



May 2, 2023

Brooke P. Clark
Secretary, U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTN: Rulemaking and Adjudications Staff
Submitted via email: Rulemaking.Comments@nrc.gov

Subject: Proposed Rule amending environmental protection regulations pursuant to Revision 2 to NUREG-1437 "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (LR GEIS)

Dear Secretary Clark,

The undersigned appreciate the opportunity to comment on the Nuclear Regulatory Commission's plans to update environmental protection regulations concerning subsequent nuclear power plant license renewals. We support the Commission's commitment to update the GEIS, although in our view the staff has positioned too many important, site-specific issues as "Category 1".

This letter, in response to the March 10, 2023 Federal Register notice (*Renewing Nuclear Power Plant Licenses—Environmental Review*, 88 Fed. Reg. 13,329), identifies existing environmental concerns at the Turkey Point Nuclear Power Plant in Miami-Dade County that should be fully vetted in any subsequent license renewal. Given the increasing gravitas of climate change and sea level rise in our region, we cannot overstate the need for site-specific review of environmental factors that will be increasingly affected in ways not previously contemplated. The NRC should evaluate the following factors on a site-specific basis at Turkey Point:

- (11) *Altered Salinity Gradients*
- (14) *Discharge of Metals into Cooling System Effluent*
- (16) *Surface Water Use Conflicts (plants with cooling ponds or cooling towers using makeup water from a river)*
- (22) *Groundwater Use Conflicts (plants that withdraw more than 100 gallons per minute)*
- (25) *Groundwater Quality Degradation (plants with cooling ponds)*
- (26) *Radionuclides released to groundwater*
- (32) *Water use conflicts with terrestrial resources (generating plants with cooling ponds or cooling towers)*
- (41) *Effects of non-radiological contaminants on aquatic organisms*
- (47 and 48) *Endangered Species Act: Federally listed species and critical habitats under U.S. Fish and Wildlife and National Marine Fisheries Service jurisdiction*
- (56) *Transportation*
- (74) *Climate Change Impacts on Environmental Resources*

Turkey Point Nuclear Power Plant's Site-Specific Environmental Impacts

Location

The Turkey Point complex is located in a highly sensitive area of the watershed: at the shores of the Biscayne Bay Aquatic Preserve (a State of Florida designation to conserve a waterbody's natural and cultural heritage); abutting the Biscayne National Park; approximately 12 miles from Everglades National Park; above a sole-source drinking water aquifer; less than ten miles from several municipal wellheads; and adjacent to the Model Lands (an undeveloped area of Miami-Dade County that is designated as "environmentally-endangered"). It occupies traditional Miccosukee land. Now, the complex is abutting an area contemplated for Everglades restoration under state and federal auspices.

Cooling Canal System

In the early 1970s, a consent decree between the Federal Government and Florida Power and Light (FPL) stipulated that FPL build a recirculating multichannel system to prevent thermal pollution from entering the adjacent Biscayne Bay.¹ When the U.S. Atomic Energy Commission prepared a 1972 environmental impact statement (EIS) for the planned cooling canal system (CCS), the EIS acknowledged that water from the unlined CCS could emerge via groundwater into Biscayne Bay to the east,² even while acknowledging that available information was extremely limited³ regarding the environmental impacts from the construction and operation of the proposed CCS. The agency also concluded that environmental impacts from the 5,900 acre CCS would be insignificant on subsurface flows to the west.⁴

FPL, through the original consent decree, agreed to seek ways of improving on the CCS by investigating the feasibility of a mechanical draft cooling tower and water spray modules as a replacement or supplemental cooling system for the CCS.⁵ FPL also agreed to investigate alternate sources of water, such as brackish, deep groundwater, and surface water sources for either the CCS or mechanical cooling devices.

¹ *Final Environmental Statement Related to Operation of Turkey Point Plant*, 1972, Dockets No, 50-250 and 50-251, at III-5 and III-7. Included as Attachment 1.

² *Id.*, at ii.

³ *Id.*, at iii.

⁴ *Id.*, at VI-2.

⁵ *Id.*, XI-2

CCS Temperature and Salinization

The environmental impacts on groundwater are, in fact, clearly noticeable and significant. Dense, saline water circulating through the unlined cooling canal system migrates radially from the CCS⁶ because the porous geology of the underlying Biscayne Aquifer allows water from the CCS to move freely through the ground beyond the limits of the Turkey Point property.

