered Species Act.<sup>67</sup> These issues are discussed further in section II.

After the hearing, we posed additional questions to the Staff and FPL.<sup>68</sup> The parties' written responses were admitted as exhibits, and after adopting corrections to the hearing transcript, we closed the evidentiary record.<sup>69</sup>

## II. DISCUSSION

Although our review encompassed the entire application, our decision discusses just a few of the safety and environmental topics addressed during the uncontested portion of the proceeding. We first consider FPL's requested exemptions from our regulatory requirements and departures from the AP1000 certified design. Our discussion then turns to site-specific and novel issues.

### A. Exemptions and Departures

FPL requested eight exemptions and identified seventeen departures from the AP1000 certified design.<sup>70</sup> Where a combined license applicant references a certified design, changes

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<sup>67</sup> See Tr. at 134-79; Ex. FPL-006, Florida Power & Light Company's Presentation Slides: Environmental Panel (Dec. 5, 2017) (ML17348A652); Ex. NRC-011, Staff Presentation Slides – Environmental Panel (Dec. 5, 2017) (ML17348A686).

<sup>68</sup> Order of the Secretary (Transmitting Post-Hearing Questions) (Dec. 19, 2017) (unpublished).

<sup>69</sup> Order of the Secretary (Adopting Proposed Transcript Corrections, Admitting Post-Hearing Exhibits, and Closing the Record of the Proceeding) (Jan. 18, 2018) (unpublished). The Staff subsequently filed a motion to reopen the record for the limited purpose of admitting into evidence a revised exhibit, Ex. NRC-005-R, Staff Pre-Hearing Responses. *NRC Staff Motion to Reopen the Record to File Corrected Exhibit NRC-005-R* (Jan. 23, 2018). We grant that motion, admit Ex. NRC-005-R into the record, and strike Ex. NRC-005 from the record. The Staff's revision took the form of a revised attachment to the pleading transmitting its responses to pre-hearing questions. Citations here to NRC-005-R reference the January 23, 2018, revision.

<sup>70</sup> Ex. FPL-001, FPL Testimony, at 5-12; Ex. NRC-008F, Florida Power and Light Company, Application for Combined License for Turkey Point Units 6 and 7, Part 7, Departures and

to the design may be made in the combined license if proposed as a departure from the certified design. Certain departures may be made without prior Commission approval.<sup>71</sup> But departures that involve a change to the design as described in the rule certifying the design require an exemption from our regulations.<sup>72</sup> The Staff may approve an exemption where it finds that the exemption is authorized by law, will not present an undue risk to the public health and safety, is consistent with the common defense and security, and special circumstances exist that warrant the exemption.<sup>73</sup> In addition, the Staff must determine that the special circumstances outweigh any decrease in safety resulting from the reduction in standardization that may result from the exemption.<sup>74</sup>

All of the exemptions proposed by FPL are similar to those previously granted to other combined license holders.<sup>75</sup> FPL requested five departures requiring exemptions<sup>76</sup> that correspond to departures in the Levy and Lee combined license applications, which both also

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Exemption Requests, rev. 8 (Aug. 2016), at 7-1 to 7-2 (ML17348A675) (Departures and Exemptions). The Staff identified an additional needed exemption and evaluated and found acceptable all nine exemptions from NRC regulations. Ex. NRC-001, Staff Information Paper, at 14, 15 n.4, 16-17; *see also infra* notes 80-81 and accompanying text.

<sup>71</sup> 10 C.F.R. pt. 52, app. D, VIII.B.5.

<sup>72</sup> *Id.* pt. 52, app. D, VIII.A.4. The requirements that combined license applicants must meet to obtain an exemption from NRC regulations are found at 10 C.F.R. § 52.93.

<sup>73</sup> *See id.* §§ 52.63(b)(1), 52.7, 50.12(a).

<sup>74</sup> *Id.* § 52.63(b)(1).

<sup>75</sup> Tr. at 33 (Mr. Franzone); *see also* Ex. NRC-001, Staff Information Paper, at 14-18.

<sup>76</sup> Each departure contains changes to AP1000 Tier 1 information or technical specifications and, as such, requires an exemption. Ex. NRC-001, Staff Information Paper, at 14.

referenced the AP1000 certified design.<sup>77</sup> These departures concern containment cooling design changes with respect to the passive core cooling system condensate return, the main control room habitability dose analysis, heat load in the main control room during a design-basis event, control of containment hydrogen concentrations during a beyond-design-basis event, and the plant monitoring system's compliance with IEEE Standard 603-1991 related to source range neutron flux logic.<sup>78</sup> Consistent with the design-centered review approach, the Staff found each requested departure and its accompanying exemption acceptable based on the reasoning also used for the Lee and Levy applications.<sup>79</sup>

FPL requested an exemption from certain combined license application organization and numbering requirements in 10 C.F.R. Part 52, Appendix D, Section IV.A.2.a in order to be consistent with NRC guidance in Regulatory Guide 1.206 and NUREG-0800.<sup>80</sup> The Staff found

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<sup>77</sup> *Id.* at 16 (citing "Staff Statement in Support of the Uncontested Hearing for Issuance of Combined Licenses for the Levy Nuclear Plant Units 1 and 2 (Docket Nos. 52-029 and 52-030)," Commission Paper SECY-16-0076 (June 10, 2016) (ML12188A087) and "Staff Statement in Support of the Uncontested Hearing for Issuance of Combined Licenses for the William States Lee III Nuclear Station Units 1 and 2 (Docket Nos. 52-018 and 52-019)," Commission Paper SECY-16-0094 (Aug. 8, 2016) (ML16123A064)). The Staff designated the Levy combined license application as the "reference" application for the five common departures and exemptions. *Duke Energy Carolinas, LLC* (William States Lee III Nuclear Station, Units 1 and 2), CLI-16-19, 84 NRC 180, 199 (2016).

The ACRS reviewed and recommended approval of the requested departures and exemptions. *Id.* (citing Letter from Dennis C. Bley, ACRS, to Stephen G. Burns, NRC (Apr. 18, 2016), at 1 (ML16102A149)).

<sup>78</sup> Ex. NRC-001, Staff Information Paper, at 16.

<sup>79</sup> *Id.* We discussed our approval of these requested departures and their accompanying exemptions in our decision authorizing issuance of the combined licenses for the Levy Nuclear Plant. *Duke Energy Florida, LLC* (Levy County Nuclear Power Plant, Units 1 and 2), CLI-16-16, 84 NRC 66, 79-82 (2016).

<sup>80</sup> Ex. FPL-001, FPL Pre-Filed Testimony, at 5; Ex. NRC-001, Staff Information Paper, at 16.

the minor administrative change to be acceptable and determined that an associated exemption from 10 C.F.R. § 52.93(a)(1) was necessary (and likewise acceptable).<sup>81</sup> FPL also seeks an exemption from certain requirements pertaining to material control and accounting for special nuclear material, such that the same requirements apply to both Part 52 and Part 50 licenses.<sup>82</sup>

And finally, FPL requested an exemption from a design certification document site parameter value for the maximum safety wet bulb (noncoincident) air temperature because the Turkey Point site value exceeded the AP1000 design certification document value by 1.3 degrees Fahrenheit.<sup>83</sup> Although the increase in temperature is small, the change affected a number of systems related to passive containment cooling, control room habitability, normal residual heat removal, component cooling water, spent fuel pool cooling, and central chilled water.<sup>84</sup> The Staff concluded that the higher temperature would not adversely affect safety-related or defense-in-depth structures, systems, and components.<sup>85</sup>

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<sup>81</sup> Ex. NRC-001, Staff Information Paper, at 16-17.

<sup>82</sup> This exemption has been granted to other combined license holders. *Id.* at 17; Ex. FPL-001, FPL Pre-Filed Testimony, at 6-7; *see also, e.g., Lee*, CLI-16-19, 84 NRC at 198 n.111.

<sup>83</sup> Ex. NRC-001, Staff Information Paper, at 17-18; Ex. FPL-001, FPL Pre-Filed Testimony, at 6; Tr. at 34 (Mr. Franzone). “The measured wet bulb temperature . . . provides an indication of the amount of water vapor in the atmosphere. Wet bulb temperature measures the lowest temperature that can be reached by evaporating water into the air. Essentially, a higher web bulb temperature means that the air is not able to evaporatively cool a system as efficiently as when the wet bulb temperature is lower.” Ex. NRC-001, Staff Information Paper, at 17. The maximum safety wet-bulb (noncoincident) temperature is a site parameter value that represents a maximum wet-bulb temperature that exists within a set of hourly data for a duration of at least two hours. Ex. NRC-006, “Final Safety Evaluation Report for Combined Licenses for Turkey Point Units 6 and 7” (Nov. 2016), at 2-48 (ML17348A661) (Safety Evaluation Report).

<sup>84</sup> Ex. NRC-001, Staff Information Paper, at 18.

