

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
FLORIDA POWER & LIGHT COMPANY) Docket Nos. 50-250-LA
) 50-251-LA
(Turkey Point Nuclear Generating,)
Units 3 and 4))

NRC STAFF TESTIMONY OF AUDREY L. KLETT, BRIANA A. GRANGE,
WILLIAM FORD, AND NICHOLAS P. HOBBS CONCERNING CONTENTION 1

I. INTRODUCTION

Q1. Please state your name, occupation, and by whom you are employed.

A1a. (AK) My name is Audrey L. Klett. I am a Project Manager employed by the U.S. Nuclear Regulatory Commission ("NRC") in Plant Licensing Branch II-2 of the Division of Operating Reactor Licensing in the Office of Nuclear Reactor Regulation. I have been employed by the NRC for over 12 years. A statement of my professional qualifications is attached as Exhibit ("Ex.") NRC-002.

A1b. (BG) My name is Briana A. Grange. I am a Biologist employed by the NRC. I have been employed by the NRC for over 9 years. My statement of qualifications is attached as Ex. NRC-003.

A1c. (WF) I am a Senior Physical Scientist with the NRC and a professional geologist with the State of Florida. I have been employed by the NRC for over 30 years. A statement of my qualifications is attached as Ex. NRC-004.

A1d. (NH) My name is Nicholas P. Hobbs. I am a Reactor Systems Engineer employed by the NRC in the Balance-of-Plant Branch. I began work with the NRC earlier this year. A statement of my professional qualifications is attached as Ex. NRC-005.

Q2. Please describe your current responsibilities.

A2a. (AK) I am the NRC's licensing project manager for Turkey Point Units 3 and 4. I process licensing actions related to Turkey Point 3 and 4, including license amendment requests ("LARs"). I serve as the NRC's point of contact for the licensee and arrange communications between the licensee and NRC staff related to licensing actions. When the licensee requests an amendment to its operating license, I identify and assign the NRC organizations that need to review the request and develop safety evaluations and environmental reviews. As part of determining whether environmental reviews are necessary, I review LARs to see if they meet any of the environmental categorical exclusions in 10 CFR 51.22(c), and I coordinate with the NRC's environmental review branch to determine if an environmental assessment ("EA") or an environmental impact statement ("EIS") is needed for the licensing action. When the NRC organizations send me their evaluations, I review them and compile them into formal communications sent to NRC organizations for concurrence and to the licensee (e.g., amendment packages), and I develop the notices of the licensing actions that are published in the *Federal Register*. I also inform and coordinate with the designated State official with respect to any comments they may have regarding the license amendments.

A2b. (BG) I perform National Environmental Policy Act ("NEPA") reviews of reactor licensing actions in the areas of terrestrial ecology, aquatic ecology, land use, visual resources, and microbiological hazards for a variety of licensing actions including license amendments and license renewal applications. I perform NEPA reviews, prepare EAs for reactor LARs and exemption requests, and develop substantial inputs for EISs. I coordinate most Endangered Species Act ("ESA") section 7 consultations and Magnuson–Stevens Act ("MSA") Essential Fish Habitat ("EFH") consultations for license renewal application reviews and reactor LAR reviews, which includes preparing biological assessments and EFH assessments. I monitor incidental takes at all operating nuclear power plants with biological opinions issued by the U.S. Fish and Wildlife ("FWS") or National Marine Fisheries ("NMFS") and compile related information into

databases that track whether operating plants are within the allowable incidental take limit set forth within applicable biological opinions. In so doing, I ensure that the NRC complies with the terms and conditions of biological opinions. I am also responsible for reinitiating consultation with FWS or NMFS in a timely manner in the event that an incidental take limit at a nuclear power plant is exceeded.

A2c. (WF) I conduct groundwater, surface water, and geology investigations of NRC licensed power reactors. I conduct independent environmental reviews of license renewal applications and license amendments, groundwater contamination investigations at operating reactors. As needed, I support NRC groundwater research activities, and I conduct reviews of groundwater contamination in support of inspection activities and NRC licensed reactors. Over many years, I have conducted geologic and hydrologic studies of conventional uranium mills and mill tailings piles and facilities that use large numbers of wells to extract uranium from aquifers. For the NRC, I have conducted groundwater and geology studies of proposed high-level waste repositories in Louisiana, Mississippi, and Nevada and of low level waste disposal sites.

A2d. (NH) I am currently in training to be a Reactor Technical Reviewer for the NRC. As needed, I support various projects to analyze NRC license amendments and their potential impacts on reactor operational safety. I have performed thermal-hydraulic analyses in support of reactor modeling for advanced reactors and light water reactors for over five years.

Q3. Please explain your duties in connection with the Staff's review of the LAR submitted by Florida Power & Light Co. ("FPL" or "Licensee") for the increase in the Technical Specifications limiting condition of operation ("LCO") value related to the ultimate heat sink ("UHS", "cooling canal system", "CCS", industrial waste water facility, or "IWF") inlet temperature of Turkey Point Units 3 and 4 (collectively "Turkey Point") License Nos. 50-250 and 50-251.

A3a. (AK) As the NRC Project Manager for Turkey Point, Units 3 and 4, I received the LAR from FPL to increase the TS value for the plant UHS inlet temperature from 100 degrees Fahrenheit (°F) to 104 °F. (Ex. FPL-008, FPL Ultimate Heat Sink Temperature License Amendment Request, July 10, 2014). I identified and assigned the appropriate organizations within the NRC to evaluate the LAR including the Environmental Review and Guidance Update Branch ("RERB"), Balance-of-Plant Branch, Containment and Ventilation Branch, Reactor Systems Branch, Fire Protection Branch, and Technical Specifications Branch. With respect to Contention 1, I provided the LAR to NRC's RERB staff. I coordinated NRC staff's requests for additional information ("RAIs") to FPL, arranged clarification calls between FPL and NRC staff about the RAIs, and provided FPL's RAI responses to the appropriate NRC staff. I compiled the NRC staff's safety evaluations ("SEs") into one SE, and I developed and issued the amendment package that included the SE. (Ex. NRC-006, Letter From Audrey Klett, Project Manager, N.R.C., to Mano Nazar, President and Chief Nuclear Officer, NextEra Energy, Turkey Point Generating Station Unit Nos. 3 and 4 - Issuance of Amendments Under Exigent Circumstances Regarding Ultimate Heat Sink and Component Cooling Water Technical Specifications (August 8, 2014) (ADAMS No. ML14199A107.) I notified the designated State of Florida official, Ms. Cindy Becker, the Chief of the Bureau of Radiation Control in the Florida Department of Health, of the proposed issuance of the amendments. I developed the notices that appeared in the *Federal Register* and the local newspapers. (Exs. NRC-007, Florida Power & Light Company, Turkey Point Units 3 and 4: License amendment application; opportunity to comment, request a

hearing, and petition for leave to intervene, 79 Fed. Reg. 44,214 (July 30, 2014); NRC-008, Letter From Audrey Klett, Project Manager, N.R.C., to Mano Nazar, President and Chief Nuclear Officer, NextEra Energy, Turkey Point Generating Station Unit Nos. 3 and 4 - Individual Notice of Consideration of Issuance of Amendments to Renewed Facility Operating Licenses, Proposed No Significant Hazards Consideration Determination, and Opportunity for a Hearing (Exigent Circumstances) (July 24, 2014) (ADAMS Accession No. ML14204A129); NRC-041, N.R.C., Public Notice: NRC Staff proposes to amend renewed facility operating licenses at the Turkey Point Nuclear Generating Unit Nos. 3 and 4 (July 31, 2014) (ADAMS Accession No. ML14211A266).) Regarding the EA, I coordinated the development of the EA, the Finding of No Significant Impact ("FONSI"), and the *Federal Register* notice with RERB staff. I informed the State of Florida designated official for coordinating comments on license amendments of the upcoming EA and FONSI. I prepared the package containing RERB staff's EA and the FONSI, and I routed it through the concurrence process. (Exs. FPL-008, NRC-006, NRC-007, NRC-009, Florida Power & Light Company, Turkey Point Units 3 and 4: Environmental Analysis and Finding of No Significant Impact, 79 Fed. Reg. 44,464 (July 31, 2014).)

A3b. (BG) I was responsible for performing the NEPA review and preparing the EA and FONSI (Ex. NRC-009) associated with the UHS TS LAR. I also prepared the biological assessment (NRC-010, N.R.C., Biological Assessment on the American Crocodile (*Crocodylus acutus*), Florida Power & Light Company, Turkey Point Units 3 and 4: Proposed License amendment application to increase the ultimate heat sink temperature limit (July 2014) (ADAMS Accession No. ML14206A806)) associated with the UHS TS LAR and coordinated the Staff's ESA section 7 consultation with the FWS for the UHS TS LAR. I was aware of the communications between FPL, the Florida Department of Environmental Protection ("FDEP"), and the Florida Fish and Wildlife Conservation Commission related to FPL's request and FDEP's subsequent approval for FPL to treat an algal bloom in the CSS with various chemicals. Prior to the FDEP's approval, I coordinated with FWS regarding FPL's request to determine

what, if any, effect such chemical treatments might have on the American crocodiles (*Crocodylus acutus*) living on the Turkey Point site. I was also aware of communications between FPL, FDEP, South Florida Water Management District (SFWMD), and other local and State agencies related to FDEP's authorizations for FPL to make aquifer withdrawals.