As hot water exiting the reactor circulates around the CCS, the water evaporates in the shallow canals, concentrating its salt content. Salinity has increased in the CCS by around 5% per decade since 1973,⁷ resulting in present-day hypersaline conditions. Given that the shallow, unlined CCS was excavated into highly porous limestone, water migrates beyond the limits of the cooling canal system and off the FPL property. Due to its density, the hypersaline water sinks through the strata and to the bottom of the Biscayne aquifer where it spreads in all directions. Hypersaline water has been tracked spreading west at a rate of up to around one foot per day.⁸ Over time, the CCS has emitted a hulking mass of hypersaline (<19,000 mg/L chloride concentration) groundwater that has extended as far as 2 miles west of the property.⁹

To be sure, the CCS is not the only driver of saltwater contamination into the aquifer. Saline water is encroaching into the fresh Biscayne Aquifer as a phenomenon of sea level rise. However, the CCS-driven hypersaline plume in the area of Turkey Point presents an additional concern, because it is influencing the movement of the saline water interface within the Biscayne Aquifer more than 4 miles inland.¹⁰

Moreover, cooling canal waters are warming. A 2014 uprate that increased the plant's power-generating capacity correlated to increasing water temperatures in the CCS,¹¹ so much so that FPL requested approval from the NRC to increase the maximum limit on cooling waters.¹² In addition to the hotter temperatures yielded by the increased power-generating capacity, waters in the CCS are also subject to a warming climate.

⁶ McThenia, A.W, Martin, W. K., Reynolds, J., 2017. *Rising Tides and Sinking Brines: Managing the Threat of Salt Water Intrusion*. Florida Water Resources Journal 68, at 36. Included as Attachment 2.

⁷ Chin, D. A. (2015). *The Cooling Canal System at the FPL Turkey Point Power Station*, at 2. Included as Attachment 3.

⁸ McThenia, A.W, Martin, W. K., Reynolds, J., 2017. *Rising Tides and Sinking Brines: Managing the Threat of Salt Water Intrusion*. Florida Water Resources Journal 68, at 36.

⁹ *Id.*, at 36.

¹⁰ McThenia, A.W, Martin, W. K., Reynolds, J., 2017. *Rising Tides and Sinking Brines: Managing the Threat of Salt Water Intrusion*. Florida Water Resources Journal 68, at 36.

¹¹ Chin, D. A., 2015. *The Cooling Canal System at the FPL Turkey Point Power Station*, at 1.

¹² Turkey Point Generating Unit Nos. 3 and 4 - Issuance of Amendments No. 261 and 256 (TAC Nos. M4392 and MF 4393).

Cooling Canal Freshwater Augmentation and Surface Water Impacts

Concerns regarding the unusually high temperatures and salinity in the CCS reached a flashpoint following the uprate. In August of 2014, the plant operator reduced power at Turkey Point Units 3 and 4 due to excessive ultimate heat sink temperature in the CCS.¹³ Likewise, the South Florida Water Management District (SFWMD, or “District”) issued an emergency order approving the use of water from the nearby L-31E canal to freshen the CCS.¹⁴ Following the emergency order, the District approved a separate authorization in 2015 to allow the plant operator to pump up to 18,300 million gallons annually (up to 100 million gallons per day) of L-31E fresh water into the CCS.¹⁵

The canal freshening was evaluated by a third-party academic reviewer who posited that additions to the CCS may have adverse impacts.¹⁶ The reviewer stated that under the SFWMD-approved pumping protocol, the cooling canal stage would rise while the stage of the L-31E canal would be held constant. This could result in a decreased, or potential reversal of, the seaward piezometric-head gradient — leading to a potential saline plume advecting from the CCS towards the L-31E canal and creating a circulation cell in which the salinity of the water in the L-31E Canal is increased as the saline plume enters the L-31E Canal.¹⁷ The reviewer additionally found that “elevated water levels in the CCS resulting from pumping 100 mgd from the L-31E will increase the (seaward) piezometric-head gradient between the CCS and Biscayne Bay, resulting in the increased discharge of higher-salinity water from the CCS into the Bay via the Biscayne Aquifer.”¹⁸

Under current authorization, water is taken from the brackish Floridan Aquifer and pumped into the CCS.¹⁹ However, no matter the source of the water used to freshen the canals, there exists the possibility of a decreased or reversed piezometric head gradient if the CCS water level exceeds the stage of the L-31E, resulting in advection of hypersaline water into the L-31E. Figure 1, below, shows measured spikes in specific conductance - indicating that significant salinity events in the L-31E have occurred as recently as March 2023.

¹³ NUREG-1437, Volume 1, Revision 2 GEIS - Draft Report for Comment, February 2023, at 3-42.

¹⁴ Miami Dade County, March 7, 2016. *Report on Recent Biscayne Bay Water Quality Observations associated with Florida Power and Light Turkey Point Cooling Canal System Operations*, at 4. Included as Attachment 4.

