

RECORD OF DECISION  
U.S. NUCLEAR REGULATORY COMMISSION  
DOCKET NOS. 50-250 AND 50-251  
SUBSEQUENT LICENSE RENEWAL APPLICATION FOR  
TURKEY POINT NUCLEAR GENERATING UNIT NOS. 3 AND 4

BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC) received an application dated January 30, 2018 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML18037A812), from Florida Power & Light Company (FPL), filed pursuant to Section 103 of the Atomic Energy Act of 1954, as amended, Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, "Environmental Protection Regulations For Domestic Licensing And Related Regulatory Functions," and 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," for subsequent license renewal of the renewed operating licenses for Turkey Point Nuclear Generating Unit Nos. 3 and 4 (Turkey Point or Turkey Point Units 3 and 4). FPL subsequently supplemented its application by letters dated February 9, 2018 (ADAMS Accession No. ML18044A653), February 16, 2018 (ADAMS Package Accession No. ML18053A123), March 1, 2018 (ADAMS Package Accession No. ML18072A224), and April 10, 2018 (ADAMS Package Accession Nos. ML18102A521 and ML18113A132).

The Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.) (AEA), specifies that licenses for commercial power reactors can be granted for an initial period of up to 40 years. NRC regulations permit these licenses to be renewed beyond the initial 40-year term for an additional period of time, limited to 20-year increments per renewal, based on the results of an assessment to determine whether the nuclear facility can continue to operate safely during the proposed period of extended operation. There are no limitations in the AEA or NRC regulations restricting the number of times a license may be renewed.

The NRC granted initial renewed licenses to FPL for Turkey Point Units 3 and 4 on June 6, 2002. The Turkey Point Unit 3 current renewed facility operating license (DPR-31) and the Turkey Point Unit 4 current renewed facility operating license (DPR-41) expire on July 19, 2032, and April 10, 2033, respectively. The subsequent renewed operating licenses would authorize FPL to operate Turkey Point Units 3 and 4 until July 19, 2052, and April 10, 2053, respectively.

Turkey Point Units 3 and 4 are Westinghouse pressurized-water nuclear reactors located on approximately 9,460 acres (ac) (38.3 square kilometers (km<sup>2</sup>)) of FPL-owned land. Each reactor is designed to produce a core thermal power output of 2,644 megawatts-thermal (MWt) with a corresponding gross electrical output of approximately 811 megawatts-electric (MWe) for Unit 3 and 821 MWe for Unit 4. The Turkey Point site is located on the southeastern coast of Florida in unincorporated southeastern Miami-Dade County. The site borders Biscayne Bay and Card Sound to the east, and is adjacent to Biscayne National Park.

In addition to nuclear generating Units 3 and 4, the Turkey Point site also hosts three fossil fuel power plants: Units 1 and 2 are retired natural-gas/oil steam-generating units, and Unit 5 is an operating natural-gas combined-cycle steam generating unit. In addition to these five currently operating and retired units, the NRC has previously issued combined licenses (COLs) to FPL, authorizing the construction and operation of two new nuclear plants (Turkey Point Units 6 and 7); those plants have not yet been constructed. The Turkey Point site also features a 5,900-ac (24 km<sup>2</sup>) artificial body of water called the cooling canal system (CCS) that is used by Units 3 and 4 for reactor heat rejection, as well as by Units 1 and 2 for operation in synchronous condenser mode and by Unit 5 for the discharge of blowdown. The yet to be constructed nuclear reactors (Units 6 and 7) will not use the CCS.

On April 18, 2018, the NRC staff published a notice of receipt of the subsequent license renewal application in the *Federal Register* (FR) (83 FR 17196). On May 2, 2018, the NRC staff published a notice that it had accepted the application for review and provided notice of an opportunity to request a hearing or petition to intervene (83 FR 19304). As discussed below, an adjudicatory proceeding concerning the application was then conducted.

Section 102 of the National Environmental Policy Act of 1969, as amended (NEPA), directs Federal agencies to prepare a detailed statement in advance of making a decision on major Federal actions that may significantly affect the quality of the human environment. In accordance with the Commission's regulations in 10 CFR Part 51, the NRC prepares an environmental impact statement (EIS) or a site-specific supplement to an EIS (SEIS) for all applications to renew reactor operating licenses pursuant to 10 CFR 51.20(b)(2), regardless of the action's environmental impact significance. In this instance, the NRC's major Federal action is to decide whether to issue subsequent renewed operating licenses for Turkey Point Units 3 and 4, authorizing operation for an additional 20 years through July 19, 2052, and April 10, 2053, respectively.

On May 22, 2018, the NRC staff published a notice of intent to prepare a supplemental environmental impact statement and conduct an environmental scoping process in the *Federal Register* (83 FR 23726). In addition, Federal, State, and local agencies, as well as Tribal governments, were notified and asked to provide comments on and to participate in the environmental scoping process and review. On May 31, 2018, the NRC staff held public scoping meetings near the Turkey Point site in Homestead, FL, to obtain public input on the proper scope of the NRC's environmental review of the Turkey Point Units 3 and 4 subsequent license renewal application. The NRC issued a scoping summary report on January 31, 2019 (ADAMS Accession No. ML18342A014).

The National Park Service, Southeast Region (NPS) participated in the environmental review as a cooperating agency under a Memorandum of Understanding with the NRC (ADAMS Accession No. ML18355A847). The NPS provided special expertise for the areas in and around the adjacent Biscayne National Park; however, impact determinations made in the EIS should not be attributed to NPS, but only to the NRC. The NPS's participation in connection with the EIS does not imply NPS concurrence with the NRC staff's impact determinations.