A3c. (WF) I was not involved in the review of the LAR.

A3d. (NH) I was not involved in the review of the LAR.

Q4. Why are you testifying here today?

A4a. (AK) The purpose of my testimony is to present the NRC Staff's ("Staff") views with respect to Contention 1, filed in the proceeding by Citizens Allied for Safe Energy, Inc. ("CASE") and as narrowed by the Atomic Safety and Licensing Board ("ASLB"). That contention generally asserts that the EA for the LAR does not adequately address the impact of increased temperature and salinity in the CCS on saltwater intrusion arising from (1) migration out of the CCS; and (2) the withdrawal of fresh water from surrounding aquifers to mitigate conditions within the CCS.

A4b. (BG) The purpose of my testimony is to present the Staff's views with respect to Contention 1 and the NRC's environmental review process associated with the UHS TS LAR.

A4c. (WF) The purpose of my testimony is to present the Staff's views with respect to Contention 1 and the minimal impact that increasing the allowable inlet temperature from the UHS from 100 °F to 104 °F would have on the groundwater.

A4d. (NH) The purpose of my testimony is to present the Staff's views with respect to Contention 1 and the thermodynamic processes that govern the response of the CCS to a change in allowable operational temperature.

Q5. What did you review in order to prepare your testimony?

A5. (AK, BG, WF, NH) I have reviewed the following documents:

- CASE's pleadings, statement of position, and supporting exhibits and attachments;

- the Staff's responses to CASE's pleadings;
- FPL's responses to CASE's pleadings;
- FPL's July 10, 2014, application for the UHS TS LAR (Ex. FPL-008) and related supplements dated July 17, 2014 (Ex. NRC-011, Letter from Michael Kiley, Florida Power & Light, to N.R.C. Document Control Desk, Request for Emergency Approval of License Amendment Request No. 231 (Application to Revise Ultimate Heat Sink Temperature Limit) (July 17, 2014) (ADAMS Accession No. ML14202A392)), July 22, 2014 (Exs. NRC-012, Letter from Michael Kiley, Florida Power & Light, to N.R.C. Document Control Desk, Supplement 1 and Response to Request for Additional Information for License Amendment Request No. 231 (Application to Revise Ultimate Heat Sink Temperature Limit), (July 22, 2014) (ADAMS Accession No. ML14204A367); NRC-0013, Letter from Michael Kiley, Florida Power & Light, to N.R.C. Document Control Desk, Response to Request for Additional Information Regarding License Amendment Request No. 231 (Application to Revise Ultimate Heat Sink Temperature Limit), (July 22, 2014) (ADAMS Accession No. ML14204A368)); July 24, 2014 (Ex. NRC-014, "Letter from Michael Kiley, Florida Power & Light, to N.R.C., Response to Containment and Ventilation Branch Request for Additional Information, Regarding License Amendment Request No. 231 (Application to Revise Ultimate Heat Sink Temperature Limit), (July 24, 2014) (ADAMS Accession No. ML14206A853)), and July 29, 2014 (Ex. NRC-040, Letter from Michael Kiley, Vice President, Turkey Point Nuclear Plant, Florida Power and Light, to N.R.C. Document Control Desk, License Amendment Request No. 231, Application to Revise Ultimate Heat Sink Temperature Limit – Supplement 2, and Response to Request for Additional Information (July 29, 2014) (ADAMS Accession No. ML14211A508));

- the Staff's Requests for Additional Information related to the UHS TS LAR dated July 18, 2014 (Exs. NRC-015, Email from Audrey Klett, N.R.C., to Bob Tomonto and Paul Czaya, Florida Power & Light, Turkey Point 3 and 4: Request for Additional Information - License Amendment Request 231 (1 of 2), (July 18, 2014) (ADAMS Accession No. ML14203A614); NRC-016, Email from Audrey Klett, N.R.C., to Bob Tomonto and Paul Czaya, Florida Power & Light, Turkey Point 3 and 4: Request for Additional Information - License Amendment Request 231 (2 of 2), (July 18, 2014) (ADAMS Accession No. ML14203A618)) and July 22, 2014 (Ex. NRC-017, Email from Audrey Klett, N.R.C., to Bob Tomonto, Paul Czaya, and Olga Hanek, Florida Power & Light, Turkey Point 3 and 4: Request for Additional Information - License Amendment Request 231, (July 22, 2014) (ADAMS Accession No. ML14204A814));
- the Staff's July 23, 2014, Notice of Enforcement Discretion for FPL regarding Turkey Point (Ex. NRC-018, Letter from Victor McCree, Regional Administrator, N.R.C. Region II, to Michael Kiley, Florida Power & Light, Notice of Enforcement Discretion for Florida Power & Light Company Regarding Turkey Point Nuclear Generating Unit 3 and 4 [NOED NO. 14-2-001], (July 23, 2014) (ADAMS Accession No. ML14213A069));
- the Staff's July 24, 2014, Notice of Consideration of Issuance of Amendments to Renewed Facility Operating Licenses, Proposed No Significant Hazards Consideration Determination, and Opportunity for a Hearing (Ex. NRC-008, Letter From Audrey Klett, Project Manager, N.R.C., to Mano Nazar, President and Chief Nuclear Officer, NextEra Energy, Turkey Point Generating Station Unit Nos. 3 and 4 - Individual Notice of Consideration of Issuance of Amendments to Renewed Facility Operating Licenses, Proposed No Significant Hazards Consideration Determination, and Opportunity for a Hearing (Exigent Circumstances) (July 24, 2014) (ADAMS Accession No. ML14204A129)) related July 30, 2014 *Federal Register* notice (Ex. NRC-007, Florida Power & Light Company, Turkey Point Units 3 and 4: License amendment application;

opportunity to comment, request a hearing, and petition for leave to intervene, 79 Fed. Reg. 44,214 (July 30, 2014)), and July 31, 2014, Public Notice (Ex. NRC-041, N.R.C., Public Notice: NRC Staff proposes to amend renewed facility operating licenses at the Turkey Point Nuclear Generating Unit Nos. 3 and 4 (July 31, 2014) (ADAMS Accession No. ML14211A266));

- communications between FPL, the FDEP, the Florida Fish and Wildlife Conservation Commission, and the NRC regarding chemical treatment of algal blooms in the CCS dated June 18, 2014, June 27, 2014, and July 1, 2014 (Ex. NRC-010, Appendix A);
- the Staff's July 28, 2014, EA and FONSI related to the UHS TS LAR (Ex. NRC-009);
- a summary of the Staff's July 22, 2015, meeting with representatives of the FWS's Vero Beach, Florida office (Ex. NRC-019);
- the NRC's July 25, 2014, Biological Assessment for the UHS TS LAR (Ex. NRC-010, N.R.C., Biological Assessment on the American Crocodile (*Crocodylus acutus*), Florida Power & Light Company, Turkey Point Units 3 and 4: Proposed License amendment application to increase the ultimate heat sink temperature limit (July 2014) (ADAMS Accession No. ML14206A806)) and related request to reinstate informal consultation with the FWS (Ex. NRC-020, Letter from David J. Wrona, Chief, Environmental Review and Guidance Update Branch, N.R.C., to Larry Williams, Field Supervisor, U.S. Fish and Wildlife Service, Request to Reinitiate Informal Consultation for a Proposed License Amendment to Increase the Ultimate Heat Sink Temperature Limit at Turkey Point Nuclear Generating Station Unit Nos. 3 and 4 (July 25, 2014) (ADAMS Accession No. ML14206A800));
- the FWS's July 29, 2014, letter concurring on the Staff's biological assessment conclusions and documenting the conclusion of ESA section 7 consultation (Ex. NRC-021, Letter from Craig Aubrey, Field Supervisor, U.S. Fish and Wildlife Service, to David

J. Wrona, Chief, Environmental Review and Guidance Update Branch, N.R.C.,
Endangered Species Act Section 7 Consultation Concurrence (July 29, 2014) (ADAMS
Accession No. ML14210A170));

- the NRC's August 8, 2014, issuance of the license amendments regarding the UHS, related safety evaluation, and other attachments (Ex. NRC-006, Letter From Audrey Klett, Project Manager, N.R.C., to Mano Nazar, President and Chief Nuclear Officer, NextEra Energy, Turkey Point Generating Station Unit Nos. 3 and 4 - Issuance of Amendments Under Exigent Circumstances Regarding Ultimate Heat Sink and Component Cooling Water Technical Specifications (August 8, 2014) (ADAMS No. ML14199A107)) and related August 14, 2014, Federal Register notice (Ex. NRC-042, Florida Power & Light Company, Turkey Point Units 3 and 4: License amendment; issuance, opportunity to comment, request a hearing, and petition for leave to intervene, 79 Fed. Reg. 47,689 (August 14, 2014));
- the Staff's March 27, 2012, EA and FONSI related to the EPU (Ex. NRC-022, License Amendment to Increase the Maximum Reactor Power Level, Florida Power & Light Company Turkey Point, Units 3 and 4: Final environmental assessment and finding of no significant impact, 77 Fed. Reg 20,059 (April 3, 2012));
- the Staff's January 28, 2002, Generic Environmental Impact Statement Regarding License Renewal of Turkey Point (Ex. NRC-024, NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 5, Regarding Turkey Point Units 3 and 4, (January 2002) (ADAMS Accession No. ML020280119));
- FPL's September 11, 2000, Environmental Report related to its application for renewal of Turkey Point (Ex. NRC-032, Florida Power and Light Company, Application for Renewed Operating Licenses: Applicant's Environmental Report – Operating License Renewal