¹⁵ SFWMD Permit Number 13-05856-W, issued June 1, 2015.

¹⁶ Chin, D. A., 2015. *The Cooling Canal System at the FPL Turkey Point Power Station*.

¹⁷ *Id.*, at 3.

¹⁸ *Id.*, at 40.

¹⁹ Stantec, August, 2022. *FPL Turkey Point Annual Monitoring Report*. Retrieved at <https://prodenv.dep.state.fl.us/DepNexus/public/electronic-documents/FL0001562/facility!search>

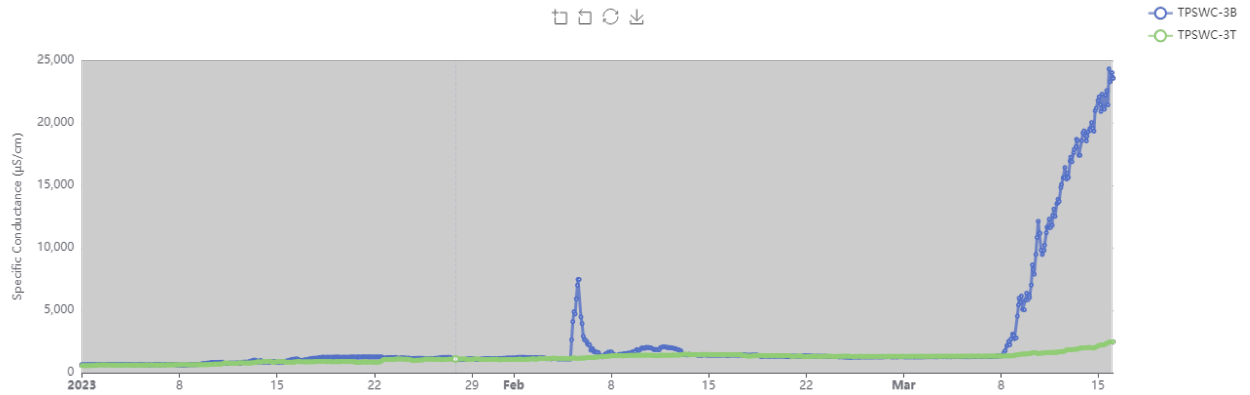


Figure 1: March 8, 2023 salinity event on L-31E canal, at approximately 3:00AM. Source: Miami-Dade County Department of Regulatory and Economic Resources.

In addition to high chloride levels, the CCS contains high levels of radionuclides. Per a 2016 county memorandum, tritium concentrations have been measured as high as 16,500 pCi/L in the cooling water.²⁰

Sampling in the nearshore waters adjacent to the CCS found evidence of polluted water leakage from the canals by way of tritium, which acts as an excellent tracer for the fate of CCS water. Miami-Dade County conducted surface water sampling in Biscayne Bay near the CCS and found that all samples contained tritium concentrations higher than background levels typical for Biscayne Bay surface waters (where the baseline is 20 pCi/L).²¹ In areas closest to the CCS, bottom samples contained tritium concentrations ranging from 2,652 to 4,317 pCi/L—indicating that water originating from the CCS is reaching tidal waters outside of the CCS.

Far beyond the nearshore waters of the Turkey Point plant, the approximate limit of the 20 pCi/L contour has been reported as far as 3.8-4.7 miles west of the CCS and 2.1 miles east of the CCS.²²

Cooling Canal System Groundwater Contamination Remediation Plan

Given the significant surface water and groundwater contamination, FPL was sued by the county and the state. To settle litigation, FPL entered into a consent agreement with Miami-Dade County in October 2015, and entered into a consent order with the Florida Department of Environmental Protection (FDEP) in June 2016. These instruments compelled FPL to install a recovery well system to remediate the hypersaline plume. Per the FDEP consent order, FPL is required to confirm by Year 5 that the recovery well

²⁰ Miami Dade County, March 7, 2016. *Report on Recent Biscayne Bay Water Quality Observations associated with Florida Power and Light Turkey Point Cooling Canal System Operations*, at 4.

²¹ *Id.*, at 4.