<sup>85</sup> *Id.* This exemption was also granted for the Summer combined license application, although the value for Summer was one-tenth of a degree less than the Turkey Point value. Tr. at 34 (Mr. Franzone). FPL performed a sensitivity analysis and determined that there was no

Of the seventeen departures requested by FPL and proposed to be approved by the Staff (if an approval is needed), two are standard for combined license applicants adopting the AP1000 design and eleven are departures common to multiple combined license applicants.<sup>86</sup> The remaining four departures are unique to the Turkey Point application.<sup>87</sup> The first unique departure increases the operating basis wind speed of the site from 145 miles per hour to 150 miles per hour.<sup>88</sup> The Staff found that FPL's stated site characteristics are acceptable for the Turkey Point site.<sup>89</sup> The wind load does not control the design for the nuclear island structures; an increase of wind speed from 145 miles per hour to 150 miles per hour will not require safety-related structures to be redesigned.<sup>90</sup> The second unique departure increases the maximum normal wet-bulb (noncoincident) air temperature by 1.4 degrees Fahrenheit.<sup>91</sup> The Staff found

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increase in containment peak pressure for Turkey Point when using the higher Turkey Point value. *Id.* (Mr. Franzone).

This exemption includes an associated departure from the AP1000 design. See Ex. NRC-001, Staff Information Paper, at 20; Ex. NRC-006, Safety Evaluation Report, at 2-9 to 2-11. This exemption should be included in the licenses. See Ex. NRC-002, Draft Combined License for Turkey Point Unit 6 (Dec. 5, 2017), § 2.F (ML17348A657) (list of exemptions associated with departures); Ex. NRC-003, Draft Combined License for Turkey Point Unit 7 (Dec. 5, 2017), § 2.F (ML17348A658) (same).

<sup>86</sup> Ex. NRC-001, Staff Information Paper, at 18.

<sup>87</sup> *Id.* at 14; Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 3.

<sup>88</sup> Ex. NRC-001, Staff Information Paper, at 19.

<sup>89</sup> *Id.*; see also Ex. NRC-006, Safety Evaluation Report, at 2-8 to 2-9.

<sup>90</sup> Ex. NRC-008F, Departures and Exemptions, at 7-31 to 7-32. The safety-related structures are contained on the nuclear island, which consists of the containment/shield building and the auxiliary building. Ex. NRC-008A-A, Florida Power and Light Company, Application for Combined Licenses for Turkey Point Units 6 and 7, Part 2, Final Safety Analysis Report, rev. 8 (Aug. 2016), at 2.2-12 (ML17348A680) (Final Safety Analysis Report).

<sup>91</sup> Ex. NRC-001, Staff Information Paper, at 19. The maximum normal wet-bulb (noncoincident) air temperature is the one-percent seasonal exceedance temperature. Ex. NRC-006, Safety

that the increased value is acceptable for the Turkey Point site.<sup>92</sup> The third departure modifies the minimum distance from the source boundary to the exclusion area boundary to 0.27 miles rather than the AP1000 design certification document site parameter of 0.5 miles. The Staff determined that this departure results in more conservative (i.e., higher) atmospheric dispersion ( $\chi/Q$ ) values and is therefore acceptable.<sup>93</sup>

The fourth unique departure relates to the initiating event frequency for certain categories of high winds at the Turkey Point site, which is higher than that in the AP1000 design control document.<sup>94</sup> Following review of FPL's site-specific high winds and tornado analysis (in which the most conservative scenario only slightly exceeded the AP1000 design value), the Staff determined that the departure does not alter its conclusion that high winds do not contribute to core damage.<sup>95</sup>

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Evaluation Report, at 2-49. This departure is different from the exemption (and departure) discussed above, associated with the revision of the maximum *safety* wet-bulb (noncoincident) air temperature.

<sup>92</sup> Ex. NRC-001, Staff Information Paper, at 19. In its Safety Evaluation Report, the Staff also analyzed this departure as an exemption request. Ex. NRC-006, Safety Evaluation Report, at 2-6 to 2-7. Consistent with the Staff's testimony and FPL's application, however, we find that an exemption is not required for this departure; it does not involve a change to or departure from Tier 1 information, Tier 2\* information, or the Technical Specifications of the AP1000 design control document. See Ex. NRC-008F, Departures and Exemptions, at 7-1, 7-8 to 7-11; Ex. NRC-001, Staff Information Paper, at 18-19.

<sup>93</sup> Ex. NRC-001, Staff Information Paper, at 20; Ex. NRC-006, Safety Evaluation Report, at 2-7 to 2-8.

<sup>94</sup> Ex. NRC-001, Staff Information Paper, at 20.

<sup>95</sup> *Id.*; Ex. NRC-006, Safety Evaluation Report, at 19-11; Ex. NRC-008F, Departures and Exemptions, at 7-28 to 7-29.

## **B. Site-Specific Issues**

### **1. Safety-Related Issues**

#### *a. Storm Surge Analysis*

The site grade of the proposed nuclear island for Units 6 and 7 is currently near sea level. During construction, the site grade will be raised to an elevation of twenty-six feet NAVD 88, to accommodate storm surge and wave run-up heights.<sup>96</sup> The design basis flood elevation at the Turkey Point site is governed by the probable maximum storm surge (PMSS) due to a probable maximum hurricane (PMH) approaching the site from the Atlantic Ocean.<sup>97</sup> FPL followed applicable NRC regulations and guidance in determining the design basis flood elevation for the Turkey Point site.<sup>98</sup> The methods that FPL used to determine the PMSS are consistent with approaches used to determine PMSS for other combined license holders and existing reactor sites.<sup>99</sup>

FPL's determination of the design basis flood elevation resulting from the storm surge calculation considers a combination of components, each of which FPL modeled using

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<sup>96</sup> Tr. at 26 (Mr. Franzone). The finished grade elevation at the plant area, where safety-related facilities are located, is 25.5 feet NAVD 88, but the elevation of floor entrances and openings of all safety-related structures is 26 feet NAVD 88. Ex. NRC-008A-A, Final Safety Analysis Report, at 2.4.5-2 to 2.4.5-3. The NAVD 88 (North American Vertical Datum of 1988) is the plant reference elevation datum for Units 6 and 7. Ex. NRC-006, Safety Evaluation Report, at 2-84.

<sup>97</sup> Ex. FPL-011, *Florida Power & Light Company's Responses to Post-Hearing Questions* (Jan. 9, 2018), at 10 (ML18019A040) (FPL Post-Hearing Responses) (citing Ex. NRC-008A-A, Final Safety Analysis Report § 2.4.5).

<sup>98</sup> Ex. FPL-011, FPL Post-Hearing Responses, at 10-11.

<sup>99</sup> Ex. NRC-001, Staff Information Paper, at 21.

conservative estimates.<sup>100</sup> The resulting total storm surge is more than nine feet higher than the storm surge of record in Florida from Hurricane Andrew.<sup>101</sup> In total, the design basis flood elevation includes 4.1 feet of quantified conservatisms.<sup>102</sup> FPL added 2.9 feet, or twenty percent, to the calculated PMH storm surge, and FPL used a value for the “extreme high tide plus sea level anomaly” that is 1.2 feet higher than the highest observed level in the local area.<sup>103</sup> FPL included other conservatisms in the analysis that have non-quantifiable effects—the intensity and size of the PMH,<sup>104</sup> no weakening of the PMH prior to landfall,<sup>105</sup> and the use of high wind speeds to generate the wind wave run-up.<sup>106</sup> And finally, the design plant grade

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<sup>100</sup> Ex. FPL-011, FPL Post-Hearing Responses, at 10-11; Ex. NRC-012, *NRC Staff Responses to Commission Post-Hearing Questions* (Jan. 9, 2018), Attach., at 6-7 (ML18019A041) (Staff Post-Hearing Responses).

<sup>101</sup> Ex. NRC-012, Staff Post-Hearing Responses, Attach., at 6. Hurricane Andrew, a Category 5 storm, in 1992 produced the highest storm surge on record in Florida, including consideration of the preliminary data from the 2017 hurricanes. Tr. at 96 (Mr. Giacinto). The maximum storm surge from Hurricane Andrew was 15.4 feet, north of the Turkey Point site. *Id.*

<sup>102</sup> Ex. NRC-012, Staff Post-Hearing Responses, Attach., at 7.

<sup>103</sup> *Id.*

<sup>104</sup> FPL used a large storm diameter—a radius of maximum winds of twenty nautical miles—for a storm as intense as the PMH. Ex. NRC-012, Staff Post-Hearing Responses, Attach., at 7. The large diameter increases the surge estimate. *Id.* The diameter and storm intensity are not independent, as the physics of hurricanes limits high-intensity storms to smaller diameters. *Id.*; see also Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 14-15. Hurricane Andrew, for example, had a radius of maximum winds of nine nautical miles at landfall. Ex. NRC-012, Staff Post-Hearing Responses, Attach., at 7.

<sup>105</sup> Typically, intense storms weaken before landfall. Ex. NRC-012, Staff Post-Hearing Responses, Attach., at 7.