Stage, Turkey Point 3 & 4 (September 8, 2000) (ADAMS Accession No. ML003749667));

- the U.S. Atomic Energy Commission's January 31, 1972, Final Environmental Statement related to the operation of Turkey Point;
- a September 30, 1971, Final Judgement related to Turkey Point (Ex. NRC-047, Atomic Energy Comm'n, Final Environmental Statement Related to Operation of Turkey Point Plant, Appendix C: Final Judgement Order, U.S. v. Florida Power and Light Company, No. 70-328-CA, (S.D. Fla. 1970), (July 1972) (ADAMS Accession No. ML092030310));
- FPL's December 16, 2013, Environmental Report related to its application for combined licenses for Turkey Point, Units 6 and 7 (Ex. NRC-026, Florida Power & Light Company, Turkey Point Units 6 & 7 Combine License Application, Part 3: Environmental Report, Rev. 5, 2.3-48 (December 23, 2013) (ADAMS Accession No. ML13357A435));
- NRR Office Instruction LIC-101, Revision 4, "License Amendment Review Procedures" (Ex. NRC-027, N.R.C., NRR Office Instruction LIC-101, Rev. 4: License Amendment Review Procedures (May 25, 2012) (ADAMS Accession No. ML113200053));
- NRR Office Instruction LIC-203, Revision 3, "Procedural Guidance for Preparing Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues" (Ex. NRC-028, N.R.C., NRR Office Instruction LIC-203, Rev. 3: Procedural Guidance for Preparing Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues (July 13, 2013) (ADAMS Accession No. ML12234A708));
- other EAs and FONSI's issued by the Staff to support amendments related to increases in the allowable UHS temperature at Millstone Power Station, Unit 2 (Ex. NRC-043, Letter from James Kim, Project Manager, N.R.C., to David A. Heacock, President and Chief Nuclear Officer, Dominion Nuclear, Millstone Power Station, Unit No. 2 - Issuance

of Amendment Re: Revise Technical Specification 3/4.7.11 Ultimate Heat Sink (April 18, 2014) (ADAMS Accession No. ML14037A408)), Hope Creek Generating Station, Unit 1 (Ex. NRC-029, Letter from Stewart Bailey, Senior Project Manager, N.R.C., to William Levis, Senior Vice President & Chief Nuclear Officer, PSEG Nuclear LLC, Hope Creek Generating Station - Issuance of Amendment Re: Ultimate Heat Sink (August 1, 2006) (ADAMS Accession No. ML062130012)), Nine Mile Point, Unit 2 (Ex. NRC-030, Letter from Peter Tam, Senior Project Manager, N.R.C., to Mr. James A. Spina, Vice President, Nine Mile Point Nuclear Station, LLC, Nine Mile Point Nuclear Station, Unit No. 2 - Issuance of Amendment Re: Ultimate Heat Sink Temperature Limit Requirements (May 7, 2004) (ADAMS Accession No. ML041170234)), and LaSalle County Station, Units 1 and 2 (Ex. NRC-031, Exelon Generation Company, LLC, LaSalle County Station, Units 1 and 2: Environmental assessment and finding of no significant impact; issuance. 80 Fed. Reg. 46062 (August 3, 2015)); and

- FPL's root cause evaluation for CR Number 1979235 "Canal Temperature Exceeded 100 degrees F." (Ex. NRC-025, Florida Power and Light, Root Cause Evaluation for CR Number 1979235, "Canal Temperature Exceeded 100 degrees F" (Nov. 21, 2014) (ADAMS Accession No. ML15128A656)).

Q6. Are you familiar with Contention 1?

A6. (AK, BG, WF, NH) Yes.

Q7. Can you briefly describe the issues CASE raises in Contention 1?

A7. (AK, BG, WF, NH) As admitted and limited by the Board, Contention 1 asserts deficiencies with the Staff's analysis with respect to the limited issue of whether the impacts of salt water intrusion arising from migration out of the CCS and withdrawal of fresh water from surrounding aquifers to mitigate conditions within the CCS. The issue, therefore, is the sufficiency of the Staff's review of the environmental impact of raising the shutdown temperature

limit by 4 °F specified in Turkey Point's operating licenses.

Q8. Based on your review, what is your expert opinion regarding Contention 1?

A8. (AK, BG, WF, NH) Contention 1 does not identify a deficiency in the Staff's EA.

The conclusion that groundwater would not be impacted by the UHS TS LAR is well supported by the facts and the staff's analysis. Thus, the EA complies with NRC's regulations implementing NEPA at 10 C.F.R. § 51 and is sufficient for the purpose of making a FONSI decision regarding the UHS TS LAR.

II. TURKEY POINT AND THE SURROUNDING ENVIRONMENT

A. Site Overview

Q9. Can you briefly describe the Turkey Point site?

A9. (AK, BG) The Turkey Point site is situated on the shore of Biscayne Bay about 25 miles (mi) south of Miami, Florida. The site encompasses 11,000 acres (ac) in Miami-Dade County, Florida. The nearest city limits are Florida City, which lies 8 mi to the west, Homestead, which lies 4.5 mi to the northwest, and Key Largo, which lies 10 mi south of the Turkey Point site. The Turkey Point site is bordered to the east by Biscayne National Park, to the north by Homestead Bayfront Park and a portion of Biscayne National Park, and on the west and south by FPL's 13,000-ac Everglades Mitigation Bank.

The Turkey Point site employs the use of fossil, combined cycle, and nuclear units operated by FPL for commercial electric power generation. Turkey Point Units 1 and 2 are oil and gas-fired units that produced about 430 MWe each (assuming a "rule-of-thumb" 34 percent power conversion efficiency would put the thermal output at about 1260 MWt). Since late 2010, FPL has operated Unit 2 as a synchronous condenser. It serves to adjust the electrical grid's

voltage and improve power factor by generating or absorbing reactive power. Unit 1 continues to be used as a power generator.

Turkey Point Units 3 and 4¹ are the nuclear reactor units that are rated at about 888 MWe (2644 MWt) each. The units are Westinghouse-designed pressurized light water moderated and cooled systems. Units 3 and 4 generate electricity via three steam generators that produce steam that turns turbines. The operating licenses for these units, which were renewed in 2002, expire in 2032 for Unit 3 and in 2033 for Unit 4.

Turkey Point Unit 5 is an 1150 MWe combined cycle unit that employs four natural gas turbines and one heat-recovery steam-powered generator. In June 2009, FPL submitted an application to the NRC to build two more nuclear units, Units 6 and 7. The application for Units 6 and 7 remains under NRC review at this time.

The Turkey Point site also features a system of closed recirculating cooling canals, called the IWF or CCS, which four of the five units (Units 1 through 4) use for waste heat rejection. Unit 2 discharges a small fraction of its waste heat to the CCS in synchronous condenser mode compared to when it was operated as a power generator. The CCS is located south and southwest of the power generating units.

Q10. Can you briefly describe the CCS?

A10. (AK, BG) The CCS is used by Units 1 through 4 for waste heat rejection. For Units 3 and 4, the CCS serves as the UHS. The intake cooling water system draws cooling water from the intake end of the canal system at the intake structure for Units 3 and 4, which is located on the east side of the plant, as shown in Figure 1. The intake cooling water system provides cooling water for heat removal from the safety-related component cooling water heat exchangers. The water temperature for the UHS TS limit is measured at the inlet to the

¹ Throughout this testimony, "Turkey Point" is used interchangeably with Turkey Point Units 3 and 4. Any reference to Units 1, 2, and 5 or the proposed Units 6 and 7 will be indicated as such.

component cooling water heat exchangers after the water passes through the plant intake. The discharge to the CCS occurs on the west side of the plant, as shown in Figure 1. Temperature rises occur across the plant from intake to discharge that depend on the number of fossil and nuclear units in operation, unit load, and various other factors.