²² Chin, D. A., 2015. *The Cooling Canal System at the FPL Turkey Point Power Station*, at 2.

system will retract the westward extent of the hypersaline plume to the L-31E canal within 10 years.²³

The recovery well system was installed in May, 2018 and has been monitored by the plant operator on an annual basis. Each Remedial Action Annual Status Report provides the results of aerial electromagnetic surveys, groundwater monitoring, and groundwater modeling. FPL's Year 3 Status Report²⁴ includes modeling results depicting the hypersaline groundwater in the lower aquifer falling far short of reaching the L-31E Canal at the 10-year mark.²⁵

In its most recent (November 15, 2022) Year 4 Status Report,²⁶ FPL predicts that at the 10-year mark that the plume in Layer 13 will not have retracted far enough to reach its target.²⁷ Moreover, FPL's modeling predicts that the hypersaline interface in layer 16 will have expanded in some areas.²⁸ FPL posits that their models over-simulates the edge of the hypersalinity in deep layers such as layer 16, and that "perceived over-simulation is an area that continues to be investigated with sensitivity analysis and alternative conceptual models".²⁹ To that end, FPL conducted several sensitivity simulations in its Year 4 report, and sensitivity simulations still model the plume in lower aquifer layers *not* retracting to the boundary prescribed in the consent agreement and consent order by the 10-year mark.³⁰

The consent agreement and consent order both specify that at the Year 5 remediation mid-point, which falls on May 16, 2023, FPL must assess the effectiveness of the recovery well system in retracting the hypersaline plume to achieve the goals of the orders.³¹⁻³² With the two latest consecutive annual reports showing by way of modeling that the remediation system is unlikely to achieve hypersaline plume retraction to the L-31E canal by Year 10, FPL may be required to consider refinement of, or an alternative to, the remediation plan.

²³ *State of Florida Department of Environmental Protection v. Florida Power & Light Company*, Consent Order OGC No. 16-024 (June 20, 2016), at 10.

²⁴ FPL, November 15, 2021. *Remedial Action Annual Status Report, Turkey Point Clean Energy Center*, Year 3. Included as Attachment 5.

²⁵ *Id.*, at 5-22., Figure 5.3-1c included as Attachment 6

²⁶ FPL, November 15, 2022. *Remedial Action Annual Status Report, Turkey Point Clean Energy Center*, Year 4. Included as Attachment 7.

²⁷ *Id.*, at 5-25. Reference Figure 5.3-1c, included as Attachment 8.

²⁸ *Id.*, at 5-26. Reference Figure 5.3-1d, included as Attachment 9

²⁹ *Id.*, at 5-13.

³⁰ *Id.*, at 5-30. Reference Figure 5.3-3, included as Attachment 10, Figure 5.3-4, included as Attachment 11, Figure 5.3-6 included as Attachment 12, and Figure 5.3-7, included as Attachment 13.

³¹ *State of Florida Department of Environmental Protection v. Florida Power & Light Company*, Consent Order OGC No. 16-024 (June 20, 2016), at 10.

³² *Miami-Dade County v Florida Power & Light Company, Consent Agreement* (October 7, 2015), at 6.

Nutrient Pollution and Algae Blooms in the CCS

The CCS has also been beset by nutrient and algae problems. In 2014, algae significantly bloomed within the CCS.³³ Large-scale application of copper sulfate was implemented to control algae, though this was reported as being ineffective and serving only to stabilize the existing concentrations.

While FPL has implemented multiple measures to improve the conditions of the CCS, some forms of pollution are still not abating: FPL's November 15, 2022, Remediation status report shows that total phosphorus exhibits no decreasing trend,³⁴ and chlorophyll-a concentrations — which act as a proxy for algae — do not exhibit a downward trend either.³⁵ This is concerning since the adjacent Biscayne Bay, a phosphorus-limited estuary, is exceptionally sensitive to phosphorus. Recently, overfertilization of the Bay has caused three consecutive years of summer algae blooms and fish kills beginning in 2020.

Habitat Decline

Adjacent to Turkey Point nuclear plant are remnants of sawgrass prairie, which once sprawled to the west in endless expanse. Sawgrass (*Cladium jamaicense*), the most common and dominant plant of the Everglades, requires fresh to brackish water and is not commonly found growing in or directly abutting marine waters.³⁶ In the vicinity of Turkey Point, the Miami-Dade County Department of Environmental Resource Management documented declining sawgrass height over time,³⁷ which suggests that the plant could be imparting hydrologic impacts that are affecting nearby habitat.

Endangered Species Impacts

State and federally protected species historically found in the vicinity of Turkey Point include the American crocodile, Florida panther, eastern indigo snake, red knot, West Indian manatee, and wood stork.

The health of Turkey Point's CCS greatly affects the health and the numbers of crocodiles that use the CCS for nesting and foraging. The earthen banks along the cooling canal system, and the low-energy waters do provide suitable habitat for this species — the CCS has been a haven for the species — but only if ambient conditions are maintained. After the uprate, poor conditions in the CCS previously caused crocodiles to starve and experience stress, dehydration, and malnutrition, which, in turn, caused a reduction in

³³ Chin, D. A., 2015. *The Cooling Canal System at the FPL Turkey Point Power Station* at 9.