<sup>106</sup> *Id.* “A ten-minute sustained straight-line wind of 159 miles per hour was used to generate wind waves. For comparison, this equates to a one-minute average wind speed of 188 miles per hour, which is significantly above the Category 5 hurricane one-minute average threshold wind speed of 157 miles per hour.” *Id.*



elevation of 26.0 feet NAVD 88 provides a margin of 1.2 feet above the design basis flood elevation of 24.8 feet NAVD 88 resulting from the storm surge calculation.<sup>107</sup> With respect to sea level rise, FPL used 1.0 feet over the design life of the plant, which is 0.22 feet higher than the rise estimated from local tide gauges.<sup>108</sup>

Miami Beach is the nearest tide gauge station to the Turkey Point site that has a period of record long enough to span multiple multi-decadal tidal cycles.<sup>109</sup> The National Oceanic and Atmospheric Administration's (NOAA) data analysis shows that sea level at the Miami Beach station is rising at a rate of 0.78 feet per century.<sup>110</sup> Using the observed data and NRC guidance, FPL estimated a sea level rise of 1.0 feet over the life of Turkey Point Units 6 and 7.<sup>111</sup> Although recent scientific reports discuss the potential for more than one foot of sea level rise by 2100, the multiple conservatisms in other aspects of the storm surge calculation provide a significant safety margin in the event that sea level rise at the site exceeds one foot.<sup>112</sup>

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<sup>107</sup> *Id.*; Ex. FPL-011, FPL Post-Hearing Responses, at 13.

<sup>108</sup> Ex. NRC-012, Staff Post-Hearing Responses, Attach., at 7.

<sup>109</sup> Tr. at 98 (Ms. Smith).

<sup>110</sup> *Id.* (Ms. Smith). The Miami Beach station was removed from service in 1981, but trends at Miami Beach are well correlated with trends at the Key West station, where NOAA tide records are available from 1913 to 2016. *Id.* at 99 (Ms. Smith).

<sup>111</sup> *Id.* (Ms. Smith). The Staff followed applicable guidance and used data from nearby tide gauges to estimate sea level rise. Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach. at 17; see "Probable Maximum Surge and Seiche Flooding," NUREG-0800, Standard Review Plan § 2.4.5, rev. 3 (Mar. 2007) (ML070730425); "Guidance for Performing a Tsunami, Surge, or Seiche Hazard Assessment" (Interim Staff Guidance), JLD-ISG-2012-06, rev. 0 (Jan. 2013) (ML12314A412).

<sup>112</sup> See, e.g., City of South Miami Statement in the Evidentiary Session of the Uncontested Portion of the Proceeding on the Application of Florida Power and Light Co. (FPL) Application for Issuance of Combined Licenses for Turkey Point Units 6 and 7 (Aug. 30, 2017) (ML17242A185). FPL also noted that, if sea level rise exceeds the one foot estimate accounted

Moreover, “[t]he Staff will proactively, routinely, and systematically seek, evaluate, and respond to new information on natural hazards,” including flooding due to sea level rise pursuant to the framework that we approved last year for ongoing assessment of natural hazard information.<sup>113</sup>

*b. Use of Deep Well Injection for Liquid Radioactive Waste Disposal*

FPL has proposed to use a nontraditional disposal method, deep well injection, for NRC-licensed radioactive material in liquid effluent.<sup>114</sup> This proposed disposal approach would be unique for a nuclear power plant in the United States.<sup>115</sup> Blowdown from the cooling towers and other plant discharge effluents would be collected in a sump and injected via underground injection wells into the Boulder Zone of the Lower Floridan Aquifer, which is approximately 2,800 feet below ground.<sup>116</sup> The Floridan Aquifer is one of two aquifers underlying the Turkey Point

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for in the licensing basis, then it will follow an established plant procedure—the formal corrective action program under 10 C.F.R. Part 50, Appendix B, Criterion XVI or operability determinations as described in NRC Regulatory Issue Summary 2005-20—to either reevaluate the flood hazard or implement corrective action. Ex. FPL-003, FPL Pre-Hearing Responses, at 22.

<sup>113</sup> Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 16-17 (citing “Proposed Resolution of Remaining Tier 2 and 3 Recommendations Resulting from the Fukushima Dai-Ichi Accident,” Commission Paper SECY-16-0144 (Dec. 29, 2016) (ML16286A552)); *see id.*, Encl. 2, “Recommendation 2.2: Plan to Ensure Ongoing Assessment of Natural Hazard Information” (ML16286A569); Staff Requirements—SECY-16-0144—Proposed Resolution of Remaining Tier 2 and 3 Recommendations Resulting from the Fukushima Dai-Ichi Accident” (May 3, 2017) (ML17123A453).

<sup>114</sup> Tr. at 101 (Mr. Gran).

<sup>115</sup> *Id.* (Mr. Gran); Ex. NRC-001, Staff Information Paper, at 23.

<sup>116</sup> See Ex. NRC-008B, Florida Power and Light Company, Application for Combined Licenses for Turkey Point Units 6 and 7, Part 3, Environmental Report, rev. 6 (Nov. 2014), at 2.3-2, 2.3-15 to 2.3-16, 5.2-10 (ML17348A666) (Environmental Report); Ex. NRC-007, Final EIS, at 2-24.

site, and it is divided into the following three levels in descending order: the Upper Floridan Aquifer, the middle confining unit, and the Lower Floridan Aquifer.<sup>117</sup>

The Florida Department of Environmental Protection (FDEP) has the authority to issue permits for discharge of wastewater via injection wells into the Boulder Zone in Florida.<sup>118</sup> The FDEP has permitted over 180 Class I injection wells for disposal of municipal and industrial wastewater into the Boulder Zone.<sup>119</sup> FPL plans to install six pairs of injection wells for Units 6 and 7.<sup>120</sup> Each pair of wells will have a dual zone monitoring well, which will detect if injected material is migrating upward from the Boulder Zone.<sup>121</sup>

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<sup>117</sup> See Ex. NRC-008B, Environmental Report, at 2.3-16, 2.3-18 to 2.3-19. “[T]he Floridan aquifer system is a vertically continuous sequence of interbedded carbonate rocks of Tertiary age that are hydraulically interconnected by varying degrees . . . .” See *id.* at 2.3-15. The other aquifer is the Biscayne Aquifer, which is the uppermost surficial aquifer system in the vicinity of the Turkey Point site. Ex. NRC-007, Final EIS, at 2-47. “Low-permeability confining units separate the Biscayne aquifer and the underlying Floridan aquifer system and limit exchange of groundwater between these aquifer systems.” *Id.*

<sup>118</sup> See Ex. NRC-008B, Environmental Report, at 2.3-19.

<sup>119</sup> Ex. NRC-007, Final EIS, at 2-61; Tr. at 89 (Mr. Jacobs). FDEP regulations specify approved construction techniques and testing and monitoring requirements for Class I wells. Ex. NRC-007, Final EIS, at 4-25. Class I wells are monitored to detect any migration of injected fluids before they could reach an underground source of drinking water. *Id.* at 4-21.

<sup>120</sup> Tr. at 90 (Mr. Jacobs). The injection wells will be installed between 2900 and 3500 feet below land surface. The base of the underground source of drinking water is approximately 1450 feet below land surface. Between the injection point and the underground source of drinking water is an area designated as the Middle Floridan Confining Zone, which is approximately 1000 feet thick and has a low hydraulic conductivity that prevents flow through the layer. *Id.* at 90-91 (Mr. Jacobs).

<sup>121</sup> *Id.* at 90 (Mr. Jacobs). Florida requires all Class I injection wells to have a dual-zone monitoring system that consists of a zone open below the deepest underground source of drinking water and a zone located in the underground source of drinking water for geochemical and pressure monitoring. Ex. NRC-008B, Environmental Report, at 2.3-53.

FPL provided information to demonstrate compliance with 10 C.F.R. § 20.2002, which allows an applicant to seek approval of a disposal procedure not otherwise authorized by the regulations.<sup>122</sup> FPL determined the radionuclides to be used in the analysis based on the largest contributors to dose and then provided conservative groundwater modeling scenarios of both radial and vertical transport of effluents within and out of the Boulder Zone.<sup>123</sup> This modeling resulted in a cumulative radionuclide inventory at the end of plant operations.<sup>124</sup> FPL then evaluated the scenarios that would produce the highest dose to potential receptors to demonstrate compliance with NRC standards.<sup>125</sup>

The Staff typically approves requests under section 20.2002 that will result in a dose to a member of the public that is no more than “a few millirem/year.”<sup>126</sup> The Staff used the criteria in 10 C.F.R. Part 50, Appendix I for evaluating dose; these criteria are normally used in calculating dose to the maximally exposed individual for surface water disposals of liquid effluent.<sup>127</sup> Under FPL’s worst-case scenario analysis, a subsistence driller sinks a well deep into the Upper

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<sup>122</sup> Ex. NRC-001, Staff Information Paper, at 23. The applicant must include a description of the waste, the proposed manner and conditions of disposal, an analysis of the nature of the environment, the nature and location of other potentially affected facilities, and analyses and procedures to ensure that doses are maintained as low as is reasonably achievable and within the dose limits of Part 20. 10 C.F.R. § 20.2002. At most facilities, such effluent is released to surface water.

<sup>123</sup> Ex. NRC-001, Staff Information Paper, at 23.