## ENVIRONMENTAL IMPACT STATEMENT

In accordance with 10 CFR 51.95(c), "Operating License Renewal Stage," the NRC staff documents its environmental review of a license renewal application and publishes it as a site-specific supplemental environmental impact statement (called a SEIS), as a supplement to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (called the GEIS) (ADAMS Accession Nos. ML13106A241, ML13106A242, and ML13106A244). The GEIS documents the results of the NRC's systematic approach to evaluating the environmental consequences of issuing renewed operating licenses for nuclear power plants authorizing an additional 20 years of operation beyond the end of the current license term. The GEIS serves to facilitate the NRC's environmental review process for license renewal by identifying and evaluating environmental impacts that are considered generic and common to all (or a distinct class of) nuclear power plants (Category 1 issues). For Category 1 issues, no additional site-specific analysis is required in the site-specific SEIS unless new and significant information is identified that would change the conclusions in the GEIS. The GEIS also identifies site-specific issues (Category 2 issues). For Category 2 issues, an additional site-specific review is required, and the NRC staff documents the results of that review in the SEIS.

The NRC established a standard of significance for each NEPA issue evaluated in the GEIS based on the Council on Environmental Quality's (CEQ) regulations on how to evaluate significance (see Title 40, "Protection of Environment," of the *Code of Federal Regulations* (40 CFR) 1508.27, "Significantly"). The term "significantly," as explained by the CEQ, requires consideration of both of the following:

- 1) Context—as in the geographic, biophysical, and social context in which the effects will occur.
- 2) Intensity—which refers to the severity of the impact in whatever context it occurs.

Since the significance and severity of an impact can vary with the setting of the proposed action, the NRC considered both "context" and "intensity" as defined in Council on Environmental Quality regulations at 40 CFR 1508.27. Context is the geographic, biophysical, and social context in which the effects will occur. In the case of license renewal, the context is the environment surrounding the nuclear power plant. As stated above, intensity refers to the severity of the impact in whatever context it occurs. Based on this, the NRC established a three-level standard of significance for potential impacts, SMALL, MODERATE, and LARGE, as defined below.

**SMALL:** Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

**MODERATE:** Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

**LARGE:** Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

FPL submitted its license renewal application and environmental report under the NRC's 2013 revised rule governing license renewal environmental reviews, as codified in 10 CFR Part 51.<sup>1</sup> The 2013 GEIS<sup>2</sup> provided the technical bases for the list of NEPA issues and associated environmental impact findings for license renewal that are contained in Table B-1, "Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants," in Appendix B to subpart A of 10 CFR Part 51.

The NRC's environmental review included an environmental scoping process. The scoping process included two public meetings held in Homestead, FL, on May 31, 2018. On March 31, 2019, the NRC staff issued a draft SEIS as "Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 5, Second Renewal, Regarding Subsequent License Renewal for Turkey Point Nuclear Generating Unit Nos. 3 and 4, Draft Report for Comment," NUREG-1437, Supplement 5, Second Renewal (ADAMS Accession No. ML19078A330).

A 45-day comment period began on April 5, 2019, when the U.S. Environmental Protection Agency (EPA) published a Notice of Availability in the *Federal Register* (84 FR 13662) of the draft SEIS to allow members of the public, interested organizations and stakeholders, and governmental agencies to comment on the results of the staff's environmental review. The comment period ended on May 20, 2019. Additionally, the NRC held two public meetings on May 1, 2019, to discuss the preliminary findings in the draft SEIS.

Among other concerns, the continued operation of the cooling canal system and its potential impact on certain environmental resources was the focus of considerable concern expressed by members of the public and government agencies. The draft SEIS characterized the complex interaction of the cooling canal system with the environment and described potential impacts of continued cooling canal operation on surface water, groundwater, and biologic resources. These concerns were addressed by the NRC staff in the final SEIS.

The NRC staff made the final SEIS (FSEIS) for the Turkey Point Units 3 and 4 subsequent license renewal application publicly available on October 25, 2019 (ADAMS Package Accession No. ML19295F526). All substantive comments received during the draft SEIS comment period are included in Appendix A of the FSEIS. Neither FPL nor the NRC staff identified any new and significant information related to Category 1 issues that would call into question the conclusions in the GEIS, with respect to the subsequent license renewal period of extended operation for Turkey Point Units 3 and 4. In the FSEIS, the NRC staff recommended that the Commission determine that the adverse environmental impacts of subsequent license renewal for Turkey Point are not so great that preserving the option of subsequent license renewal for energy-planning decisionmakers would be unreasonable. This recommendation is based on: (1) the analysis and findings in the GEIS; (2) the NRC staff's review of information provided in the environmental report and other documents submitted by FPL; (3) the NRC staff's consultation with Federal, State, local, and Tribal agencies; (4) the NRC staff's independent environmental

---

<sup>1</sup> 78 FR 37281. U.S. Nuclear Regulatory Commission. Final Rule, "Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses." *Federal Register* 78 FR 37281. June 20, 2013.

<sup>2</sup> U.S. Nuclear Regulatory Commission. 2013. NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Rev. 1, Vols. 1-3 (ADAMS Accession Nos. ML13106A241, ML13106A242, and ML13106A244). June 2013.

review; and (5) the NRC staff's consideration of public comments received during the scoping process and on the Draft Supplemental Environmental Impact Statement. Pursuant to 10 CFR 51.102(b) and 10 CFR 51.103(a)(1)-(5), the NRC staff has prepared this concise public record of decision (ROD) to document its action on the Turkey Point Units 3 and 4 subsequent license renewal application. In accordance with 10 CFR 51.103(c), this ROD incorporates by reference the material contained in the FSEIS.

## DECISION

Pursuant to 10 CFR 54.29, "Standards for issuance of a renewed license," a renewed license may be issued by the Commission if the Commission finds, in part, that the license renewal application satisfies the requirements of 10 CFR Part 54, and any applicable requirements of Subpart A of 10 CFR Part 51 have been satisfied; pursuant to 10 CFR 51.102, this includes the completion of a Record of Decision.