³⁴ FPL, November 15, 2022. *Remedial Action Annual Status Report, Turkey Point Clean Energy Center, Year 4*, Figure 6.2-1.

³⁵ *Id.*, Figure 6.4-1 .

³⁶ Loveless, C. M. 1959. "A study of the vegetation in the Florida Everglades". *Ecology* 40: 1–9

³⁷ Miami-Dade County Memorandum, April 8, 2015. FPL Units 3&4 Ecological Monitoring – Sawgrass Effects. Included as Attachment 14.

numbers of crocodiles, as well as nesting and hatchling abundance.³⁸ Although FPL is currently required to conduct activities aimed at improving water quality within the CCS,³⁹ the Fish and Wildlife Service determined in 2019 that current conditions within the system are having an adverse impact on crocodiles and their critical habitat.⁴⁰

Local Wellfields

Within the vicinity of the plant, there are several municipal wellfields that extract water from the freshwater Biscayne Aquifer, a sole source aquifer that provides drinking water for southeast Florida. A map of major public water supply wellfields for major utilities is included as Attachment 15.⁴¹ The Florida Keys Aqueduct Authority relies on a wellfield approximately 9.5-miles west of the CCS for the entire Keys archipelago. Therefore, the failure to retract the plume could pose a significant threat to the sole source of drinking water to the Florida Keys and to existing municipal wellfields nearby, and to any new wellfield that may be contemplated in the area.

Turkey Point Power Plant’s present-day environmental impacts will persist into the future:

Given the numerous environmental issues outlined above, the undersigned assert that the following environmental issues must be addressed for site-specific review, and/or elevated in significance.

(11) Altered Salinity Gradients

This issue must be modified from a “1” to a “2” and significance should be elevated from “small” up to “moderate/large”. As noted above, Miami-Dade County has documented salinization events on the L-31E canal that may be caused by cooling canal water augmentation. The L-31E, a freshwater canal, discharges water to the Biscayne Bay Aquatic Preserve. The waters of the preserve are historically estuarine, and life is adapted for estuarine conditions less saline than marine waters.

Any review of a future license extension should consider hydrological interactions between the cooling canal system, the L-31E, and any nearby control structures. If operation of the CCS is causing salinizing events to occur outside of the cooling

³⁸ Letter from Roxanna Hinzman, U.S. Fish and Wildlife Serv., to Briana Grange, U.S. Nuclear Regulatory Comm’n, regarding formal consultation on subsequent renewed licenses for Units 3 and 4, 31, 32-33 (July 25, 2019) (“2019 Biological Opinion”).

³⁹ *Id.* at 5–6, 34.

⁴⁰ *Id.* at 31, 33, 34, 40.

⁴¹ Map of major public water supply wellfields for major utilities, retrieved from <https://www.arcgis.com/home/item.html?id=4713b7c6529e4a53b2092a19d21f4090>

canals, license review should also examine impacts to affected surface waters, ecological communities, and endangered species.

(14) Discharge of Metals into Cooling System Effluent

This issue must be modified from a “1” to a “2” and significance should be elevated from “small” up to “moderate/large”. Florida Power and Light’s use of copper sulfate in cooling canals presents a toxic hazard to aquatic species, and a danger to the underlying drinking water aquifer. Copper sulfide is bio-accumulative.⁴² Annual remediation status reports do not report on copper sulfate. As it has been clearly shown that hyper-salinized water migrates radially from the CCS, the plant operator should confirm whether groundwater and surface water surrounding the CCS are polluted with copper sulfide.

(16) Surface Water Use Conflicts (plants with cooling ponds or cooling towers using makeup water from a river):

We agree that this issue should remain a “2”. We further assert that significance must be elevated from “small/moderate” up to “moderate/large”.

Everglades restoration is being programmed for the Model Lands area (shown in Attachment 16). The Army Corps and South Florida Water Management District, along with Miami-Dade County, are working on a component of the multi-billion dollar Comprehensive Everglades Restoration Plan, called the Biscayne Bay and Southeastern Everglades Ecosystem Restoration (BBSEER) project. This ecosystem restoration project directs surface and groundwater to the coast in efforts to restore hydrologic patterns resembling historic conditions. At this location, fresh water hydrating the coastline, Biscayne Bay, and Biscayne National Park would reinvigorate an ecosystem in precarious decline for lack of the fresh, clean water that once feathered from the Everglades into the Biscayne Bay.

Turkey Point, its 5,900 acres of cooling canals, and the lingering hypersaline plume are literal impediments to the ecosystem restoration project. Any re-licensing review needs to thoroughly explore how the continued existence of the cooling canals and the underground hypersaline plume could blunt the objectives of a federally funded ecosystem restoration project. The license extension review should also evaluate a range of alternatives to the cooling canal system, including a cooling tower, and the water used to freshen the CCS or to supply a cooling tower.