<sup>124</sup> *Id.*

<sup>125</sup> *Id.*

<sup>126</sup> *Id.* at 23-24 (citing “Basis and Justification for Approval Process for 10 C.F.R. 20.2002 Authorizations and Options for Change,” Commission Paper SECY-07-0060 (Mar. 27, 2007), Encl. 1 (ML062050587); “Decommissioning Process for Materials Licensees” (Final Report), NUREG-1757, vol. 1, rev. 2 (Sept. 2006) § 15.12 (ML063000243)).

<sup>127</sup> Ex. NRC-001, Staff Information Paper, at 24.

Floridan Aquifer to supply water for drinking and production of food, and that well is located directly above a hypothetical failure in the lowermost confining barrier above the Boulder Zone.<sup>128</sup> The subsistence driller's dose would be less than a few millirem per year, in compliance with the Appendix I limits.<sup>129</sup> The Staff reviewed FPL's approach and concluded that the disposal of liquid radioactive waste as described in the application meets the requirements of 10 C.F.R. § 20.2002: FPL has adequately described the waste, performed an analysis that described the environment in which the effluent is transported, described the nature and location of potentially affected individuals and entities, and has ensured that doses will be maintained as low as is reasonably achievable by meeting Appendix I and all other applicable NRC regulations.<sup>130</sup>

*c. Site Selection – Population Density*

Our rules direct that “[r]eactor sites should be located away from very densely populated centers.”<sup>131</sup> While sites in areas of low population density are generally preferred, a particular site not in an area of low density but “located away” from a high-density population may still be acceptable.<sup>132</sup> “Locating reactors away from densely populated centers is part of the NRC’s

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<sup>128</sup> Tr. at 93-94 (Mr. Orthen).

<sup>129</sup> *Id.* at 94 (Mr. Orthen); Ex. NRC-006, Safety Evaluation Report, at 11-26.

<sup>130</sup> Ex. NRC-001, Staff Information Paper, at 24; Ex. NRC-006, Safety Evaluation Report, at 11-33 to 11-36. In addition to 10 C.F.R. § 20.2002, the Staff found the design of the liquid waste management system satisfied the requirements of sections 20.1301(e), 20.1302, 20.1406, 50.34a, and General Design Criteria 60 and 61 (located in 10 C.F.R. Part 50, Appendix A). Ex. NRC-006, Safety Evaluation Report, at 11-37.

<sup>131</sup> 10 C.F.R. § 100.21(h).

<sup>132</sup> *Id.* (in such cases, “consideration will be given to safety, environmental, economic, or other factors, which may result in the site being found acceptable”); *see also* “General Site Suitability

defense-in-depth philosophy and facilitates emergency planning and preparedness, as well as reduces potential doses and property damage in the event of a severe accident.”<sup>133</sup>

NRC guidance states that “[a] reactor should be located so that . . . the population density . . . averaged over any radial distance out to 20 miles . . . does not exceed 500 persons per square mile. A reactor should not be located at a site where the population density is well in excess of [this] value.”<sup>134</sup> During its review of the combined license application, the Staff determined that the population density criterion of 500 persons per square mile was exceeded for the Turkey Point site.<sup>135</sup> Contemplating such a circumstance, the guidance provides that “[i]f the population density of the proposed site exceeds, but is not well in excess of the above preferred value, . . . consideration of other factors, such as safety, environmental, or economic concerns, may result in the site with the higher population density being found acceptable.”<sup>136</sup> The Staff determined that “[t]he projected maximum density value determined within 20 miles of the Turkey Point site is about 200 people per square mile in excess of the 500 people per square mile which, for this site, is a reasonable proportion of the criterion.”<sup>137</sup> On this basis, the Staff determined that the population density for the Turkey Point site was not “well in excess” of

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Criteria for Nuclear Power Stations,” Regulatory Guide 4.7, rev. 3 (Mar. 2014), at 7 (ML12188A053) (Regulatory Guide 4.7).

<sup>133</sup> Regulatory Guide 4.7 at 7, 18.

<sup>134</sup> *Id.* at 18.

<sup>135</sup> Ex. NRC-012, Staff Post-Hearing Responses, Attach., at 1.

<sup>136</sup> Regulatory Guide 4.7 at 18. The guidance does not quantify a population “not well in excess” of the preferred value.

<sup>137</sup> Ex. NRC-012, Staff Post-Hearing Responses, Attach., at 1.

the criterion set forth in the guidance.<sup>138</sup> In determining the acceptability of the site, the Staff, consistent with 10 C.F.R. § 100.21(h) and Regulatory Guide 4.7, evaluated the physical characteristics of the site, with particular focus on the security and emergency plans and measures that ensure the public health and safety.<sup>139</sup> After considering these factors, including population density, the Staff found the Turkey Point site to be acceptable because the application demonstrated that the public health and safety would be assured.<sup>140</sup>

With respect to the site selection process, FPL noted that “Florida’s unique geography with its largest metropolitan area near the southern end of a peninsula present[s] challenges for transmission planning and large generating facilities that must be located with adequate foresight.”<sup>141</sup> FPL studied its entire service territory, with particular focus on areas that would serve the Miami load center.<sup>142</sup> FPL selected the Turkey Point site over alternative sites with lower nearby population densities because the Turkey Point site has several safety, economic,

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<sup>138</sup> *Id.*

<sup>139</sup> *Id.*, Attach., at 2. According to FPL, “population density did not pose a significant impediment to the development of emergency plans.” Ex. FPL-011, FPL Post-Hearing Responses, at 7. Furthermore, our regulations require emergency plans to be continually maintained and updated, including accounting for changes in population characteristics. 10 C.F.R. pt. 50, app. E, IV.5-7.

<sup>140</sup> Ex. NRC-012, Staff Post-Hearing Responses, Attach., at 2. The Staff noted that the highest population density at any radial distance out to 20 miles for the Turkey Point site is comparable to that of previously licensed sites. *Id.* For example, the Limerick site had a density of 789 persons per square mile at 5 miles; the Zion site had a density of 668 persons per square mile at 10 miles; and the Connecticut Yankee site had a density of 716 persons per square mile at 20 miles. *Id.* (citing “Metropolitan Siting – A Historical Perspective,” NUREG-0478 (Oct. 1978), tbl.I (ML12187A192)).

<sup>141</sup> Tr. at 23 (Mr. Maher).

<sup>142</sup> *Id.* (Mr. Maher).

reliability, and environmental attribute advantages.<sup>143</sup> Specifically, the Turkey Point site has a unique cooling water supply source, land availability, and existing nuclear power plant and emergency planning infrastructure.<sup>144</sup> The site also addresses an FPL reliability objective; it would enable generation in Miami-Dade County, closer to the load than any other alternative site.<sup>145</sup>

## **2. Environmental Issues**

### *a. Cooling Water Sources*

Mechanical draft cooling towers will be used during normal operation of Units 6 and 7 to dissipate heat.<sup>146</sup> FPL plans to use reclaimed wastewater from the Miami-Dade Water and Sewer Department South District Wastewater Treatment Plant as the principal source of makeup cooling water.<sup>147</sup> The plant is located nine miles north of the Turkey Point site. After treatment, pipelines will carry approximately 73 million gallons per day of water to the Turkey Point site.<sup>148</sup> The reclaimed water will then be further treated at FPL's onsite facility for use in the cooling system.<sup>149</sup> If reclaimed water is not available in the quantity or quality that FPL

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<sup>143</sup> Ex. FPL-011, FPL Post-Hearing Responses, at 7.

<sup>144</sup> *Id.* at 7-10.

<sup>145</sup> *Id.* at 8.

<sup>146</sup> Ex. NRC-008B, Environmental Report, at 1.1-3.

<sup>147</sup> *Id.* Palo Verde Nuclear Generating Station is the only nuclear power plant in the United States currently using reclaimed water as its primary source of cooling water. Ex. NRC-001, Staff Information Paper, at 25; see also Tr. at 27 (Mr. Franzone).

<sup>148</sup> Ex. NRC-001, Staff Information Paper, at 24; see Ex. NRC-008B, Environmental Report, at 5.2-1.

<sup>149</sup> Ex. NRC-001, Staff Information Paper, at 24; Ex. NRC-008B, Environmental Report, at 5.2-1.



needs, radial collector wells will serve as a backup source of cooling water.<sup>150</sup> The proposed makeup water reservoir has approximately a three-day supply of reclaimed water available for cooling the units.<sup>151</sup>

The South District Wastewater Treatment Plant currently injects treated water at a rate of 97 million gallons per day into the Boulder Zone.<sup>152</sup> During operation of Units 6 and 7, the estimated injection rate into the Boulder Zone at the Turkey Point site would be 18 million gallons per day of blowdown water from the cooling towers.<sup>153</sup> The environmental review team<sup>154</sup> determined that construction of the injection and monitoring wells related to proposed wastewater injection would have negligible effects on groundwater quality in the surficial Biscayne Aquifer and the deeper Floridan Aquifer system.<sup>155</sup> With respect to operation, the review team concluded that the South District Wastewater Treatment Plant will filter and disinfect the wastewater to a level that will protect the underground source of drinking water

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<sup>150</sup> Tr. at 27 (Mr. Franzone).

<sup>151</sup> *Id.* at 29 (Mr. Franzone).

<sup>152</sup> Ex. NRC-001, Staff Information Paper, at 24.