This Record of Decision and the FSEIS, which is incorporated by reference herein, document the NRC's final decision regarding the environmental review of the Turkey Point Units 3 and 4 subsequent license renewal application, in accordance with 10 CFR 51.103(a)(5), that the adverse environmental impacts of subsequent license renewal for Turkey Point Units 3 and 4 are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

In making its final decision on the proposed Federal action to authorize the continued operation of Turkey Point Units 3 and 4 through July 19, 2052, and April 10, 2053, respectively, the NRC must make a favorable safety finding. The purpose of the NRC's safety review of a license renewal application is to determine if the applicant has adequately demonstrated that the effects of aging will not adversely affect the intended functions of any safety-related structures or components as specified in 10 CFR 54.4 and 10 CFR 54.21. The applicant must demonstrate that the effects of aging will be adequately managed so that the intended functions will be maintained in accordance with the plants' current licensing basis throughout the license renewal period. The NRC staff documented the results of its safety review in its "Safety Evaluation Report Related to the Subsequent License Renewal of Turkey Point Nuclear Generating Units 3 and 4," issued July 22, 2019 (ADAMS Accession No. ML19191A057).

Further, the Advisory Committee on Reactor Safeguards (ACRS) completed its review and report in accordance with 10 CFR 54.25, "Report of the Advisory Committee on Reactor Safeguards," with respect to the application for subsequent renewal of the Turkey Point Units 3 and 4 renewed operating licenses. The ACRS completed its review during its 666<sup>th</sup> meeting, held on September 4–6, 2019, and documented its findings recommending subsequent renewal of the Turkey Point Unit 3 and 4 licenses in a letter to the Commission dated October 7, 2019 (ADAMS Accession No ML19283A168).

Several requests for hearing and petitions to intervene were filed in response to the notice of opportunity for hearing that was published on May 2, 2018 (83 FR 19304). An NRC Atomic Safety and Licensing Board (Board) was appointed and an adjudicatory proceeding was commenced. The Board granted two petitions to intervene and admitted several contentions on March 7, 2019 (LBP-19-3) (ADAMS Accession No. ML19067A003). The Board later dismissed the remaining contentions in a decision issued on July 8, 2019 (LBP-19-6) (ADAMS Accession

No. ML19189A252), and denied all outstanding contentions and terminated the proceeding before the Board in its Memorandum and Order of October 24, 2019 (LBP-19-8) (ADAMS Accession No. ML19297F366). Appeals from the Board's decisions in LBP-19-3, LBP-19-6 and LBP-19-8, and the Board's referred ruling in LBP-19-3, are pending before the Commission at this time.

## PURPOSE AND NEED

The purpose and need for the proposed Federal action (issuance of subsequent renewed licenses for Turkey Point Units 3 and 4) is to provide an option that allows for power generation capability beyond the term of the current renewed nuclear power plant operating licenses to meet future system generating needs. Such needs may be determined by energy-planning decisionmakers such as State regulators, utility owners, and Federal agencies other than the NRC. This definition of purpose and need reflects the NRC's recognition that, unless there are findings in the NRC's safety review (required by the Atomic Energy Act) or findings in the NRC's environmental analysis (required by NEPA) that would lead the NRC to reject a license renewal application, the NRC does not have a role in energy-planning decisions as to whether a particular nuclear power plant should continue to operate.

The issuance of a renewed license is just one of a number of conditions that a licensee must meet to be able to operate its nuclear power plant during the license renewal term. Ultimately, the appropriate energy-planning decisionmakers and Florida Power & Light will decide whether the plants will continue to operate based on the need for power or other factors within the State and County's jurisdiction or the purview of the owners.

## NRC EVALUATION OF THE PROPOSED ACTION AND ALTERNATIVES

In license renewal environmental reviews, the NRC considers the environmental consequences of the proposed action (i.e., renewing the operating license), the environmental consequences of the no-action alternative (i.e., not renewing the operating license), and the environmental consequences of various alternatives for replacing the nuclear power plant's generating capacity. Section 102(2)(C)(iii) of NEPA and the NRC's regulations require the consideration of alternatives to the proposed action in the EIS. In this case, the proposed action is issuance of renewed operating licenses for Turkey Point Units 3 and 4, which will authorize the applicant to operate the plant for an additional period beyond the expiration date of the current licenses. Chapter 2 of the SEIS, "Alternatives Including the Proposed Action," and Chapter 4, "Environmental Consequences and Mitigating Actions," present the NRC staff's evaluation and analysis of the environmental impacts of the proposed action and alternatives to license renewal that were considered in detail, as well as those alternatives that were eliminated from detailed study. The evaluation considered environmental impacts of each alternative across the following impact areas: land use and visual resources, air quality and noise, geologic environment, water resources, terrestrial resources, aquatic resources, special status species, historic and cultural resources, socioeconomics, human health, environmental justice, and waste management. In addition to replacement power alternatives, the SEIS evaluates an alternative cooling water system to mitigate potential impacts associated with the continued use of the existing cooling canal system.

As explained in the purpose and need for the proposed Federal action, outside of the safety and environmental reviews, the NRC does not have a role in the energy planning decisions as to whether a particular nuclear power plant should continue to operate. Should the operating license not be renewed and the nuclear plant shuts down at the end of its current license, the appropriate energy planning decisionmakers will decide how best to replace the nuclear power plant's generating capacity. In evaluating alternatives to license renewal, the NRC considered energy technologies or options currently in commercial operation, as well as technologies not currently in commercial operation but likely to be commercially available by the time the current Turkey Point Units 3 and 4 operating licenses expire.

For a replacement power alternative to be considered reasonable, it must be both (1) commercially viable on a utility scale and (2) operational before the reactor's operating license expires or (3) expected to become commercially viable on a utility scale and operational before the expiration of the reactor's operating license. The current renewed operating licenses for Turkey Point Units 3 and 4 expire on July 19, 2032, and April 10, 2033, respectively. Therefore, to be considered in this evaluation, reasonable alternatives had to be available (i.e., constructed, permitted, and connected to the grid) by those dates. To determine whether alternatives were reasonable, or likely to be commercially suitable to replace Turkey Point, the NRC staff reviewed energy-relevant statutes, regulations, and policies; the state of technologies; and information on energy outlook from sources such as the Energy Information Administration, other organizations within the U.S. Department of Energy, industry sources and publications, and information submitted by FPL in its environmental report.