(22) Groundwater Use Conflicts (plants that withdraw more than 100 gallons per minute)

⁴² Mirzaei VandKhanghah M, Hedayati A, Nazeri S, Mohammadi Azarm H, Ghorbani R. *Biomagnification of Copper Along the Aquatic Food Chain (Artemia franciscana, Danio rerio, and Astronotus ocellatus)*. Biol Trace Elem Res. 2022 Apr;200(4):1854-1860. doi: 10.1007/s12011-021-02781-4. Epub 2021 Jul 15. PMID: 34264447.

We agree that this issue should remain a “2”. We further assert that significance at Turkey Point must be considered as “large”.

The NRC documented in the draft LR GEIS that they believe there is the potential for groundwater use conflicts imparted by the site recovery well system and the marine well operation on existing groundwater quality. The draft LR GEIS further documents that “Based on the NRC staff’s review of groundwater modeling performed by the licensee and State regulators, it is likely that operation of the recovery well system will have beneficial water quality impacts by retracting the CCS hypersaline plume and the westward expansion of the regional saltwater interface, while providing reasonable assurance that any impacts on groundwater resources and users would be mitigated”.⁴³

In contrast, FPL’s two latest consecutive annual reports show by way of modeling that the remediation system is unlikely to achieve hypersaline plume retraction by Year 10 in all layers of the aquifer. A peer reviewer, Groundwater Tek Inc., posited that the hypersaline plume in the lower layers will likely remain a source of pollution and the salt will likely diffuse back to the layers above due to the concentration gradient if the recovery well pumps were shut off.⁴⁴ The consent agreement and consent order both specify that at the Year 5 remediation mid-point, which falls on May 16, 2023, FPL must assess the effectiveness of the recovery well system in retracting the hypersaline plume. The specific language in the FDEP consent order states that, at the conclusion of the fifth year of operation of the remediation project, FPL shall evaluate and report to the Department, within 60 days, the effectiveness of the system in retracting the hypersaline plume to the L-31E canal within 10 years.⁴⁵ The NRC should ascertain whether state and county regulators will require FPL to alter its remediation plan or use an alternate source of water, such as a reverse osmosis plant. The NRC should also obtain peer review reports to understand the success of the recovery well system in meeting the objective of the consent agreement and consent decree.

(25) Groundwater Quality Degradation (plants with cooling ponds)

We agree that this issue should remain a “2”. We further assert that significance must be elevated from “small/moderate” up to “moderate/large”. In the February 2023 NUREG-1437, Volume 1, Revision 2 GEIS Draft Report for Comment, the NRC concedes that in the SEIS for the second renewal of Turkey Point, new information for the generic issue of “Groundwater Quality Degradation (Plants with

⁴³ NUREG-1437, Volume 1, Revision 2 GEIS - Draft Report for Comment, February 2023, at 4-40 and 4-41.

⁴⁴ Groundwater Tek, Inc., July 2020. *Review of FPL’s Groundwater Flow and Salt Transport Models and Assessment of the First Year Operation of the RWS*, at 34. Included as Attachment 16.

⁴⁵ *State of Florida Department of Environmental Protection v. Florida Power & Light Company*, Consent Order OGC No. 16-024 (June 20, 2016), at 10.

Cooling Ponds in Salt Marshes) was both new and significant for the initial LR term”.⁴⁶

According to the Florida Power and Light’s latest (Year 4) remediation status report, modeling shows that the hypersaline plume at Turkey Point is unlikely to be remediated by year 10 of the consent order and consent agreement. Clearly, the Atomic Energy Commission’s original finding that environmental impacts from subsurface flow would be “insignificant” did not bear out. Fifty years later, Florida Power and Light has spent considerable resources on remediation after it was sued by Miami-Dade County and the Florida Department of Environmental Protection due to significant concerns about groundwater pollution. As shown in the Year 4 remediation status reports, Figures 5.31-c and 5.31-d (included as Attachments 8 and 9 to this letter), the plume has far from retracted and, via modeling, appears to be expanding in some areas of the lower aquifer.

The hypersaline plume is clearly noticeable and has locally destabilized the Biscayne Aquifer in the vicinity of Turkey Point. Therefore, the NRC must evaluate the significance of this issue as “large”. The NRC must evaluate whether the continued existence of the hypersaline plume poses an unacceptable threat to drinking water supplies drawn from nearby wellfields.