<sup>153</sup> *Id.*

<sup>154</sup> The environmental review team consisted of individuals with expertise in disciplines including ecology, geology, hydrology, meteorology, radiological health, socioeconomics, and cultural resources. Ex. NRC-007, Final EIS, app. A. The team consisted of individuals from the NRC, its contractors, and the Corps. *Id.* at xxxi. The National Park Service provided special expertise for the areas in and around Biscayne and Everglades National Parks. *Id.* at xxxi, A-2 to A-3.

<sup>155</sup> Ex. NRC-007, Final EIS, at 4-33. This conclusion is due, in part, to FDEP regulations governing deep well injection. *Id.*

should the injected wastewater migrate out of the Boulder Zone.<sup>156</sup> The review team further concluded that significant upwelling of the injected wastewater is not likely at the Turkey Point site due to the confining ability of the middle confining unit, which separates the Upper and Lower Floridan Aquifer.<sup>157</sup> In addition to the isolation of the Boulder Zone from the overlying underground source of drinking water and the treatment of the wastewater, the review team evaluated the extent and fate of injected effluent at the site, reviewed risk assessments of deep well disposal, and considered FDEP monitoring requirements.<sup>158</sup> While injection would introduce contaminants into the Boulder Zone, the salt content of the water in the Boulder Zone is too high for it to be considered a potential, current, or future source of irrigation or drinking water.<sup>159</sup> The review team concluded that the operational impacts to groundwater quality would be “small.”<sup>160</sup>

The alternative source of cooling water, which also would be capable of supplying one hundred percent of the makeup water for non-safety-related circulating-water system cooling demand, would be saltwater supplied from horizontal radial collector wells installed in the

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<sup>156</sup> Ex. NRC-007, Final EIS, at 5-21. The wastewater will receive further treatment onsite at Turkey Point; additionally, the concentrations of contaminants in the wastewater would be reduced due to volatilization and dilution at the site before injection. *Id.*

<sup>157</sup> *Id.* at 5-21 to 5-22, 5-28.

<sup>158</sup> *Id.* at 5-41 to 5-42.

<sup>159</sup> *Id.* at 5-42.

<sup>160</sup> *Id.* As discussed above, certain environmental impacts of deep well injection disposal were the subject of a contention in the contested proceeding. The Board found that the Staff demonstrated that the environmental impacts would be “small” because the wastewater is unlikely to migrate to the Upper Floridan Aquifer, and even if it did, the chemicals at issue would be at concentrations too low to pose any known health risks. LBP-17-5, 86 NRC at 5.

Biscayne Aquifer between 25 and 40 feet beneath the bed of Biscayne Bay and adjacent to Biscayne National Park.<sup>161</sup> This alternative source “would only be used when needed to supplement makeup-water demand when reclaimed water is not available in sufficient quantity or quality, and would be limited to a maximum of 60 days per year by the Florida State Conditions of Certification.”<sup>162</sup> Withdrawal from the four radial collector wells would be at a maximum flowrate of 86,400 gallons per minute (about 124 million gallons per day).<sup>163</sup> This rate is higher than what it would be for reclaimed water, which would be cycled through the plant a greater number of times.<sup>164</sup> The Staff considered three independent modeling studies to determine the potential impacts to the hydrological environment as a result of the operation of the radial collector wells.<sup>165</sup> The studies projected insignificant alterations to both Biscayne Bay and the underlying Biscayne Aquifer as a result of the operation of the wells.<sup>166</sup>

*b. Alternative Sites*

In its site selection process, FPL used the guidance in NRC’s Environmental Standard Review Plan, Regulatory Guide 4.7, and the Electric Power Research Institute’s siting guide.<sup>167</sup> FPL’s screening process began with selecting a region of interest, which was the FPL service

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<sup>161</sup> Ex. NRC-007, Final EIS, at 2-24; *see also* Ex. NRC-008B, Environmental Report, at 1.1-3.

<sup>162</sup> Ex. NRC-007, Final EIS, at 2-24.

<sup>163</sup> Ex. NRC-001, Staff Information Paper, at 25.

<sup>164</sup> *Id.* Reclaimed water could be cycled through the circulating water system four times, whereas the saltwater from radial collector wells would be cycled 1.5 times through the plant. *Id.* at 24-25.

<sup>165</sup> *Id.* at 25.

<sup>166</sup> *Id.*

<sup>167</sup> Ex. NRC-007, Final EIS, at 9-34.

area, and screened sites in successive steps until a reasonable number of alternative sites were determined and evaluated; from these FPL selected the Turkey Point site.<sup>168</sup> FPL selected the Turkey Point site based on a provision in the Environmental Standard Review Plan that acknowledges a proposed site may be selected because an existing nuclear plant is already located there.<sup>169</sup> FPL then compared the Turkey Point site to the alternative sites that were identified through the site selection process and determined that there was no obviously superior alternative site.<sup>170</sup> The Staff also conducted an independent evaluation of the alternative sites and compared them to the Turkey Point site and likewise concluded that there was no obviously superior site.<sup>171</sup>

In its alternative site analysis, the Staff typically uses the same cooling water system design at each of the alternative sites as would be used at the proposed site.<sup>172</sup> But this was not possible for the Turkey Point application because the alternative sites did not have potential

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<sup>168</sup> *Id.*

<sup>169</sup> *Id.*; Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 38-39; see also “Environmental Standard Review Plan,” NUREG-1555, rev. 1 (July 2007) § 9.3, at 9.3-11 to 9.3-12 (ML071800223) (“Recognize that there will be special cases in which the proposed site was not selected on the basis of a systematic site-selection process. Examples include plants proposed to be constructed on the site of an existing nuclear power plant previously found acceptable on the basis of a NEPA review and/or demonstrated to be environmentally satisfactory on the basis of operating experience . . .”). FPL also retained the St. Lucie site as a candidate site based on this provision. Ex. NRC-007, Final EIS, at 9-34.

<sup>170</sup> Ex. NRC-012, Staff Post-Hearing Responses, Attach., at 4. The Staff observed that “FPL then implemented an acceptable systematic and logical selection process to identify alternative sites and to compare [the Turkey Point site] to the alternative sites to determine if any alternative was environmentally preferable.” Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 38.

<sup>171</sup> Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 38.

<sup>172</sup> Ex. NRC-001, Staff Information Paper, at 25.

sources of reclaimed wastewater.<sup>173</sup> Instead, FPL evaluated different approaches for cooling the plants at the alternative sites.<sup>174</sup> At the St. Lucie site, cooling water would come from the Atlantic Ocean.<sup>175</sup> For the three inland sites, FPL used a combination of excess surface water (with a reservoir) and pumping groundwater from a deep, saline aquifer.<sup>176</sup> For these inland sites, FPL also considered the use of a desalination plant to reduce the salt content of the cooling water to protect nearby vegetation.<sup>177</sup> Recognizing the uncertainty about cooling water sources at the alternative inland sites, the review team analyzed them in the Final EIS without the reservoir and without the desalination plant and also qualitatively assessed how those impacts would be different if a reservoir was included in the system.<sup>178</sup> The review team determined that a reservoir would increase the impacts on land use and terrestrial ecology and also would result in a minor increase in impacts to aquatic ecology and surface-water use.<sup>179</sup> Under the review team's approach, the alternative sites were considered under the most environmentally favorable circumstances. Even so, the review team concluded that none of the

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<sup>173</sup> *Id.*

<sup>174</sup> *Id.*

<sup>175</sup> *Id.*

<sup>176</sup> *Id.*

<sup>177</sup> *Id.* at 25-26.

<sup>178</sup> *Id.* at 26. The Staff determined that it might be possible to cool the plants at the inland sites without the use of a reservoir and without the desalination plant. *Id.*

<sup>179</sup> *Id.*

alternative sites was environmentally preferable and, therefore, not obviously superior to the Turkey Point site.<sup>180</sup>

*c. Endangered and Threatened Species*

Under the Endangered Species Act, any action authorized by the NRC must not jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify the critical habitat of such a species.<sup>181</sup> The NRC must consult with the FWS or NMFS, as appropriate, on activities that may affect a listed species or a species proposed to be listed.<sup>182</sup> Thirty-nine terrestrial species listed or proposed to be listed as federally threatened, endangered, or candidates for listing as threatened or endangered are known to occur in Miami-Dade County or the vicinity of the Turkey Point site.<sup>183</sup> And ten aquatic species listed as threatened or endangered could occur at the Turkey Point site.<sup>184</sup>

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<sup>180</sup> *Id.*; see Ex. NRC-007, Final EIS, at 9-247 to 9-249.

<sup>181</sup> Endangered Species Act, 16 U.S.C. § 1536(a)(2).

<sup>182</sup> *Id.* § 1536(a)(3). Federal agencies must also consult with the FWS or NMFS on actions that are likely to jeopardize the continued existence of any species proposed to be listed under section 4 of the Act or result in the destruction or adverse modification of critical habitat proposed to be designated for such species. *Id.* § 1536(a)(4).