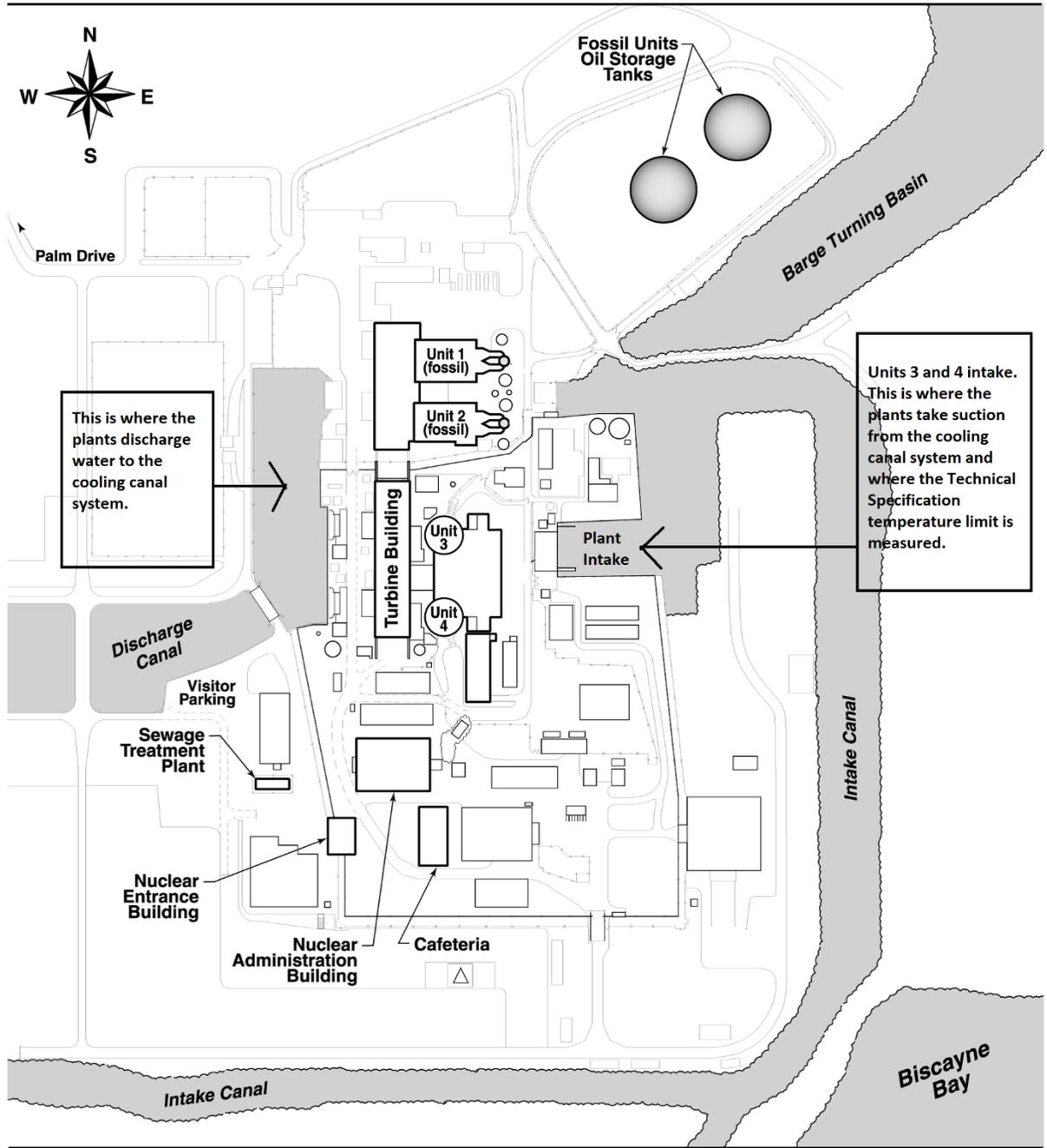


Figure 1 – Turkey Point Power Block Area, Page 3.1-2, License Renewal Application Turkey Point Units 3 & 4, Environmental Report (modified from Figure 3.1-1) (Ex. NRC-032, Florida Power and Light Company, Application for Renewed Operating Licenses: Applicant’s Environmental Report – Operating License Renewal Stage, Turkey Point 3 & 4 (September 8, 2000) (ADAMS Accession No. ML003749667)).

The CCS occupies an area approximately 2 mi wide by 5 mi long and includes 168 mi of earthen canals covering approximately 6,100 ac (4,370 ac of water surface). The average canal

depth is 2.8 ft. Total water volume in the cooling canals is approximately 12,300 acre-feet (4 billion gallons). The canals receive heated water from the fossil and nuclear plant equipment cooling systems and supply cooled water for reuse.

The discharge canal distributes the outflow into 32 feeder canals for cooling. As shown in Figure 2, water in the feeder canals flows south and discharges to a single collecting canal that distributes water to six return canals. Water in the return canals flows north to the plant intake, which is at a lower elevation than the plant discharge. The entire “water circuit” (plant discharge back to plant intake) is 13.2 mi and takes approximately 44 hours to complete.

The CCS is described as a “closed loop” system because it does not discharge directly into fresh or marine surface waters. However, an exchange of water exists between the canal system and groundwater because the canals are unlined.

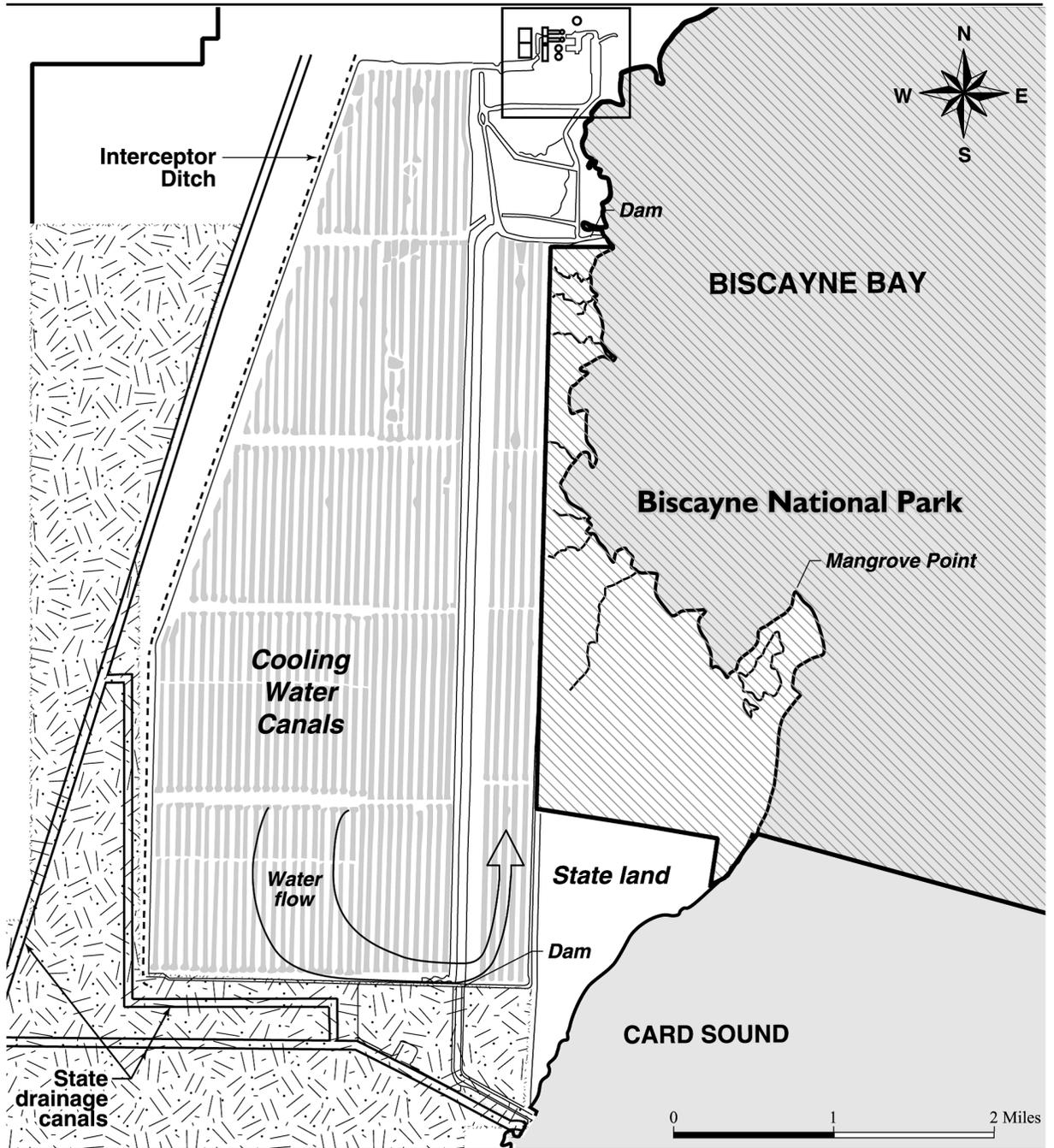


Figure 2 – Turkey Point Cooling Water Canals,” page 3.1-6, License Renewal Application Turkey Point Units 3 & 4, Environmental Report. (modified from Figure 3.1-2) (Ex. NRC-032).

Q11. Could you explain more about the CCS and its licensing?

A11. (AK, BG) Appendix A to the Turkey Point 3 and 4 renewed facility operating licenses, contains Technical Specification (“TS”) 3/4.7.4, “Ultimate Heat Sink,” that has a limiting

condition for operation that states that the UHS shall be OPERABLE with a supply water temperature less than or equal to 104 °F. If this condition is not met, the plants have to initiate actions to shut down. Prior to UHS TS LAR being granted the temperature was required to be less than or equal to 100 °F.