### Evaluation of Alternatives

#### *i. No-Action Alternative*

At some point, all operating nuclear power plants will permanently cease operations and undergo decommissioning. The no-action alternative represents a decision by the NRC to not issue renewed operating licenses to a nuclear power plant beyond the current operating license term. Under the no-action alternative, the NRC does not issue the subsequent renewed operating licenses for Turkey Point, such that the units would shut down at or before the expiration of the current licenses in July 2032 (Unit 3) and April 2033 (Unit 4). The GEIS describes the environmental impacts that arise directly from permanent plant shutdown. The NRC expects shutdown impacts to be relatively similar whether they occur at the end of the current license term (i.e., after 60 years of operation) or at the end of a subsequent renewed license term (i.e., after 80 years of operation).

After permanent shutdown, plant operators will initiate decommissioning in accordance with 10 CFR 50.82, "Termination of license." The decommissioning GEIS (ADAMS Accession Nos. ML023470327, ML023500228, and ML023500295) describes the environmental impacts from decommissioning a nuclear power plant and related activities. The analysis in the decommissioning GEIS bounds the environmental impacts of decommissioning at such time as FPL terminates reactor operations at Turkey Point. Chapter 4 of the license renewal GEIS and Section 4.15.2 of the Turkey Point SEIS describe the incremental environmental impacts of subsequent license renewal on decommissioning activities.

Termination of operations at Turkey Point would result in the total cessation of electrical power production by Turkey Point Units 3 and 4. The no-action alternative does not expressly meet the purpose and need of the proposed action because the no-action alternative does not provide a means of delivering baseload power to meet future electric system needs. Assuming that a need exists for the power generated by Turkey Point Units 3 and 4 at the time of their shutdown, the no-action alternative would likely create a need for a replacement power alternative. The NRC staff's environmental review includes a comparison of the environmental impacts of subsequent license renewal with the impacts of a range of energy sources that might be chosen in the event that the current renewed Turkey Point licenses are not subsequently renewed.

*ii. Alternative Energy Sources*

In evaluating alternatives to subsequent license renewal, the NRC considered energy technologies or options currently in commercial operation, as well as technologies not currently in commercial operation, but likely to be commercially available by the time the current Turkey Point renewed operating licenses expire.

The GEIS presents an overview of some alternative energy technologies but does not conclude which alternatives are most appropriate. Because alternative energy technologies are continually evolving in capability and cost, and because regulatory structures have changed to either promote or impede the development of particular technologies, the analyses in the FSEIS rely on a variety of sources of information to determine which alternatives would be available and commercially viable when the current licenses expire. FPL's environmental report provides a discussion of replacement power alternatives. In addition to the information FPL provided in its environmental report, the NRC staff's analyses relied on appropriate Federal, State, and industry information sources.

In total, the NRC staff considered 16 replacement power alternatives to the proposed action and eliminated 13 of these from detailed study because of existing technical, resource availability, or commercial limitations. These limitations are likely to continue when the current Turkey Point renewed licenses expire, rendering these alternatives not feasible or commercially viable. The no-action alternative (i.e., not issuing subsequent renewed licenses) was also considered. Alternatives considered, but eliminated from detailed study were as follows:

- solar power
- wind power
- biomass power
- demand-side management
- hydroelectric power
- geothermal power
- wave and ocean energy
- municipal solid waste
- petroleum-fired power
- coal-fired power
- fuel cells
- purchased power
- delayed retirement of other generating facilities.

The basis for the elimination of each of these alternatives is explained in Section 2.3 of the final SEIS.

This left three reasonable replacement power alternatives for in-depth evaluation:

- new nuclear generation
- natural gas combined cycle (NGCC)
- combination alternative (NGCC and solar power)

These three alternatives are described in Sections 2.2.2.1 through 2.2.2.3 of the FSEIS, and NRC staff's in-depth evaluation of these alternatives is presented in Chapter 4 of the FSEIS. The alternatives selected for detailed evaluation in the FSEIS are briefly described below.

#### *New Nuclear Alternative*

The NRC staff considers the construction of a new nuclear plant to be a reasonable alternative to Turkey Point subsequent license renewal. The NRC staff determined that there may be sufficient time for FPL to prepare and submit an application, build, and operate two new nuclear units using a certified design before the Turkey Point Units 3 and 4 licenses expire in 2032 and 2033.

In 2018, as part of a separate licensing action, the NRC issued combined licenses (COLs) to FPL for the construction and operation of two new Westinghouse AP1000 reactor units at the Turkey Point site. For the purpose of this subsequent license renewal analysis, the NRC staff assumed two separate Westinghouse AP1000 reactors would replace Turkey Point Units 3 and 4. For the new nuclear alternative, the replacement power facility would be located within the Turkey Point property, but outside the current footprints of Turkey Point Units 3 and 4. Accordingly, the heat rejection demands of these new nuclear reactors would also be similar to those of Turkey Point Units 3 and 4. As stated in FPL's environmental report, the new nuclear alternative would use a mechanical draft cooling tower system. This closed-cycle cooling system would primarily use reclaimed wastewater from the Miami-Dade Water and Sewer Department, with saltwater produced from radial collection wells under Biscayne Bay used as a temporary backup source.

The NRC staff also considered the installation of multiple small modular reactors as a new nuclear alternative to renewing the Turkey Point Unit 3 and 4 licenses. Small modular reactors generate approximately 300 MW or less, so they have lower initial capacity than that of traditional large-scale units. However, they have greater siting flexibility because they can fit in locations not large enough to accommodate traditional nuclear reactors. The NRC staff assumes that the resource requirements and key characteristics associated with constructing and operating small modular reactors would be bounded by the larger nuclear units evaluated in the SEIS.