<sup>183</sup> Ex. NRC-007, Final EIS, at 2-82 & tbl.2-12. The listed terrestrial species include eighteen plants, twelve birds, two mammals, one reptile, and five invertebrates. *Id.*

<sup>184</sup> *Id.* at 2-143 & tbl.2-28. The listed aquatic species include five sea turtles, two other aquatic reptiles, one fish, one marine mammal, and one seagrass. *Id.*

**(1) CONSULTATIONS WITH THE U.S. FISH & WILDLIFE SERVICE**

The Staff initiated formal consultation with the FWS under Section 7 of the Endangered Species Act by letter in September 2016.<sup>185</sup> With its letter, the Staff included its Biological Assessment that outlined the Staff's evaluation of potential effects on threatened or endangered species known to potentially occur in the area of the proposed project.<sup>186</sup> The consultation concluded in June 2017 with the FWS's issuance of a Biological Opinion.<sup>187</sup>

The Biological Opinion concluded that the proposed project would not likely put any species in jeopardy of extinction.<sup>188</sup> The FWS also concluded that the proposed project would either "have no effect" or "may affect but would not likely adversely affect" most threatened or endangered species potentially occurring in the area.<sup>189</sup> But the FWS found that the proposed project "may affect" and "could likely adversely affect" six listed (threatened or endangered) species: the Florida panther, American crocodile, eastern indigo snake, Everglades snail kite, red knot, and wood stork.<sup>190</sup> The FWS established incidental take limits for each of these six

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<sup>185</sup> *NRC Staff Analysis of Biological Opinion and Submission of Proposed License Conditions for Turkey Point Units 6 & 7* (July 7, 2017), Attach. A, NRC Staff Assessment of the U.S. Fish & Wildlife Service Biological Opinion (June 23, 2017), at 1 (Staff Analysis of Biological Opinion).

<sup>186</sup> *Id.* (citing Biological Assessment for the U.S. Fish and Wildlife Service (Feb. 2015) (ML15028A372)).

<sup>187</sup> Letter from Roxanna Hinzman, Department of the Interior/FWS, to Alicia Williamson, NRC (June 23, 2017) (ML17177A673) (Biological Opinion). The Staff then notified us that it had completed consultations, provided its analysis of the Biological Opinion and Incidental Take Statement, and proposed related license conditions. Staff Analysis of Biological Opinion at 1 (attaching a revised Environmental Protection Plan).

<sup>188</sup> Staff Analysis of Biological Opinion, Attach. A, at 1 (citing Biological Opinion at 51).

<sup>189</sup> *Id.*, Attach. A, at 1 (citing Biological Opinion at 2, 13-17).

<sup>190</sup> *Id.*, Attach. A, at 1 (citing Biological Opinion at 2). The American crocodile is discussed in greater detail below.

species.<sup>191</sup> The Incidental Take Statement also sets forth reasonable and prudent measures, monitoring and reporting requirements, and requirements for the disposition of dead or injured individuals of listed species.<sup>192</sup>

All non-discretionary terms and conditions of the Incidental Take Statement will be incorporated into either the combined licenses issued by the NRC or the Department of the Army permit issued by the Corps under Section 404 of the Clean Water Act (Section 404 Permit).<sup>193</sup> The requirements to be included in the NRC licenses will be incorporated as conditions in the Environmental Protection Plan for each unit.<sup>194</sup> The conditions included by the NRC relate to surveying, monitoring, and reporting requirements for listed species.<sup>195</sup> The Corps committed to incorporate conditions into the Section 404 permit related to: wildlife fencing and underpasses; a site worker education program; measures protecting sea turtles, manatees, and benthic marine resources; measures protecting eastern indigo snakes; on-site speed limits;

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<sup>191</sup> *Id.*, Attach. A, at 1 (citing Biological Opinion at 48-53). “[T]aking that is incidental to, and not intended as part of the agency action, is not considered to be prohibited taking under the [Endangered Species] Act provided such taking is in compliance with the terms and conditions of this incidental take statement.” Biological Opinion at 48. The limits are either expressed as the number of individuals injured or killed over specific time intervals or as acres of suitable habitat lost or degraded over specific time intervals. Staff Analysis of Biological Opinion, Attach. A, at 1 (citing Biological Opinion at 49-51).

<sup>192</sup> *Id.*, Attach. A, at 1 (citing Biological Opinion at 51, 52).

<sup>193</sup> *Id.*, Attach. A, at 1-2; Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 46-48.

<sup>194</sup> Staff Analysis of Biological Opinion, Attach. A, at 1-2. Attachment B to the Staff Analysis of Biological Opinion shows the Staff’s proposed license conditions to be added as a result of the Incidental Take Statement. “[T]he requirements in the Turkey Point Units 6 and 7 [Environmental Protection Plans] were written so that the structure and language would be consistent with previously issued [Environmental Protection Plans].” Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 48.

<sup>195</sup> Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 47.



FPL's avian protection plan; wetland mitigation measures; surveys for shorebirds, wood storks, and seagrass; restoration of construction access roadways; Florida panther habitat; wood stork habitat; and relocation of listed plant species in a proposed transmission line corridor.<sup>196</sup>

**(2) CONSULTATIONS WITH THE NATIONAL MARINE FISHERIES SERVICE**

The Staff sent its Biological Assessment to, and requested consultation with, NMFS in February 2015.<sup>197</sup> After receiving additional information from the NRC, NMFS initiated consultation in October 2016.<sup>198</sup> Consultations between the NRC and NMFS concluded in April 2017.<sup>199</sup> NMFS determined that smalltooth sawfish and five species of listed sea turtles may be present in the action area and potentially affected.<sup>200</sup> NMFS agreed with the Staff that the construction and operation of the proposed units would not likely adversely affect listed species under its purview.<sup>201</sup> NMFS's conclusion was based, in part, on certain project conditions.<sup>202</sup> The Staff and FPL represent that they expect the Section 404 Permit to include non-

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<sup>196</sup> *Id.* at 46-47 (citing Letter from Francis M. Akstulewicz, NRC, to Ingrid Gilbert, Army Corps of Engineers (Aug. 24, 2017), Encl. 2 (ML17201Q242)); see Biological Opinion at 8-13. The Corps has not yet issued the Section 404 Permit.

<sup>197</sup> Letter from Jennifer Dixon-Herrity, NRC, to Miles Croom, NOAA/NMFS (Feb. 25, 2015) (ML15049A319) (enclosing Biological Assessment for the National Marine Fisheries Service (Feb. 2015) (ML15028A378)).

<sup>198</sup> Letter from Roy E. Crabtree, NOAA/NMFS, to Jennifer Dixon-Herrity, NRC, and Colonel Alan Dodd, Army Corps of Engineers (Apr. 26, 2017), at 1 (ML17143A153) (NMFS Consultation Letter).

<sup>199</sup> *Id.* at 7.

<sup>200</sup> *Id.* at 4.

<sup>201</sup> *Id.* at 7.

<sup>202</sup> *Id.*; see also *id.* at 2-4, 5 (discussing the project description and construction conditions).

discretionary terms and conditions listed by NMFS in its consultation letter.<sup>203</sup> For example, the Corps will include conditions to protect sea turtles and smalltooth sawfish in its Section 404 Permit.<sup>204</sup> The Staff also noted its expectation that the Corps would include in its permit appropriate conditions to protect animals from injurious noise impacts.<sup>205</sup>

### **(3) AMERICAN CROCODILE**

Unlike other sites recently reviewed in conjunction with a combined license application, the Turkey Point site contains federally designated critical habitat for a listed species under the Endangered Species Act.<sup>206</sup> In particular, the site contains critical habitat for the threatened American crocodile (*Crocodylus acutus*).<sup>207</sup> The entire proposed plant area for Units 6 and 7, as well as much of the Industrial Wastewater Facility, falls within the designated critical habitat.<sup>208</sup> Potential impacts of the project include the permanent loss of 270 acres of critical habitat and adverse effects to approximately 211 acres of additional critical habitat as a result of relocating soils and other solid material from the power block area.<sup>209</sup>

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<sup>203</sup> Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 44-45; Ex. FPL-003, FPL Pre-Hearing Responses, at 52.

<sup>204</sup> Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 44 (citing NMFS Consultation Letter at 4 (referencing, in turn, the implementation of NMFS's *Sea Turtle and Smalltooth Sawfish Construction Guidelines*)).

<sup>205</sup> *Id.*, Attach., at 44-45.

<sup>206</sup> Ex. NRC-001, Staff Information Paper, at 26.

<sup>207</sup> *Id.*

<sup>208</sup> *Id.* The plant area for Units 6 and 7 is located within the Industrial Wastewater Facility and is surrounded by cooling canals. Ex. NRC-008A-A, Final Safety Analysis Report, at 2CC-12.

<sup>209</sup> Ex. NRC-001, Staff Information Paper, at 26.