According to the FDEP Administrative Order signed on December 23, 2014, FPL signed a Consent Decree with the U.S. Department of Justice in 1971 that required the construction, after permitting, of a closed loop cooling configuration. The Florida Department of Pollution Control (later to become the FDEP), in 1971, issued a construction permit for the CCS. The construction of the CCS was completed in 1973 and was closed from the surface waters of Biscayne Bay and Card Sound. The cooling system became a closed-loop system prior to operation of Units 3 and 4. (Ex. INT-004.)

In 1972, FPL entered into an agreement with the Central and Southern Florida Flood Control district (later to become the SFWMD) addressing the operations and impacts of the CCS. The agreement has been updated several times, and is currently the Fifth Supplemental Agreement dated October 16, 2009. (Ex. NRC-033, S. Fla. Water Mgmt. Dist., Resolution 2009-1000, Fifth Supplemental Agreement Between the S. Fla. Water Mgmt. Dist. and Florida Power & Light Company (October 16, 2009).) FDEP also issued Turkey Point State License No. PA 03-45, "Conditions of Certification" ("CoC"). The version of this license in place at the time of the August 8, 2014, TS amendment was dated June 19, 2009 (PA 03-45D). (Ex. NRC-034, Fla. Dep't. of Env'tl. Protection, Conditions of Certification for Florida Power & Light Company: Turkey Point Plant, Units 3 and 4 Nuclear Power Plant, Unit 5 Combined Cycle Plant, PA 03-45D (June 19, 2009) (ADAMS Accession No. ML15142A650).) The current CoC is dated March 19, 2015 (PA 03-45E.1). (Ex. FPL-028, Florida Department of Environmental Protection; Final Order Modifying Conditions of Certification for Turkey Point Units 3-5 (March 19, 2015).) The revised CoC contains updated descriptions of the water withdrawal authorizations.

The State Industrial Wastewater Facility Permit No. FL0001562, issued by the FDEP, authorizes releases of industrial wastewater to the closed-loop cooling system and subsequently to groundwater. The permit does not authorize the existing units to discharge to surface waters of the state. The industrial wastewater facility is not waters of the state. (Ex. NRC-035, Letter from T.O. Jones, Vice President, Turkey Point Plant, Florida Power and Light, to N.R.C. Document Control Desk, Turkey Point Units 3 and 4 – Request for Renewal Notification of Wastewater Permit Number FL0001562 (June 25, 2004) (ADAMS Accession No. ML042190427).)

As part of the Fifth Supplemental Agreement and Turkey Point's State License No. PA03-45 Conditions of Certification, FPL was required to implement an extensive monitoring program for the CCS, entitled the Turkey Point Plant Groundwater, Surface Water and Ecological Monitoring Plan. The purpose of this plan was to provide information to determine the effects and extent of saline CCS water on existing and projected surface and groundwater resources, and ecological conditions surrounding the Turkey Point Facility. The Fifth Supplement Agreement and the CoC contain provisions for mitigating actions based on the results of the monitoring. (Exs. FPL-028; NRC-033, S. Fla. Water Mgmt. Dist., Resolution 2009-1000, Fifth Supplemental Agreement Between the S. Fla. Water Mgmt. Dist. and Florida Power & Light Company (October 16, 2009); NRC-034, Fla. Dep't. of Env'tl. Protection, Conditions of Certification for Florida Power & Light Company: Turkey Point Plant, Units 3 and 4 Nuclear Power Plant, Unit 5 Combined Cycle Plant, PA 03-45D (June 19, 2009) (ADAMS Accession No. ML15142A650).)

Q12. Can you briefly describe what mitigation and monitoring is currently required of FPL as part of the operation of the CCS?

A12. (AK, BG) Exhibit 3, Page 23, of the Fifth Supplemental Agreement states that the Monitoring Plan provides information to determine the vertical and horizontal effects and

extent of the CCS water on existing and projected surface and groundwater, and ecological conditions surrounding Turkey Point. The plan required a minimum of 2 years of monitoring prior to the EPU, and through the EPU until the SFWMD provides notification to FPL that the monitoring can be terminated. The data collected includes ground and surface water levels, specific conductance, temperature, CCS tracer suite constituents, tidal influences, preferential groundwater flow paths, surface and groundwater quality, rainfall, information for the water budget, and ecological conditions. (Ex. NRC-033)

The Fifth Supplemental Agreement states that if the results of the Monitoring Plan met certain conditions described in the agreement, then FPL has to begin consultation with SFWMD to identify measures to mitigate, abate, or remediate impacts from the CCS and promptly implement those measures approved by the SFWMD. The agreement lists measures that may be taken, and states that if the SFWMD notifies FPL to implement any alterations as outlined, any such alterations shall not impair the reasonable operations of the existing power plant. (Ex. NRC-033.)

The CoC dated March 19, 2015 (PA 03-45E.1), refers to the plan in the Fifth Supplemental Agreement and indicates that if the monitoring data warrants mitigating measures, those measures can include additional modeling, measures to reduce salinity increases, including the use of highly treated reuse water for recharge of the Biscayne Aquifer or wetlands rehydration, and operational changes in the CCS to reduce such impacts. (Ex. FPL-028.)

Q13. Can you briefly describe the hydrological environment at and near the Turkey Point site?

A13. (AK, BG) The site is surrounded by a series of surface water bodies, including Biscayne Bay and various canals, including the CCS and drainage canals. The area is underlain by two aquifers, the Biscayne and Floridan Aquifers, which are discussed in more detail below.

B. Groundwater Resources Overview

Q14. For the purposes of this testimony please define freshwater, brackish water, and saltwater.

A14. (WF) Freshwater is water that meets the U.S. Environmental Protection Agency's secondary drinking water standards for chloride concentrations (i.e., salinity) of less than or equal to 0.25 parts per thousand (ppt). (Ex. NRC-036, Origins and Delineation of Saltwater Intrusion in the Biscayne Aquifer and Changes in the Distribution of Saltwater in Miami-Dade County, Florida at 2.) Brackish water is water with chloride concentrations that ranges from 0.251 to 19 ppt. Saltwater (seawater) is water that has a concentration of greater than or equal to 19 ppt. (Ex. NRC-037, South Florida Water Management District Glossary.)

1. Discussion of Aquifers

Q15. Can you briefly describe the Biscayne Aquifer?

A15. (WF) The aquifer consists of highly permeable limestone and less permeable sand and sandstone. The top of the aquifer is found beneath soils at the land surface. Water in the Biscayne Aquifer is found under water table conditions and generally flows toward streams, the ocean and the extensive system of canals in south Florida. (Ex. NRC-040, DEP website . <https://fldep.dep.state.fl.us/swapp/Aquifer.asp#>)

Head is a measure of mechanical energy that causes groundwater to flow. Groundwater flows from higher head to lower head. During high tides, groundwater in the Biscayne Aquifer flows from Biscayne Bay and during low tides the groundwater flows towards Biscayne Bay. Seasonally, during wet periods of the year, groundwater flow is generally towards Biscayne Bay (east) and during dry times of the year it generally flows from Biscayne Bay. (Ex. NRC-024, NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 5, Regarding Turkey Point Units 3 and 4, at 2-7, 2-18 (January 2002) (ADAMS

Accession No. ML020280119).)

Q16. Can you describe how the water in the Biscayne Aquifer is used?

A16. (WF) The Biscayne Aquifer is the primary source of freshwater for all of Dade and Broward Counties and the southern portion of Palm Beach County. Water from the Biscayne is transported by pipeline to the Florida Keys. It is also used for agricultural purposes. Historically FPL has State permission and the ability pump water from the Biscayne Aquifer at the site into the CCS. FPL has also received permission to pump water from an interceptor ditch immediately adjacent to the west side of the CCS. The interceptor ditch is built into the Biscayne Aquifer. The purpose of this ditch it to prevent the westward movement of water from the CCS. Water from this ditch is pumped into the CCS.

Q17. Can you provide information about saltwater intrusion into the Biscayne Aquifer?

A17. (WF) Saltwater intrusion refers to the freshwater/saltwater interface. The Biscayne Aquifer in Miami-Dade County is prone to saltwater intrusion. This is because the area has a low land-surface elevation with a low topographic gradient and is bordered to the east and south by large saltwater bodies (i.e. the Atlantic Ocean, Biscayne Bay, and Florida Bay). Prior to development, much of Miami-Dade County was covered by the shallow marshes of the Everglades. Beginning in the early 20th century to provide land for urban development, flood control, irrigation, and agriculture, a large part of the Everglades in Miami-Dade County was drained by a network of uncontrolled or inadequately controlled canals that extended to the bays and the ocean. This drainage and subsequent water-supply withdrawals reduced water levels in the aquifer. These water-level declines were exacerbated during droughts and allowed saltwater to move inland along the base of the Biscayne Aquifer. This moved the natural saltwater/freshwater interface in the Biscayne Aquifer further west. ((Ex. NRC-036, Origins and Delineation of Saltwater Intrusion in the Biscayne Aquifer and Changes in the Distribution of

Saltwater in Miami-Dade County, Florida at 1-2.)