#### *Natural Gas Combined-Cycle Alternative*

The NRC staff considers the construction of a natural gas combined-cycle power plant to be a reasonable alternative to Turkey Point subsequent license renewal because natural gas is a

feasible, commercially available option for providing baseload electrical generating capacity beyond the expiration of Turkey Point's current licenses.

Baseload natural gas combined-cycle power plants have proven their reliability and can have capacity factors as high as 87 percent. For this alternative, the NRC staff assumes that three natural gas units would be constructed and operated to replace Turkey Point's generating capacity. Together, the three units would collectively replace Turkey Point's approximate net generating capacity of 1500 MWe.

The NRC staff assumes that the natural gas combined-cycle plant would use a closed-cycle cooling system with mechanical draft cooling towers. Because of the high overall thermal efficiency of this type of plant, the natural gas combined-cycle alternative would require less cooling water than Turkey Point subsequent license renewal. Onsite visible structures could include the cooling towers, exhaust stacks, intake and discharge structures, transmission lines, natural gas pipelines, and an electrical switchyard.

#### *Combination Alternative*

The NRC staff considers construction of an alternative that combines construction of new natural gas combined-cycle and new solar power generating facilities to be a reasonable alternative to Turkey Point subsequent license renewal because these sources, when combined, provide a feasible, commercially available option for providing baseload electrical generating capacity beyond the expiration of Turkey Point's current licenses. The staff assumes that the natural gas combined-cycle facility and one of the four solar plants would be located within the Turkey Point property and would use existing available site infrastructure to the extent practicable. The other three solar facilities would be located at offsite locations within the region of influence, specifically within Miami-Dade and Broward counties.

The natural gas portion of the combination alternative would be generated using a natural gas combined-cycle plant. Although similar in function and appearance to the natural gas plant described above, the natural gas plant considered under the combination alternative would have slightly less generating capacity. Specifically, this slightly smaller plant would collectively replace 1,420 MWe of Turkey Point's approximate net generating capacity.

The NRC staff assumes that the natural gas plant would similarly use a closed-cycle cooling system with mechanical draft cooling towers.

The NRC staff considers the construction of solar photovoltaic facilities to be a reasonable alternative to subsequent license renewal when combined with natural gas combined-cycle facilities.

The solar portion of the combination alternative would be generated using a utility-scale solar photovoltaic facility comprised of four units. Operating at a 26 percent capacity factor, the solar units collectively would have an approximate net generating capacity of 80 MWe. When combined with the natural gas portion of this alternative, the total power produced would be sufficient to replace Turkey Point's approximate net generating capacity of 1500 MWe.

*iii. Alternative Cooling Water Source*

The NRC staff also evaluated in the FSEIS an alternative cooling water system technology for Turkey Point Units 3 and 4 that might be used to mitigate the potential impacts associated with continued use of the existing cooling canal system. The purpose of this analysis is for the NRC staff to compare an alternative closed-cycle cooling system approach with the proposed action to inform the NRC's licensing decision, decisions by other decisionmakers, and the public, as applicable, under NEPA. However, the NRC has neither the statutory nor the regulatory authority to determine which cooling water system or technology should be used, or to decide other permitting issues, for which the State of Florida has been delegated regulatory authority under the Clean Water Act.

The NRC staff's analysis of the alternative cooling water system draws upon an application, which FPL submitted to the NRC in 2009 for COLs to build and operate two new nuclear reactors (Turkey Point Units 6 and 7) on the Turkey Point site. The NRC staff conducted an environmental review of that COL application and published it as NUREG-2176, "Environmental Impact Statement for Combined Licenses (COLs) for Turkey Point Nuclear Plant Units 6 and 7" (ADAMS Package Accession No. ML16335A219). Section 3.2.2.2 of the COL EIS describes a cooling water system alternative to Turkey Point's existing cooling canal system that consists of onsite mechanical draft cooling towers. Under the cooling water system alternative that is evaluated by the NRC staff in the subsequent license renewal FSEIS, Turkey Point Units 3 and 4 would each use three similar closed-cycle wet-cooling towers (six cooling towers in total) to dissipate heat from the reactor cooling water systems.

As in the new nuclear alternative, the primary source of cooling water is assumed to be reclaimed wastewater.

The CCS would continue to operate regardless of the proposed Turkey Point license renewal because it supports retired fossil fuel Units 1 and 2. FPL plans to continue to use water from the CCS to support these units' operation in synchronous condenser mode over the course of the proposed subsequent license renewal period. Additionally, fossil fuel Unit 5 would remain in operation and would continue to discharge blowdown to the CCS. Furthermore, requirements of the October 7, 2015, Consent Agreement between FPL and Miami-Dade County and the June 20, 2016, Consent Order between FPL and the Florida Department of Environmental Protection would continue to apply.

*iv. Summary*

In the FSEIS for the Turkey Point subsequent license renewal, the NRC staff considered the environmental impacts associated with subsequent license renewal and with alternatives to subsequent license renewal, including alternative power generation technologies; the impacts of not renewing the Turkey Point Unit 3 and 4 operating licenses (the no-action alternative); and the impacts of an alternative to operation of the cooling canal system. The FSEIS concludes that environmental impacts of the proposed action (subsequent renewal of the Turkey Point operating licenses) would be SMALL for all impact categories except for groundwater resources and aquatic resources. The impacts to groundwater resources range from SMALL to MODERATE because of groundwater use conflicts during subsequent license renewal. Due to impingement, entrainment, and thermal impacts on the aquatic organisms in the cooling canal

system, the impact of the Turkey Point subsequent license renewal to aquatic resources would be SMALL to MODERATE.