The Staff concluded that the lost critical habitat represents approximately 0.09 percent of total crocodile terrestrial habitat available in South Florida.<sup>210</sup> In addition, the area that would be permanently lost is in an area that is generally considered to be low-quality crocodile habitat and is not actively used by crocodiles.<sup>211</sup> The FWS concluded that the project would be expected to result in the incidental take of crocodiles in the form of harm from habitat loss and injuries or death from vehicle collisions.<sup>212</sup> In terms of habitat loss, the FWS stated that it is difficult to quantify the amount of harm because the number of individual crocodiles affected will vary over time, depending on the suitability of the habitat for nesting and foraging, the fact that not all crocodiles nest every year, and the density of nesting being highly variable.<sup>213</sup> The FWS determined that this level of anticipated take, however, is not likely to result in jeopardy to the crocodile.<sup>214</sup>

*d. Concerns of Sister Federal Agencies*

During the course of its environmental review, the Staff engaged with (among others) the EPA and the National Park Service (NPS).<sup>215</sup> The Staff engaged regularly with the agencies

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<sup>210</sup> *Id.*

<sup>211</sup> *Id.* The land that would be adversely affected by the addition of soils and other material was selected because it does not contain suitable nesting substrate for crocodiles. *Id.*

<sup>212</sup> Biological Opinion at 49.

<sup>213</sup> *Id.* The FWS noted that FPL currently conducts habitat management along the banks of the cooling canals and within the Everglades Mitigation Bank to enhance nesting opportunities for crocodiles within these areas of critical habitat. *Id.* at 33.

<sup>214</sup> *Id.* at 51.

<sup>215</sup> Ex. NRC-012, NRC Post-Hearing Responses, at 5. As noted above, NPS served as a cooperating agency for preparation of the project's EIS.

through public meetings, in-person meetings, teleconferences, and correspondence.<sup>216</sup>

Nevertheless, the EPA and NPS still had unresolved concerns related to the Final EIS.<sup>217</sup>

Despite these concerns, the Staff stands by its determination that the Final EIS is adequate and satisfies NEPA and the NRC's implementing regulations in 10 C.F.R. Part 51.<sup>218</sup>

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<sup>216</sup> *Id.*; Tr. at 172 (Ms. Williamson), 173 (Ms. Williamson), 174 (Mr. Barnhurst). For example, NRC and NPS staff met with State and local authorities to discuss FPL's plans to use reclaimed water for cooling and radial collector wells that would withdraw water from underneath Biscayne Bay as a backup source of cooling water. Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 24-25.

<sup>217</sup> See Letter from G. Alan Farmer, EPA, to Cindy Bladey, NRC (Dec. 22, 2016), at 2 ("The EPA has several environmental concerns that were not adequately addressed in the FEIS. Of greatest concern are the project's potential impacts related to wetlands, groundwater, drinking water, Underground Injection Control (UIC) permits, impacts to [Biscayne National Park] and other aquatic preserves, environmental justice (EJ) and potential hurricane and severe storm impacts.") (ML17010A034) (EPA Letter); Letter from Stan Austin, DOI/NPS, to Frank Akstulewicz, NRC, and Colonel Jason Kirk, Army Corps of Engineers (Dec. 19, 2016), at 1 ("We appreciate the extensive work done by the NRC and the [Corps] staff and their willingness to meet extensively with the NPS. However, the NPS continues to have serious concerns regarding the adequacy and accuracy of the [Final EIS].") (ML17006A137) (NPS Letter).

The Staff attributed some of the concerns to the different missions of the agencies. Tr. at 171 (Ms. Williamson). Other comments were not strictly within the scope of the combined license review. For example, the agencies expressed concerns related to environmental impacts of the hypersaline plume underneath the Turkey Point site; those impacts are associated with the operating units and would occur whether or not whether Units 6 and 7 are built. *Id.* at 175 (Mr. Barnhurst). The Staff did consider the current operation of the existing Turkey Point units and the hypersaline plume underneath the cooling canal system in its evaluation of the site selection process and in the comparison of the sites. Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 36. Section 7.2 of the Final EIS discusses specific impacts to surface and groundwater as a result of cumulative impacts from the proposed units and the existing units' use of the cooling canal system. *Id.* The hypersaline plume was also considered in the evaluation of the impacts of operating the radial collector wells for Units 6 and 7 because the wells would draw a small portion of water from the Biscayne Aquifer—the same aquifer that is impacted by the plume. *Id.*

<sup>218</sup> Ex. NRC-012, NRC Post-Hearing Responses, at 5.

The Staff nonetheless conducted additional water modeling analysis as a result of the agencies' stated concerns.<sup>219</sup> Staff from the NRC and NPS met with the U.S. Geological Survey and the Pacific Northwest National Laboratory to generate input and output parameters for a model used in the Draft EIS that evaluated the surface and ground water effects of the operation of radial collector wells on the surrounding hydrological environment, including Biscayne and Everglades National Parks.<sup>220</sup> Based on feedback from NPS and others, the Staff performed a more extensive groundwater modeling study for the Final EIS.<sup>221</sup> NPS experts were directly involved throughout this effort.<sup>222</sup>

In addition, the Staff performed additional analysis in response to EPA and NPS concerns related to the potential for prolonged operation of radial collector wells.<sup>223</sup> Although the FDEP's Conditions of Certification limit FPL's use of the radial collector well system to sixty days per year, the Staff considered a scenario where the system would operate continuously as part of its bounding sensitivity analysis.<sup>224</sup> The sensitivity analysis indicated that there would be only minor changes to water chemistry and availability between the "no operation," "60-day," "90-day," and "continuous operation" scenarios.<sup>225</sup> And since neither the primary (reclaimed

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<sup>219</sup> Tr. at 171-72 (Ms. Williamson), 174-75 (Mr. Barnhurst).

<sup>220</sup> Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 24-25.

<sup>221</sup> *Id.*, Attach., at 25.

<sup>222</sup> *Id.*

<sup>223</sup> EPA Letter, Attach., at 3; NPS Letter at 5-6.

<sup>224</sup> Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 27.

<sup>225</sup> *Id.* (citing Ex. NRC-007, Final EIS, app. G.3.2).

water) nor backup water (radial collector wells) supply is safety-related, the wells would not be relied upon in the event of a transient or emergency condition.<sup>226</sup>

### C. Findings

We now turn to the findings necessary for the issuance of the combined licenses. We have conducted an independent review of the sufficiency of the Staff's safety findings. Although our decision today highlights the topics discussed above, our findings are based on the entire record. Based on the evidence presented in the uncontested hearing, including the Staff's safety and environmental review documents and the testimony provided, we find that the applicable standards and requirements of the AEA and NRC regulations have been met. The required notifications to other agencies or bodies have been duly made.<sup>227</sup> We find that FPL is technically and financially qualified to engage in the activities authorized.<sup>228</sup> We further find that there is reasonable assurance that the facility will be constructed and operated in conformity with the license, the provisions of the AEA, and the NRC's regulations, and that issuance of the licenses will not be inimical to the common defense and security or to the health and safety of the public. In addition, we find that the proposed regulatory exemptions meet the standards in

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<sup>226</sup> *Id.*

<sup>227</sup> The Staff notified the Florida Public Service Commission (FPSC) about the combined license application in August 2016. Ex. NRC-001, Staff Information Paper, at 27. In addition, the Staff published notices of the application in the *Total Leader* and *South Dade New Leader* in July 2008. *Id.* The Staff also published notices of the application in the *Federal Register* on November 18, 2011, November 25, 2011, December 2, 2011, and December 9, 2011 (at 76 Fed. Reg. 71,608; 76 Fed. Reg. 72,725; 76 Fed. Reg. 75,566; and 76 Fed. Reg. 77,021, respectively). See 10 C.F.R. § 50.43(a).

<sup>228</sup> For a discussion of construction cost estimates, see Ex. FPL-003, FPL Pre-Hearing Responses, at 1-3; Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 2-3; Tr. at 73-74 (Mr. Mussatti).

10 C.F.R. § 50.12. Moreover, we find that the proposed license conditions are appropriately drawn and sufficient to provide reasonable assurance of adequate protection of public health and safety.

We also conducted an independent review of the Staff's environmental analysis in the Final EIS, taking into account the particular requirements of NEPA. NEPA section 102(2)(A) requires agencies to use "a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts" in decision-making that may impact the environment.<sup>229</sup> We find that the environmental review team used the systematic, interdisciplinary approach that NEPA requires.<sup>230</sup>

NEPA Section 102(2)(C) requires us to assess the relationship between short-term uses and long-term productivity of the environment (including consideration of the benefits of operating the new units), to consider alternatives, and to describe the unavoidable adverse environmental impacts and the irreversible and irretrievable commitments of resources associated with the proposed action.<sup>231</sup> The discussion of alternatives is in Chapter 9 of the Final EIS; the other items are discussed in Chapter 10.<sup>232</sup> The review team found the principal short-term benefit of the project to be the production of electrical energy.<sup>233</sup> The review team

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<sup>229</sup> 42 U.S.C. § 4332(2)(A).

<sup>230</sup> See, e.g., Tr. at 58-67 (Ms. Dixon-Herrity) (providing an overview of the Staff's environmental review methodology); Ex. NRC-009, Staff Overview Presentation, at 9-15. See note 154 for more information on the environmental review team.

<sup>231</sup> 42 U.S.C. § 4332(2)(C).

<sup>232</sup> Ex. NRC-007, Final EIS, chs. 9-10.