In sum, saltwater intrusion affects the entire coastal zone of the Biscayne Aquifer in Miami-Dade County. This prevents the use of the aquifer for drinking water along the Atlantic Ocean coast line and in the vicinity of the Turkey Point. (*Id.* at 13-14.; Ex. NRC-026, Florida Power & Light Company, Turkey Point Units 6 & 7 Combine License Application, Part 3: Environmental Report, Rev. 5, at 2.3-48, 2.3-53 (December 23, 2013) (ADAMS Accession No. ML13357A435).)

Q18. Where is the freshwater/saltwater interface relative to Turkey Point?

A18. (WF) Based on saltwater found along the base of the Biscayne Aquifer, the freshwater/saltwater interface in the Biscayne Aquifer is located approximately 6 to 8 mi inland (west) of the Turkey Point plant property. (*Id.* at 2.3-48.) In other words, Turkey Point is sitting on non-drinkable saltwater.

Q19. What lies directly beneath the Biscayne Aquifer?

A19. (WF) The Biscayne Aquifer is underlain by a confining layer that is also known as the “Intermediate Confining Unit”. It is extremely hard for groundwater to flow vertically through this natural confining layer. It is a barrier to groundwater flow, both laterally and vertically. It prevents groundwater flow between the Biscayne and any underlying aquifers (Ex. NRC-038; *Id.* at 2.3-202, Figure 2.3-17, 2.3-204, Figure 2.3-19). In effect it seals any underlying aquifers off from hydrologic connection with the Biscayne Aquifer (*Id.* at 2.3-17 – 2.3-18.). Directly beneath the confining layer is the Floridan Aquifer.

Q20. Please describe the Floridan Aquifer?

A20. (WF) The Floridan Aquifer is found under the whole State of Florida and extends into the southern portions of Georgia, Alabama, and South Carolina. (Ex. NRC-022, License Amendment to Increase the Maximum Reactor Power Level, Florida Power & Light Company

Turkey Point, Units 3 and 4: Final environmental assessment and finding of no significant impact, 77 Fed. Reg 20,059, 20062 (April 3, 2012).) The Floridan Aquifer system is divided into an upper and lower aquifer separated by a unit of lower permeability. In southeast Florida, groundwater in the Floridan Aquifer flows toward the Atlantic Ocean.

Q21. How is the Floridan Aquifer used?

A21. (WF) The upper Floridan Aquifer is the principal source of water supply in most of north and central Florida.

In southeastern Florida, the upper Floridan Aquifer is not used for drinking water. This is because the water quality in the upper Floridan Aquifer is brackish, becoming more saline with depth. The lower Floridan is used for the injection of sewage and industrial waste. (Exs. NRC-026, Florida Power & Light Company, Turkey Point Units 6 & 7 Combine License Application, Part 3: Environmental Report, Rev. 5, at 2.3-18, 2.3-19 (December 23, 2013) (ADAMS Accession No. ML13357A435); NRC-038, Aquifers, Fla. Dep't. of Env'tl. Protection, <https://fldep.dep.state.fl.us/swapp/Aquifer.asp#>. (last visited Nov. 9, 2015).)

Q22. Describe the water quality in the Biscayne and Floridan Aquifers at Turkey Point?

A22. (WF) At Turkey Point, the Biscayne Aquifer is not usable as a potable water. Near the surface, there is a large seasonal variation in the salinity of the groundwater. The near surface groundwater is less saline during the rainy season and more saline during the dry season. Near the land surface, water quality varies from saline to saltwater, but below 40 feet in depth it is saltwater all the time (greater than 28 ppt). (Ex. NRC-022 at 20063.)

Beneath Turkey Point, the Floridan Aquifer is a deeper aquifer. At Turkey Point the Floridan Aquifer is not usable as potable water. The upper Floridan Aquifer is brackish and the lower Floridan contains saltwater. (Ex. NRC-026 at 2.3-48 and 2.3-49.)

Q23. Please describe the relative locations of the CCS with respect to each aquifer?

A23. (WF) The CCS was excavated and built into the top of the Biscayne Aquifer. The CCS sits on the top of the aquifer, and the bottom and sides of the CCS are unlined.

The CCS is separated from the Floridan Aquifer by the Biscayne Aquifer and a thick confining unit² of low permeability rocks. The confining unit is made up of layers of silty calcareous sand and silt interlayered with limestone.

Q24. Can water from the CCS interact with the Floridan Aquifer?

A24. (WF) No, for two reasons. First, the CCS is not in contact with the Floridan Aquifer. Second, to the extent the CCS interacts with the Biscayne Aquifer, the Floridan Aquifer is isolated from the Biscayne Aquifer by a thick confining unit. The confining unit acts as a barrier and isolates groundwater in the Floridan Aquifer from groundwater in the Biscayne Aquifer. Therefore, neither the water in the CCS nor water in the Biscayne Aquifer can interact with the Floridan Aquifer. (Ex. NRC-024 at 2-7, 2-18)

Q25. Can water from the CCS interact with the Biscayne Aquifer?

A25. (WF) Yes, water can seep into and out of the bed of the CCS. Water can move between the CCS and Biscayne Aquifer in both directions. When the head in the Biscayne Aquifer is higher than the head in the CCS, groundwater flows from the Biscayne Aquifer into the CCS. When the opposite is true, water in the CCS flows into the Biscayne Aquifer. (Ex. NRC-022 at 20063, Ex. NRC-024 at 2-7, 2-18, Ex. NRC-024.)

² The EA referred to the confining unit as a "confining layer" as a shorthand.

Q26. What drives the difference in head between the Biscayne Aquifer and the CCS?

A26. (WF) The head in the Biscayne Aquifer changes with the tides and with changes in the weather. The head in the CCS is primarily impacted by precipitation, and groundwater movement into and out of the CCS. Head does not instantaneously change in the CCS with changes in Biscayne Aquifer head changes. This is because the permeability of the rock and sediments on the bottom of the CCS slow the rate of water movement into and out of the CCS.

Q27. How do tides and weather changes effect water flow into and out of the CCS?

A27. (WF) During high tides, the head in the Biscayne Aquifer can increase. If the head in the Biscayne Aquifer is higher than the head in the CCS, water can seep from the Biscayne Aquifer into the CCS. If they are lower, say during low tides, water would seep from the CCS into the Biscayne Aquifer. Seasonally during the dry time of year, the head in the Biscayne Aquifer is more likely to be lower than the head in the CCS. Again at this time, water would seep into the Biscayne Aquifer. During wet periods the opposite is more likely to happen.

Q28. Was the CCS designed to require FPL to add water to the CCS to maintain the amount of water in the CCS?

A28. (WF) Historically, no pumping was needed to maintain the CCS. The design did not require pumping from aquifers or the diversion of surface waters into the CCS.

2. Salinity in CCS and Biscayne Aquifer

Q29. Has the salinity in the CCS changed since the CCS was first filled with water?

A29. (WF) Yes, the CCS has higher salinities because evaporation has increased the concentration of salt in the CCS over time. This is because salt water from the Biscayne Aquifer

and blowdown water from Unit 5 continue to contribute additional salt to the CCS.

Q30. Has the salinity in the Biscayne Aquifer underneath the CCS changed since the CCS was first filled with water?

A30. (WF) Yes, salinities have increased in that area. Water with higher salt content has moved from the CCS into the Biscayne Aquifer. Water with a higher salt content has a higher density than water with less salt content. This density difference has caused the saltier water from the CCS to find its way to bottom of the aquifer and then move laterally with the groundwater in the Biscayne Aquifer.

Q31. Have these effects been studied or modeled?

A31. (WF) Yes. For example, CASE has referenced a study, "Effect of hypersaline cooling canals on aquifer salinization," (Ex. NRC-044 (provides a complete version of the study)), explicitly modeling this effect at Turkey Point.

Section X of the CoC sets forth the framework for new monitoring and potential abatement or mitigation measures, as needed. The monitoring plan outlined in the CoC requires FPL to delineate the vertical and horizontal extent of the hypersaline plume that originates from the CCS and to characterize the water quality, including salinity and temperature impacts. The CoC requires FPL to detect changes in the quantity and quality of surface and groundwater over time due to the CCS. If the FDEP, in consultation with SFWMD and Department of Environmental resources Management, determine that there is potential harm to the waters of the State, then additional measures shall be required to evaluate or to abate such impacts.

Additional measures include but are not limited to:

1. the development and application of a three-dimensional coupled surface and groundwater model (density dependent) to further assess impacts of the EPU on ground and surface waters; such model shall be calibrated and verified using the data collection during the monitoring period;

2. mitigation measures to offset such impacts of the EPU necessary to comply with State and local water quality standards, which may include methods and features to reduce and mitigate salinity increases in groundwater including the use of highly treated reuse water for recharge of the Biscayne Aquifer or wetlands rehydration; and operational changes in the cooling canal system to reduce any such impacts.