As summarized in Table 2-2 of the FSEIS (“Summary of Environmental Impacts of the Proposed Action and Alternatives,” reproduced below in Table 1), each of the three reasonable replacement power alternatives have environmental impacts in at least two resource areas that are greater than the environmental impacts of the proposed action of subsequent license renewal. In addition, the replacement power alternatives also involve the environmental impacts inherent to new construction projects. If the NRC adopts the no-action alternative and does not issue subsequent renewed licenses for Turkey Point, energy-planning decisionmakers would likely implement one of the three replacement power alternatives discussed in-depth in Chapter 4 of the FSEIS. Based on the NRC staff’s review of these three replacement power alternatives, the no-action alternative, and the proposed action, the staff concludes that the environmentally preferred alternative is the proposed action of subsequent license renewal. Therefore, the NRC staff proposes to recommend that the NRC issue subsequent renewed operating licenses for Turkey Point Units 3 and 4.

Table 1 Summary of Environmental Impacts of the Proposed Action and Alternatives

<b>Impact Area (Resource)</b>	<b>Turkey Point Subsequent License Renewal (Proposed Action)</b>	<b>No-Action Alternative</b>	<b>New Nuclear Alternative</b>	<b>Natural Gas Combined-Cycle Alternative</b>	<b>Combination Alternative (Natural Gas Combined-Cycle and Solar Photovoltaic)</b>	<b>Cooling Water System Alternative</b>
Land Use	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to LARGE	SMALL
Visual Resources	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to LARGE	SMALL to MODERATE
Air Quality	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL
Noise	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Geologic Environment	SMALL	SMALL	SMALL	SMALL	MODERATE	SMALL
Surface Water Resources	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Groundwater Resources	SMALL to MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL
Terrestrial Resources	SMALL	SMALL	MODERATE	MODERATE	MODERATE	MODERATE
Aquatic Resources	SMALL to MODERATE	SMALL	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE
Special Status Species and Habitats	See Note <sup>(a)</sup>	See Note <sup>(b)</sup>	See Note <sup>(b)</sup>	See Note <sup>(b)</sup>	See Note <sup>(b)</sup>	See Note <sup>(b)</sup>

Historic and Cultural Resources	See Note <sup>(c)</sup>	See Note <sup>(d)</sup>	See Note <sup>(e)</sup>	See Note <sup>(e)</sup>	See Note <sup>(f)</sup>	See Note <sup>(e)</sup>
Socioeconomics	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL	SMALL
Transportation	SMALL	SMALL	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Human Health	SMALL <sup>(g)</sup>					
Environmental Justice	See Note <sup>(h)</sup>	See Note <sup>(i)</sup>	See Note <sup>(i)</sup>	See Note <sup>(i)</sup>	See Note <sup>(k)</sup>	See Note <sup>(j)</sup>
Waste Management and Pollution Prevention	SMALL <sup>(l)</sup>	SMALL <sup>(l)</sup>	SMALL <sup>(l)</sup>	SMALL	SMALL	SMALL

- (a) The NRC staff concludes that Turkey Point subsequent license renewal is likely to adversely affect the American crocodile and the eastern indigo snake, and may result in adverse modification to designated critical habitat of the American crocodile. The NRC staff concludes that proposed action may affect, but is not likely to adversely affect, the Florida panther, West Indian manatee, red knot, wood stork, loggerhead sea turtle, green sea turtle, leatherback sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, and smalltooth sawfish. The NRC staff concludes that the proposed action would result in no adverse modification to designated critical habitat of the West Indian manatee. The NRC staff's evaluation of impacts to federally listed species and critical habitats under the U.S. Fish and Wildlife Service's jurisdiction appears in the NRC's Biological Assessment (ADAMS Accession No. ML18353A835). The FWS's separate evaluation and conclusions appear in a July 25, 2019, biological opinion (ADAMS Accession No. ML19221B583), which is described in Section 4.8.1.1 of this SEIS. The NRC staff's evaluation of impacts to federally listed species and critical habitats under the National Marine Fisheries Service's jurisdiction appears in Section 4.8.1.1 of this SEIS. The NRC staff concludes that the proposed action would have no adverse effects on Essential Fish Habitat. The NRC staff's evaluation of impacts to Essential Fish Habitat appears in Section 4.8.1.2 of this SEIS. The NRC staff concludes that the proposed action would not affect the sanctuary resources of the Florida Keys National Marine Sanctuary. The NRC staff's evaluation of sanctuary resources appears in Section 4.8.1.3 of this SEIS.
- (b) The types and magnitudes of adverse impacts to species listed pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), designated critical habitat, and Essential Fish Habitat would depend on Turkey Point shutdown activities, the proposed alternative site, plant design, and operation, as applicable, and on the listed species and designated critical habitats present when the alternative is implemented. Therefore, the NRC staff cannot forecast a particular level of impact for this alternative.
- (c) Based on (1) the location of National Register of Historic Places-eligible historic properties within the area of potential effect, (2) tribal input, (3) FPL's cultural resource protection plans, (4) the fact that no license renewal-related physical changes or ground-disturbing activities would occur, (5) Florida State Historic Preservation Office input, and (6) cultural resource assessment, license renewal would not adversely affect any known historic properties (Title 36 of the *Code of Federal Regulations* 800.4(d)(1), "No Historic Properties Affected").
- (d) As a result of facility shutdown, land-disturbing activities or dismantlement are not anticipated as these would be conducted during decommissioning. Therefore, facility shutdown would have no immediate effect on historic properties or historic and cultural resources.
- (e) Since the alternative would be located at the Turkey Point site, which has a low archeological potential, and avoidance of significant resources would be possible, this alternative would not adversely affect known historic properties.