<sup>233</sup> *Id.* at 10-18. While the need for power analysis in the Final EIS was based on a 2008 determination of need from the FPSC, the FPSC continuously updates its analyses and has not

also noted that, because the environmental analysis focused on the expansion of electrical generating capacity at the Turkey Point site, the benefits analysis focused on the benefits of building Units 6 and 7 rather than on the more generic benefits of electrical supply.<sup>234</sup> And the review team found that construction and operation of Turkey Point Units 6 and 7, because they are nuclear units, would have two primary societal benefits: long-term price stability and energy security through fuel diversity.<sup>235</sup> The review team found the project would have regional benefits, including enhanced tax revenues, regional productivity, and community impacts.<sup>236</sup>

NEPA section 102(2)(E) calls for agencies to study, develop, and describe appropriate alternatives.<sup>237</sup> The alternatives analysis is the “heart of the environmental impact statement.”<sup>238</sup> Based on the discussion in the Final EIS and the Staff’s testimony, we find that the Staff identified an appropriate range of alternatives with respect to alternative power sources, alternative sites, and alternative system designs, and it adequately described the environmental

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reconsidered its determination of need for the two AP1000 units at Turkey Point. Ex. NRC-005-R, Staff Pre-Hearing Responses, Attach., at 35.

<sup>234</sup> Ex. NRC-007, Final EIS, at 10-18.

<sup>235</sup> *Id.* at 10-18 to 10-20.

<sup>236</sup> *Id.* at 10-20 to 10-21.

<sup>237</sup> 42 U.S.C. § 4332(2)(E).

<sup>238</sup> 10 C.F.R. pt. 51, app. A, § 5.



impacts of each alternative.<sup>239</sup> We find that the Staff reasonably concluded that none of the alternatives considered is environmentally preferable to the proposed action.<sup>240</sup>

Chapter 10 of the Final EIS includes tables listing the unavoidable adverse environmental impacts during pre-construction, construction, and operation, along with actions to mitigate those impacts.<sup>241</sup> The review team found that the unavoidable impacts during pre-construction and construction would be small for the following resource areas: water use, water quality, demography, meteorology and air quality, nonradiological health, radiological health, and nonradioactive waste.<sup>242</sup> The review team found that there would be no adverse impacts that affect minority or low-income populations in a disproportionate manner, relative to the general population.<sup>243</sup> The pre-construction and construction impacts for land use, ecological (terrestrial) resources, and historic and cultural resources would be moderate, but when considering NRC-authorized construction activities only, the impacts would be small.<sup>244</sup> The pre-construction and construction impacts to ecological (aquatic) resources would be small to moderate.<sup>245</sup> The physical impacts and impacts to infrastructure and community service would

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<sup>239</sup> See, e.g., Ex. NRC-001, Staff Information Paper, at 31; Ex. NRC-007, Final EIS, ch. 9; Ex. NRC-004, Draft Summary Record of Decision for Turkey Point Nuclear Plant, Units 6 and 7 (Dec. 2, 2016), at 5-9 (ML17348A659).

<sup>240</sup> See Ex. NRC-007, Final EIS, at 9-30 to 9-33 (summary of alternative power sources), 9-244 to 9-249 (summary of alternative sites), 9-258 (summary of system design alternatives).

<sup>241</sup> *Id.* tbls.10-1 & 10-2.

<sup>242</sup> *Id.* tbl.10-1.

<sup>243</sup> *Id.*

<sup>244</sup> *Id.*

<sup>245</sup> *Id.*

range from adverse and small to beneficial and moderate.<sup>246</sup> And finally the economic impacts on the community would be beneficial and small.<sup>247</sup>

For operation, the review team found that the unavoidable adverse impacts would be small for the following resource areas: water use; water quality; ecological (aquatic) resources; demography; historic and cultural resources; meteorology and air quality; nonradiological health; radiological health; fuel cycle, transportation, and decommissioning; and nonradioactive waste.<sup>248</sup> There would continue to be no adverse impacts that affect minority or low-income populations in a disproportionate manner, relative to the general population.<sup>249</sup> The impacts to land use and ecological (terrestrial) resources would be moderate.<sup>250</sup> For operation, the physical impacts and impacts to infrastructure and community service would continue to range from adverse and small to beneficial and moderate.<sup>251</sup> And finally the economic impacts on the community due to operation would remain beneficial and small.<sup>252</sup>

With regard to irreversible and irretrievable commitments of resources, the review team concluded that the land used for Units 6 and 7 can be returned to other uses in the future after the units cease operation and are decommissioned.<sup>253</sup> In terms of water use, withdrawals of

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<sup>246</sup> *Id.*

<sup>247</sup> *Id.*

<sup>248</sup> *Id.* tbl.10-2.

<sup>249</sup> *Id.*

<sup>250</sup> *Id.*

<sup>251</sup> *Id.*

<sup>252</sup> *Id.*

<sup>253</sup> *Id.* at 10-15.

groundwater from the Biscayne Aquifer are reversible because the water in the aquifer is replenished by infiltration of precipitation.<sup>254</sup> With respect to both aquatic and terrestrial biota, construction activities would cause temporary and long-term changes.<sup>255</sup> Unavoidable adverse impacts on terrestrial resources and wetlands include permanent loss of mangroves and other wetland habitats and permanent loss of pine rockland and other upland habitats.<sup>256</sup> Both federally and state-listed species would be affected, in addition to other important species such as wading birds.<sup>257</sup> In terms of aquatic resources, there would be permanent loss of some onsite aquatic environments, including permanent loss of and adverse impacts to the critical habitat of the American crocodile.<sup>258</sup>

The review team also concluded that during construction of the plant, the materials used “while irretrievable, would be of small consequence with respect to the availability of such resources.”<sup>259</sup> With regard to operation of the proposed units, the review team determined that uranium would be irretrievably committed, but the amount would be negligible compared to the world’s known and recoverable uranium reserves.<sup>260</sup>

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<sup>254</sup> *Id.*

<sup>255</sup> *Id.*; *see also supra* section II.B.2.c.

<sup>256</sup> Ex. NRC-007, Final EIS tbl.10-1; *id.* at 10-8.

<sup>257</sup> *Id.* at 10-8.

<sup>258</sup> *Id.* tbl.10-1; *id.* at 10-9; *see also supra* section II.B.2.c.3.

<sup>259</sup> Ex. NRC-007, Final EIS, at 10-16.

<sup>260</sup> *Id.*

We must weigh these unavoidable adverse environmental impacts and resource commitments—the environmental “costs” of the project—against the project’s benefits.<sup>261</sup> Considering the need for power in the region and the expected increase (even though relatively minor<sup>262</sup>) in productivity, jobs, and tax revenue as described in the hearing and in the Final EIS, we find that the benefits of the project outweigh the costs described above. Moreover, we have considered each of the requirements of NEPA section 102(2)(C) and find that the record supports the Staff’s conclusions on those requirements.

In sum, for each of the environmental topics discussed at the hearing and in this decision, we find that the Staff’s review was reasonably supported in logic and fact and sufficient to support the Staff’s conclusion. Based on our review, we also find that the remainder of the Final EIS was reasonably supported and sufficient to support the Staff’s conclusions.

Therefore, as a result of our review of the Final EIS, and in accordance with the Notice of Hearing for this uncontested proceeding, we find that the requirements of NEPA section 102(2)(A), (C), and (E), and the applicable regulations in 10 C.F.R. Part 51, have been satisfied with respect to the combined license application. We independently considered the final balance among conflicting factors contained in the record of this proceeding. We find, after weighing the environmental, economic, technical, and other benefits against environmental and

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<sup>261</sup> 10 C.F.R. § 51.107(a).

<sup>262</sup> “Because of the large Florida State, Miami-Dade County, and the Homestead and Florida City tax bases, relative to the estimated increases in revenues from operations-related activities, the review team expects the tax-related impact on these governments would likely be minor and beneficial.” Ex. NRC-007, Final EIS, at 5-85 to 5-86. The review team also concluded that the beneficial impacts from (1) annual earnings and (2) operations jobs and jobs indirectly created by the presence of an increased workforce at Units 6 and 7 would be minor. *Id.* at 5-83.

other costs, and considering reasonable alternatives, that the combined licenses should be issued.

### III. CONCLUSION

For the reasons discussed above, we find that the Staff's review of FPL's combined license application was sufficient to support the findings in 10 C.F.R. §§ 52.97(a) and 51.107(a). We *authorize* the Director of the Office of New Reactors to issue the combined licenses for the construction and operation of Turkey Point Nuclear Generating Units 6 and 7. We *authorize* the Staff to issue the record of decision.

IT IS SO ORDERED.

For the Commission

**NRC Seal**

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Annette L. Vietti-Cook  
Secretary of the Commission

Dated at Rockville, Maryland,  
this 5<sup>th</sup> day of April, 2018.

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of )  
 )  
FLORIDA POWER & LIGHT COMPANY ) Docket Nos. M-52-040 and 52-041-COL  
(Juno Beach, Florida) )  
 )  
(Turkey Point, Units 6 & 7) )

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing **COMMISSION MEMORANDUM AND ORDER (CLI-18-01)** have been served upon the following persons by Electronic Information Exchange.

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[Original signed by Clara Sola \_\_\_\_\_]  
Office of the Secretary of the Commission

Dated at Rockville, Maryland,  
this 5<sup>th</sup> day of April, 2018.