III. DESCRIPTION OF THE UHS TS LICENSE AMENDMENTS

Q32. Can you briefly explain the LAR submitted by FPL for Turkey Point?

A32. (AK, BG) The licensee requested a change to the intake supply water temperature value specified in its TSs at which the plant would have to initiate shut down actions. This temperature value is for the water entering the inlet of the component cooling water heat exchangers, which comes from the plant's intake structure located on the northeastern side of the plant, as shown in Figure 1 above.

The LAR did not increase the plant's reactor coolant temperature or power level or the value of the plants' heat load discharged to the CCS. The licensee requested modification of its TSs for the UHS (TS 3/4.7.4). The licensee requested the Limiting Condition for Operation ("LCO") for this TS be changed from, "The ultimate heat sink shall be OPERABLE with an average supply water temperature less than or equal to 100 °F," to, "The ultimate heat sink shall be OPERABLE with an average supply water temperature less than or equal to 104 °F." When the intake supply water temperature is above the specified value in this LCO during the operational modes specified in the TS, the licensee has to take the action requirements specified in the TS. The action the licensee would have to take when the average intake supply water temperature goes above the value in the LCO is to place both units in at least hot standby (Mode 3) within 12 hours and in cold shutdown (Mode 5) within the following 30 hours. The

amendment request was to change the temperature value specified in the TSs that would necessitate the licensee to take actions to shut down the units.

The licensee also requested to modify the associated surveillance requirements for this TS by adding a surveillance requirement to monitor the average supply water temperature every 6 hours when it exceeded 100 °F. In a supplement to the application, the licensee requested to increase the TS surveillance requirement frequency for verifying the component cooling water heat exchanger surveillance curves by a performance test.

Q33. Can you briefly describe how the Staff's review of the LAR proceeded?

A33. (AK, BG) When the licensee submitted its application dated July 10, 2014, it requested the NRC approve the action by August 30, 2014. (Ex. FPL-008 at 1.) By supplement dated July 17, 2014, the licensee stated that the UHS temperatures approached the TS temperature limit and requested per 10 C.F.R. § 50.91(a)(5) that the NRC process the amendment on an emergency basis to avoid a dual unit shutdown and maintain grid voltage reliability. (Ex. NRC-011 at.1-2.) After discussions among the NRC's project management, technical, and environmental staff about how much time would be needed to complete the evaluations, the Staff had estimated that there would likely have been time to issue a notice to the public per 10 C.F.R. § 50.91(a)(6)(i)(A) for exigent circumstances that would allow the public an opportunity for hearing and allow two weeks from the date of the notice for prior public comment. The NRC staff's original proposed no significant hazards consideration determination, which the NRC staff sent to the Office of the Federal Register for publishing in the *Federal Register* and to the licensee on July 24, 2014, (Ex. NRC-008), appeared in the *Federal Register* on July 30, 2014. (Ex. NRC-007.) The NRC did not receive any comments from the State, the public, or from CASE in response to this Notice.

To address its obligations under the ESA with respect to the American crocodile, the Staff engaged in informal consultation with the FWS. On July 22, 2014, the Staff met with FWS

and FPL representatives at the FWS's Vero Beach (Ex. NRC-019, Memorandum from Briana Grange and Dennis Logan, N.R.C., to David J. Wrona, Chief, Environmental Review and Guidance Update Branch, N.R.C., Summary of Meeting with U.S. Fish and Wildlife Service's South Florida Ecological Services Office Regarding Endangered Species Act Section 7 Consultation for Turkey Point Nuclear Generating Station Units Nos. 3 and 4 (July 22, 2014) (ADAMS Accession No. ML14216A533)). Following the meeting, the Staff developed a biological assessment (Ex. NRC-010, N.R.C., Biological Assessment on the American Crocodile (*Crocodylus acutus*), Florida Power & Light Company, Turkey Point Units 3 and 4: Proposed License amendment application to increase the ultimate heat sink temperature limit (July 2014) (ADAMS Accession No. ML14206A806)), which the Staff transmitted to the FWS for review and concurrence on July 25, 2015 (Ex. NRC-020, Letter from David J. Wrona, Chief, Environmental Review and Guidance Update Branch, N.R.C., to Larry Williams, Field Supervisor, U.S. Fish and Wildlife Service, Request to Reinitiate Informal Consultation for a Proposed License Amendment to Increase the Ultimate Heat Sink Temperature Limit at Turkey Point Nuclear Generating Station Unit Nos. 3 and 4 (July 25, 2014) (ADAMS Accession No. ML14206A800)). The FWS concurred on the Staff's biological assessment conclusions in a letter dated July 29, 2014 (Ex. NRC-021, Letter from Craig Aubrey, Field Supervisor, U.S. Fish and Wildlife Service, to David J. Wrona, Chief, Environmental Review and Guidance Update Branch, N.R.C., Endangered Species Act Section 7 Consultation Concurrence (July 29, 2014) (ADAMS Accession No. ML14210A170)). In accordance with 50 C.F.R. § 402.13(a), the FWS's written concurrence terminated consultation and precluded the need for further action pursuant to ESA section 7.

To address its obligations under NEPA, the Staff published an EA and FONSI in the *Federal Register* on July 31, 2014 (Ex. NRC-009, Florida Power & Light Company, Turkey Point Units 3 and 4: Environmental Analysis and Finding of No Significant Impact, 79 Fed. Reg. 44,464 (July 31, 2014)).

On July 29, 2014, the licensee supplemented its amendment request with a proposed change that increased the scope of the request and provided additional information related to the proposed no significant hazards consideration published in the *Federal Register* on July 30, 2014. (Ex. NRC-040, Letter from Michael Kiley, Vice President, Turkey Point Nuclear Plant, Florida Power and Light, to N.R.C. Document Control Desk, License Amendment Request No. 231, Application to Revise Ultimate Heat Sink Temperature Limit – Supplement 2, and Response to Request for Additional Information (July 29, 2014) (ADAMS Accession No. ML14211A508).) Therefore, in accordance with 10 C.F.R. § 50.91(a)(6)(i)(B), the NRC issued a second notice in newspapers local to the Turkey Point site. (Ex. NRC-041, N.R.C., Public Notice: NRC Staff proposes to amend renewed facility operating licenses at the Turkey Point Nuclear Generating Unit Nos. 3 and 4 (July 31, 2014) (ADAMS Accession No. ML14211A266).) This notice was published in the Miami Herald and the Key West Citizen newspapers on August 3, and August 4, 2014. The NRC did not receive any comments from the public or from CASE in response to this Notice. The amendments were issued to FPL on August 8, 2014. (Ex. NRC-006, Letter From Audrey Klett, Project Manager, N.R.C., to Mano Nazar, President and Chief Nuclear Officer, NextEra Energy, Turkey Point Generating Station Unit Nos. 3 and 4 - Issuance of Amendments Under Exigent Circumstances Regarding Ultimate Heat Sink and Component Cooling Water Technical Specifications (August 8, 2014) (ADAMS No. ML14199A107).) The notice of issuance and opportunity for a hearing were published in the *Federal Register* on August 14, 2014. (Ex. NRC-042, Florida Power & Light Company, Turkey Point Units 3 and 4: License amendment; issuance, opportunity to comment, request a hearing, and petition for leave to intervene, 79 Fed. Reg. 47,689 (August 14, 2014).)

IV. THE STAFF'S ENVIRONMENTAL ASSESSMENT AND FONSI

A. The Staff's Development of the EA and FONSI

Q34. Can you briefly describe the Staff's process for determining whether an environmental analysis is required prior to authorizing a license amendment?

A34. (BG) NEPA requires the NRC to consider the environmental impacts of its licensing actions prior to issuing licenses or license amendments. Accordingly, before implementing any major federal action significantly affecting the quality of the human environment, the Staff must prepare an EIS that describes the action, its effects, and alternatives to the proposed action. For other actions, NEPA provides for less detailed analysis, which may be in the form of an EA or a categorical exclusion.

The NRC's regulations at 10 C.F.R. § 51.22 establish certain categories of actions that do not individually or cumulatively have a significant effect on the human environment as categorical exclusions. If a proposed action meets the categorical exclusion requirements, the Staff does not prepare an EIS or EA. For license amendments that fall within a categorical exclusion, the Staff typically documents the categorical exclusion in the safety evaluation.

The NRC's regulations at 10 C.F.R. § 51.20 establish other categories of actions as requiring preparation of an EIS. For actions that meet these criteria, the Staff prepares an EIS. If an action is not listed as requiring an EIS per 10 C.F.R. § 51.20 or within the categorical exclusions established at 10 C.F.R. § 51.22, the Staff prepares an EA. The EA documents the Staff's determination of whether the action is a major federal action that requires preparation of an EIS. The EA also includes a brief discussion of the need for the proposed action, alternatives to the proposed action, the environmental impacts of the proposed action and alternatives, a list of agencies and persons consulted, and identification of sources used to prepare the EA.