- 
- (f) The impacts from the construction and operation of the solar component would depend on where solar facilities are constructed. The historic and cultural resource impact could range from no adverse effect to adverse effect.
  - (g) The chronic effects of electromagnetic fields on human health associated with operating nuclear power and other electricity generating plants are uncertain.
  - (h) There would be no disproportionately high and adverse impacts to minority and low-income populations.
  - (i) A reduction in tax revenue resulting from the shutdown of Turkey Point could decrease the availability of public services in the Turkey Point area. However, the effects to minority and low-income populations would not be disproportionately high and adverse.
  - (j) Based on the analysis of human health and environmental impacts presented in this SEIS, the location of the alternative, and the assumed alternative design and characteristics, this alternative would not likely have disproportionately high and adverse human health and environmental effects on minority and low-income populations.
  - (k) This alternative would not likely have disproportionately high and adverse human health and environmental effects on minority and low-income populations. However, this determination would depend on the location of the solar facilities. Therefore, the NRC staff cannot determine whether the solar portion of the combination alternative would result in disproportionately high and adverse human health and environmental effects on minority and low-income populations.
  - (l) NUREG-2157, "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel," (ADAMS Accession No. ML14198A440) discusses the environmental impact of spent fuel storage for the timeframe beyond the licensed life for reactor operations.
-

## UPDATED STATUS OF ENDANGERED SPECIES ACT SECTION 7 CONSULTATION

In conjunction with its review of the license renewal application, the NRC staff conducted consultation under Section 7 of the Endangered Species Act (ESA) of 1973, as amended, with the National Marine Fisheries Service (NMFS). Appendix C.1 of the FSEIS describes the status of the staff's consultation with the NMFS, which was not yet concluded when the staff completed the FSEIS. On April 1, 2019, the NRC staff requested the NMFS's concurrence with the staff's determinations that the proposed action may affect, but is not likely to adversely affect, the loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtle (*Eretmochelys imbricata*), and smalltooth sawfish (*Pristis pectinata*) (ADAMS Accession No. ML19091A128). On June 7, 2019, the NRC staff transmitted its determinations for two additional species, Kemp's ridley sea turtle (*Lepidochelys kempii*) and Nassau grouper (*Epinephelus striatus*) to the NMFS (ADAMS Accession No. ML19158A503). The staff determined that the proposed action may affect, but is not likely to adversely affect, the Kemp's ridley sea turtle. The staff also determined that the proposed action would have no effect on the Nassau grouper, because NMFS had previously determined in a 2017 consultation with the NRC that the Nassau grouper would not occur in the action area, and the staff had identified no new information during its review for subsequent license renewal indicating that this species would occur in the action area.

On October 22, 2019, the NMFS concurred with the NRC staff's determinations that the proposed action may affect, but is not likely to adversely affect, the loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's ridley sea turtle (*Lepidochelys kempii*), and smalltooth sawfish (*Pristis pectinata*). The NMFS also concluded that the proposed action may affect, but is not likely to adversely affect, the Nassau grouper (*Epinephelus striatus*). The NMFS's concurrence concluded consultation for the proposed Turkey Point license renewal. Accordingly, the NRC has fulfilled its obligations under ESA Section 7(a)(2) with respect to the proposed action for federally listed species and critical habitats under the jurisdiction of the NMFS.

With respect to federally listed species and critical habitats under the jurisdiction of the U.S. Fish and Wildlife Service (FWS), the NRC staff consulted with the FWS on the proposed action in 2018 and 2019. On July 25, 2019, the FWS issued a biological opinion for Turkey Point. In its opinion, the FWS concluded that the continued operation of Turkey Point through the duration of the proposed subsequent license renewal period is not likely to jeopardize the continued existence of the American crocodile (*Crocodylus acutus*) or eastern indigo snake (*Drymarchon corais couperi*) and will not adversely modify the critical habitat of the American crocodile. The biological opinion includes an incidental take statement (ITS) applicable to the American crocodile and eastern indigo snake. The ITS's terms and conditions are nondiscretionary and must be undertaken by the NRC so that they become binding conditions of the renewed licenses, if granted, for the exemption in ESA Section 7(o)(2) to apply. Accordingly, the NRC will include conditions in the Turkey Point subsequent renewed facility operating licenses requiring FPL to adhere to the specific requirements within the ITS. Appendix A.1 of the FSEIS describes the staff's consultation with the FWS in more detail.

## MITIGATION MEASURES

The NRC has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm from the proposed action (subsequent license renewal). The NRC has determined that no additional mitigation measures are warranted and therefore is not imposing any license conditions in connection with mitigation measures for the continued operation of Units 3 and 4, apart from insertion of a condition regarding the ITS in Appendix B (Environmental Protection Plan) of the current licenses, which will continue in effect during the subsequent license renewal term. The NRC notes that Turkey Point is also subject to requirements including permits, authorizations, and regulatory orders imposed by other Federal, State, and local agencies governing facility operation, including the cooling canal system. For example, the National Pollutant Discharge Elimination System (NPDES) permit issued to FPL imposes effluent limitations and monitoring requirements as well as best management practices to ensure that impacts to water quality and aquatic life are minimized. The NRC is not requiring any new environmental monitoring programs beyond what is required for the NPDES permits or otherwise required under the NRC's regulations, as described in the FSEIS.

## CONSIDERATION OF EMERGING INFORMATION AND COMMENTS ON THE FSEIS

### Issuance of 2019 Annual Monitoring Report

The NRC staff's FSEIS includes consideration of FPL's annual monitoring reports through the period ending May 31, 2018. In August 2019, FPL issued the Turkey Point Plant Annual Monitoring Report for 2019. This report covers the period June 1, 2018, through May 31, 2019. The report summarizes the latest analytical results from FPL's meteorological, hydrologic, water quality, and ecological community monitoring that covers the Turkey Point CCS, Biscayne Bay, Card Sound, marshlands, mangrove areas, and canals adjacent to the CCS. FPL conducts this monitoring to assess the horizontal and vertical effects and extent of CCS water on existing and projected surface water, groundwater and ecological conditions surrounding Turkey Point. FPL conducts this monitoring under the auspices of the State of Florida's Department of Environmental Protection (FDEP), SFWMD, and the Miami-Dade County Department of Environmental Resources Management (DERM).