(26) Radionuclides released to groundwater

We agree that this issue should remain a “2”. We further assert that significance must be elevated from “small/moderate” up to “moderate/large”. Tritium persists in groundwater beyond the FPL property, as found in nearshore sampling conducted by the County.⁴⁷

(32) Water use conflicts with terrestrial resources (generating plants with cooling ponds or cooling towers)

We agree that this issue should remain a “2”. We further assert that significance must be elevated from “small/moderate” up to “moderate/large”.

As noted above, Everglades restoration is planned in the area. Re-establishing healthy ecosystems that resemble the historic coastal Everglades requires re-establishing similar hydrologic conditions. Healthy, freshwater sheet flow will revitalize coastal wetlands and nearshore receiving waters that are currently choked with salinity. Therefore, any license extension renewal should evaluate the plant’s water consumption from surface and groundwater sources, CCS operations, and whether such activities significantly affect the Everglades restoration planned

⁴⁶ *Id.*, at 1-19.

⁴⁷ Miami Dade County (March 7, 2016). *Report on Recent Biscayne Bay Water Quality Observations associated with Florida Power and Light Turkey Point Cooling Canal System Operations*, at 4.

in the region. For instance, the NRC must understand whether freshening of the CCS is causing salinizing events in the L-31E, and if so, how might these events conflict with BBSEER restoration. The NRC should also analyze whether a cooling tower with alternative water sources is feasible, as described in the 1972 EIS, to determine if these alternatives would have less environmental impact than the present system.

Additionally, the causes of declining sawgrass height in the vicinity of the plant and cooling canal system need to be considered in any license extension renewal application. The NRC should understand whether the impacts to habitat are the result of excess salinity stunting sawgrass growth.

(41) Effects of non-radiological contaminants on aquatic organisms

This issue must be reclassified as a “2” and elevated in significance to “moderate”. Given the plant operator’s past use of copper sulfate, and given that algae-inducing phosphorus, as well as chlorophyll-a concentrations, in the CCS show no trend of decline, a license extension environmental review should analyze the impacts of the plant operators past, present, and future use of copper sulfate on aquatic life in the CCS. Furthermore, and as previously established, water in the CCS migrates radially through the porous limestone geology. Therefore, the NRC should also analyze whether copper sulfate, a bioaccumulative compound, is present in surface and groundwater around the plant to discern how any copper sulfate leaking from the CCS may be harming aquatic organisms.

(47 and 48) Endangered Species Act: Federally listed species and critical habitats under U.S. Fish and Wildlife and National Marine Fisheries Service jurisdiction

The NRC must also consider new information regarding environmental impacts to endangered and threatened species within the action area, including the Turkey Point site, the CCS, adjacent wetlands, and areas in Biscayne Bay where barges may travel. While the NRC already considered these impacts in the 2019 FSEIS, as a Category 2 (site-specific) issue, the NRC must consider updated information available since 2019. For example, in considering how the relicensing will affect listed species, the NRC must consider the new information regarding FPL’s groundwater remediation, discussed above, and how a failure to remediate the hypersaline plume could affect species.

The NRC must reconsider all effects of the license renewal on state and federally protected species, including but not limited to the Florida panther, eastern indigo snake, red knot, West Indian manatee, and wood stork. Many of these species rely on coastal and freshwater systems that will be significantly affected by the cumulative subsequent license renewal, changing climatic conditions over the coming decades, and potentially-- a failed attempt at groundwater remediation.

Environmental impacts in the next twenty years will diverge from the previous twenty years.

Turkey Point is situated on the very edge of the bay on a low-lying coastal plain. The area is susceptible to catastrophic wind and storm surge events that are exacerbated by sea level rise and increasing storm intensity. For these reasons, the following issues must be re-examined by the NRC on a site-specific basis.

(56) Transportation

This issue must be modified from a “1” to a “2” and significance should be elevated from “small/moderate” up to “moderate/large”. While the plant itself is elevated approximately 26 feet, surrounding roadways are not. This leaves access to the plant vulnerable during storms or due to sea level rise. Each plant will have a different access vulnerability, and therefore, should be treated in a site-specific manner. Turkey Point’s unique location and cooling system create risks that are not generic or shared by other generating plants.

(74) Climate Change Impacts on Environmental Resources

The undersigned believe that the Nuclear Regulatory Commission has taken a significant, if delayed, step in including this category. We agree that this issue merits review as a “2” for site-specific analysis.

Specific to Turkey Point and its one-of-a-kind cooling canal system, Florida Power and Light must understand how a changing climate will impact the operation of the CCS. The NRC must investigate whether the recovery well system for the hypersaline plume remediation efforts is storm-hardened enough to withstand stronger, wetter storms, and whether the recovery wells will function if inundated by sea level rise and storm surge.