The NRC staff was unable to incorporate the information from the 2019 monitoring report in the Turkey Point FSEIS because FPL had not published the 2019 report by the time the NRC staff's environmental review concluded and the Turkey Point FSEIS was being prepared for publication. In the Turkey Point FSEIS, the NRC staff considered and carefully evaluated analytical results and conclusions contained in FPL's 2018 Turkey Point Plant Annual Monitoring Report, as summarized throughout the FSEIS including, but not limited to, sections 3.5.1.4, 3.5.2.2, 3.6.2, and 3.7.4.

Following FPL's issuance of the 2019 monitoring report, the NRC staff examined the report to determine whether the latest published data present new and significant information such that a supplement to the Turkey Point FSEIS would be required, in accordance with 10 CFR 51.92(a). The staff's review identified no substantial changes in monitoring results or trends for hydrologic parameters, surface water quality, groundwater quality, or ecological communities that would change any conclusions presented in the FSEIS. Therefore, the NRC staff determined that no supplement to the Turkey Point FSEIS was required.

## Comments on the FSEIS

On November 1, 2019, the EPA issued the Notice of Availability for the FSEIS regarding the Turkey Point Units 3 and 4 subsequent license renewal application (84 FR 58713). On December 2, 2019, NRC staff received a letter from EPA Region 4 providing comments on the FSEIS. The NRC staff has carefully reviewed the letter and the comments attached thereto. After thorough review and consideration, the staff has determined that the issues discussed in the EPA's comments were previously considered and addressed in the FSEIS and Appendix A thereto, as further amplified below in response to EPA's comments. Therefore, the staff has concluded that no further evaluation of these comments is required, and no change to the staff's conclusions is warranted.

First, in its comments on the FSEIS, the EPA reaffirmed its request that the NRC add language to the renewed operating licenses for Turkey Point Units 3 and 4, or to the ROD, requiring FPL to implement alternative water quality mitigation measures should FPL be unable to achieve mandated groundwater remediation objectives prescribed by the Florida Department of Environmental Protection and Miami-Dade County associated with the cooling canal system operations. As previously described in the NRC staff's October 25, 2019, letter to EPA (ADAMS Accession No. ML19295F527) and in the NRC staff's responses to EPA and other stakeholder comments contained in Appendix A, Section A.2.11, of the FSEIS, the NRC does not have regulatory authority to require FPL to comply with the Clean Water Act; such regulatory authority resides with the EPA and its delegatee, the State of Florida. Likewise, the NRC does not have regulatory authority to require FPL to comply with consent agreements or consent orders issued by the FDEP or the DERM and, therefore, cannot make compliance with orders issued by other agencies a condition of the NRC license. Neither does the NRC have the regulatory authority to require that FPL implement an alternative closed-loop cooling water system or other measures as a license condition if requirements imposed by the FDEP or DERM are unsuccessful in achieving their objectives. Similarly, the NRC's regulatory authority does not enable it to incorporate such language into this ROD.

Second, the NRC staff acknowledges the EPA's observation that a discussion in Section 3.5.1.1 ("Potential for Flooding at the Turkey Point Site") of the FSEIS does not describe the detailed model that was used by FPL to conduct flooding and storm surge analyses for the Turkey Point site, and EPA's recommendation that the NRC provide a description of the modeling and associated rationale supporting storm surge and flooding analyses in future assessments. In this regard, as noted in the FSEIS, the flood hazard analysis for Turkey Point Units 3 and 4 was performed by FPL in connection with the NRC's oversight of the current operating licenses at Turkey Point Units 3 and 4, and not in connection with the subsequent license renewal. More specifically, in 2012, the Commission ordered all nuclear power plant licensees to conduct appropriate flood hazard reevaluations based on recommendations from the NRC's Japan Near-Term Task Force that was commissioned after the March 11, 2011, Great Tohoku Earthquake and subsequent tsunami, impacting the Fukushima Dai-ichi nuclear power plants. As discussed in the FSEIS at page 3-42, FPL submitted its updated flooding analysis on June 29, 2017, as required; a detailed description of that analysis ("Turkey Point Nuclear Generating Station Flooding Focused Evaluation Summary") is contained in the document cited in the FSEIS at page 3-42 as NRC 2017b (ADAMS Accession No. ML17212B180). Following its review of FPL's analysis, the NRC staff determined that FPL conducted the flood hazard reevaluation for

Turkey Point Units 3 and 4 using NRC-approved modeling approaches and applicable guidance, including Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178). The NRC staff's letter approving FPL's analysis, dated July 3, 2018, is available at ADAMS Accession No. ML18158A548; this document was inadvertently not cited on page 3-42 of the FSEIS, and should have been identified and listed in Chapter 6. More generally, historic and current information relating to the scope, process, relevant guidance, and status of the facility-specific flood hazard reevaluation activities can be found on the NRC's public web site at <https://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard/flooding.html>.

#### DETERMINATION

Based on the NRC staff's (a) independent review, analysis, and evaluation contained in the subsequent license renewal FSEIS; (b) careful consideration of all of the identified social, economic, and environmental factors; (c) input received from other agencies, organizations, and the public; and (d) consideration of mitigation measures, the NRC has determined that the standards for the issuance of a subsequently renewed operating license, with respect to the environmental matters as described in 10 CFR 54.29(b), have been met and that the requirements of Section 102 of NEPA have been satisfied. The NRC has determined that the adverse environmental impacts or issuing subsequent renewed operating licenses for Turkey Point Units 3 and 4 are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

Dated at Rockville, MD, this 4th day of December, 2019,

APPROVED BY:

*/RA/*

Anna H. Bradford, Director  
Division of New and Renewed Licenses  
Office of Nuclear Reactor Regulation