We believe that in any re-licensing procedure, the Nuclear Regulatory Commission must evaluate whether Florida Power and Light is preparing and fortifying the plant for sea level rise, and what impacts the fortification will have. For instance, will roads into the plant be elevated? Will the cooling canal system be protected? What impacts will construction and operation of any new features have on habitat? What impacts will construction and operation of any new features have on local surface and subsurface hydrology, and will alterations in hydrology caused by construction affect the hypersalinity plume remediation?

The NRC must also consider updated information on how the subsequent license renewal will affect crocodiles and their critical habitat as climate change causes atmospheric and oceanic temperatures to rise, presenting added stressors on the species.

When considered along with an environmental baseline that will be significantly affected by climate change, the effects of Turkey Point's subsequent renewed license will likely have increasingly significant impacts to the American crocodile over the coming decades. Although sea level rise occurs over time, it intensifies the effects of discrete events such as spring tides and storm surges, causing habitat damage, migration, elimination, and conversion into other habitat types. Increasingly intense storms and higher storm surge will pose additional threats to the crocodile's coastal habitat. For example, eutrophication and seagrass loss in the CCS is likely to become more frequent or intense as temperatures rise and more intense storms increase turbidity. Sea level rise may further compromise Turkey Point's open CCS or necessitate resiliency responses such as coastal hardening that adversely modify the crocodile's critical habitat or subject it to coastal squeeze. In general, climate change will make the crocodile more vulnerable to existing negative effects, including those originating from Turkey Point's operations under the subsequent renewed license. The NRC must consider these environmental impacts – regardless of whether the NRC designates the issues as Category 1 or 2. Climate change impacts are new and significant information that the NRC must consider for all environmental issues.

Conclusion:

Thank you for the opportunity to comment. Because the NRC denied our request for additional time to prepare comments on the proposal, Miami Waterkeeper will send an addendum to this letter after May 16, 2023, which is the date of the 5-year midpoint of recovery well operation. At this time, it should be known if the plant operator is required to revise the hypersaline groundwater remediation plan. A modification to the plan could include additional recovery wells and/or alternate sources of water, such as a reverse osmosis plant. Changes to the remediation plan could incur environmental impacts – beneficial or otherwise—that the NRC should consider in any 20-year license extension.

Sincerely,



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List of Attachments

1. *Final Environmental Statement Related to Operation of Turkey Point Plant, 1972, Dockets No, 50-250 and 50-25*
2. McThenia, A.W, Martin, W. K., Reynolds, J. (2017). *Rising Tides and Sinking Brines: Managing the Threat of Salt Water Intrusion*. Florida Water Resources Journal 68
3. Chin, D. A., 2015. *The Cooling Canal System at the FPL Turkey Point Power Station*
4. Miami Dade County, March 7, 2016. *Report on Recent Biscayne Bay Water Quality Observations associated with Florida Power and Light Turkey Point Cooling Canal System Operations*
5. FPL, November 15, 2021. *Remedial Action Annual Status Report, Turkey Point Clean Energy Center, Year 3*
6. FPL, November 15, 2021. . *Remedial Action Annual Status Report, Turkey Point Clean Energy Center, Year 3, Figure 5.3-1c*
7. FPL, November 15, 2022. *Remedial Action Annual Status Report, Turkey Point Clean Energy Center, Year 4.*
8. FPL, November 15, 2022. *Remedial Action Annual Status Report, Turkey Point Clean Energy Center, Year 4, Figure 5.3-1c.*
9. FPL, November 15, 2022. *Remedial Action Annual Status Report, Turkey Point Clean Energy Center, Year 4, Figure 5.3-1d.*
10. FPL, November 15, 2022. *Remedial Action Annual Status Report, Turkey Point Clean Energy Center, Year 4, Figure 5.3-3*
11. FPL, November 15, 2022). *Remedial Action Annual Status Report, Turkey Point Clean Energy Center, Year 4, Figure 5.3-4*
12. FPL, November 15, 2022. *Remedial Action Annual Status Report, Turkey Point Clean Energy Center, Year 4, Figure 5.3-6*
13. FPL, November 15, 2022. *Remedial Action Annual Status Report, Turkey Point Clean Energy Center, Year 4, Figure 5.3-7.*
14. Miami-Dade County Memorandum, April 8, 2015. *FPL Units 3&4 Ecological Monitoring – Sawgrass Effects*
15. Map of major public water supply wellfields for major utilities
16. BBSEER map
17. Groundwater Tek, Inc., July 2020. *Review of FPL's Groundwater Flow and Salt Transport Models and Assessment of the First Year Operation of the RWS, at 34*