If the Staff determines on the basis of the EA that the action will not have a significant

impact on the environment, the Staff prepares a FONSI. Alternately, if the Staff determines that the proposed action has the potential to significantly impact the environment, the Staff prepares an EIS or a mitigated FONSI. A mitigated FONSI is appropriate when the Staff finds that an action has the potential for significant environmental impacts, but that those impacts may be mitigated so that they are no longer significant. If the Staff commits to implementing mitigation that will support a FONSI, then the Staff can prepare a mitigated FONSI and conclude the NEPA review without preparing an EIS.

Q35. How does the Staff determine what kind of environmental analysis to perform?

A35. (BG) The Staff follows the NRC's criteria for licensing and regulatory actions requiring EISs, actions requiring EAs, and those actions that are eligible for categorical exclusion in 10 C.F.R. § 51.20, 10 C.F.R. § 51.21, and 10 C.F.R. § 51.22, respectively. Additionally, the Staff is guided by NRR Office Instruction LIC-203, Revision 3, "Procedural Guidance for Preparing Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues" (July 1, 2013) (Ex. NRC-028, N.R.C., NRR Office Instruction LIC-203, Rev. 3: Procedural Guidance for Preparing Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues (July 13, 2013) (ADAMS Accession No. ML12234A708)).

If the proposed action meets the criteria in 10 C.F.R. § 51.20, then the staff prepares an EIS. Such actions include, among others, issuance of construction permits; issuance or renewal of licenses for nuclear power reactors, testing facilities, and fuel reprocessing plants; and issuance of early site permits. If the proposed action meets the criteria in 10 C.F.R. § 51.21, then the staff prepares an EA. All licensing and regulatory actions require an EA unless the action is listed at 10 C.F.R. § 51.20 as requiring an EIS or identified in 10 C.F.R. § 51.22 as a categorical exclusion. If the Staff prepares an EA and the review documented in the EA

demonstrates that the proposed action will not have a significant impact on the environment, a FONSI is prepared in accordance with the criteria of 10 C.F.R. § 51.32, and no EIS need be prepared. If the proposed action falls within the scope of the categorical exclusions listed at 10 C.F.R. § 51.22, then the Staff does not prepare an EIS or EA. In accordance with 10 C.F.R. § 51.22(b), the Staff may elect to prepare an EIS or EA for actions that meet the criteria for a categorical exclusion if special circumstances exist. Special circumstances may include the potential for adverse effects on a property included in or eligible for the National Park Service's *National Register of Historic Places*; on minority and/or low-income populations; or on federally listed species or designated critical habitat. (Ex. NRC-028 at B-8 – B-14.) In cases where the appropriate type of environmental analysis it is not immediately obvious to the Staff due to special circumstances, the Staff takes into account decisions made by the Staff on previous licensing actions of similar type and scope and on the judgement of the Staff's NEPA experts.

Q36. What did the Staff do to determine the appropriate environmental analysis for this LAR?

A36. (BG) The Staff reviewed the UHS TS LAR, the requirements of 10 C.F.R. § 51, the procedural guidance for performing environmental reviews contained in LIC-203 (ex. NRC-028), the procedural guidance for conducting license amendment reviews contained in LIC-101 (Ex. NRC-027, N.R.C., NRR Office Instruction LIC-101, Rev. 4: License Amendment Review Procedures (May 25, 2012) (ADAMS Accession No. ML113200053)), and past environmental reviews for similar UHS TS LARs at other facilities.

In the past, the Staff have found that license amendment requests at other facilities involving increases in the UHS TS temperature limit meet the NRC's criteria for a categorical exclusion at 10 C.F.R. § 51.22. In the case of the Turkey Point UHS TS LAR, the Staff considered whether the presence of the American crocodile and its critical habitat within the CCS could potentially constitute a "special circumstance" in accordance with 10 C.F.R. §

51.22(b) that could require a NEPA review. The Staff members with appropriate expertise met to discuss whether the UHS TS LAR met the categorical exclusion criteria. The Staff determined based on those discussions that the most appropriate type of environmental analysis for the action would be an EA.

As part of the environmental review, the Staff contacted FWS to determine if the UHS TS LAR would require ESA section 7 consultation. The Staff and FWS determined that the agencies would need to engage in section 7 consultation due to the potential for implementation of the UHS TS LAR to affect the American crocodile and its critical habitat.

Q37. What type of environmental analysis did the Staff perform to support this license amendment?

A37. (BG) The Staff prepared an EA and FONSI (Ex. NRC-009) pursuant to NEPA. The Staff also prepared a biological assessment (Ex. NRC-010) and consulted with FWS pursuant to section 7 of the ESA (Ex. -021).

Q38. What drove the Staff's decision to prepare an EA?

A38. (BG) The Staff's decision to prepare an EA was driven by the presence of the American crocodile on the Turkey Point site, as described above, which the Staff found to be a "special circumstance" under 10 C.F.R. § 51.22(b). Generally, the Staff has processed similar license amendment requests under 10 C.F.R. § 51.22 (Categorical Exclusions). For instance, in April 2014, the NRC issued an amendment revising Technical Specification 3/4.7.11 of the Millstone Power Station, Unit 2, license to increase the TS UHS temperature limit from 75 °F to 80 °F, the Safety Evaluation for which found that the amendment met the eligibility criteria for categorical exclusion set forth in 10 C.F.R. § 51.22(c)(9) (Ex. NRC-043 at 10). Similarly, in August 2006 and in May 2004, the Staff issued license amendments increasing the TS UHS temperature limits at Hope Creek Generating Station, Unit 1, and Nine Mile Point Nuclear Station, Unit 2, respectively, for which the Staff determined that the amendments met the criteria

for categorical exclusion at 10 C.F.R. § 51.22(c)(9) (Exs. NRC-029 at 6; NRC-030 at 5).³

Q39. Can you briefly describe what the NRC regulations require an EA to contain?

A39. (BG) NRC regulations at 10 C.F.R. § 51.30 require EAs to contain a brief discussion of the need for the proposed action, alternatives as required by section 102(2)(E) of NEPA, the environmental impacts of the proposed action and alternatives as appropriate, a list of agencies and persons consulted, and identification of resources used.

Q40. Can you briefly describe the Staff's EA and conclusions?

A40. (BG) The staff prepared an EA and FONSI for the UHS TS LAR, which appeared in the Federal Register on July 31, 2015 (Ex. NRC-009). The EA describes the plant site and environs, describes the proposed action, discusses the need for the proposed action, assesses the environmental impacts of the proposed action, assesses cumulative impacts, identifies alternatives to the proposed action and environmental impacts of the alternatives, discusses alternative use of resources, lists agencies and persons consulted, and identifies the documents cited in the EA.

The EA made conclusions on various environmental resources. As raised in CASE's statement of position, the Staff concluded that the proposed action would result in no significant impact on groundwater resources and aquatic resources. Additionally, the Staff concluded that the proposed action is not likely to adversely affect any federally protected species or affect any designated critical habitat. The EA incorporated by reference the Staff's biological assessment (Ex. NRC-010) associated with the UHS TS LAR, which concluded that the UHS TS LAR may

³ More recently, in August 2015, the Staff issued an EA and FONSI for a proposed amendment to revise the maximum allowable TS temperature of the UHS for LaSalle County Station, Units 1 and 2, from 101.25 °F to 104 °F (Ex. NRC-031). As with Turkey Point, the Staff found that a special circumstance existed: the potential for the amendment to increase the frequency of reportable fish kills in the facility's cooling pond. The LaSalle license amendment request is currently under the Staff's review and is pending final decision.

affect, but is not likely to adversely affect the American crocodile and would have no effect on designated American crocodile critical habitat (Ex. NRC-010 at 10-11). The FWS concurred on the Staff's biological assessment conclusions in a letter dated July 29, 2014 (Ex. NRC-021).

Q41. Based on the EA, how did the Staff decide to proceed with its environmental analysis for the UHS TS LAR?

A41. (BG) The Staff prepared a FONSI that incorporated the EA by reference and concluded that the proposed action would not have significant effects on the quality of the human environment. The FONSI was published in the *Federal Register* on July 31, 2014. (Ex. NRC-009.) Accordingly, the FONSI also stated that the Staff decided not to prepare an EIS for the proposed action.

Q42. One of the issues raised in this proceeding is whether the Staff considered the impact of changes that potentially resulted from the 2012 EPU license amendment in its EA. Can you briefly describe the power uprate history of Units 3 and 4?

A42. (AK, BG) Units 3 and 4 were originally designed to produce 2200 MWt. The corresponding steam and power conversion system, including the turbine generator, was designed to permit the generation of 728 MW of gross electrical power. A subsequent thermal uprate increased the capacity of the reactors to produce 2300 MWt with a corresponding gross electrical power output of 775 MW. The extended power uprate (EPU), which the NRC approved in 2012, increased the capacity of the reactors to produce 2644 MWt with a corresponding gross electrical power output of 888 MW. From February 26, 2012, through September 5, 2012, Unit 3 was in a prolonged refueling outage for EPU-related modifications. Unit 4 was in a prolonged refueling outage for EPU-related modifications from November 5, 2012, through April 17, 2013.

Q43. How did the amount of heat discharged from all Turkey Point units to the CCS change following implementation of the EPU?

A43. (AK, BG) The total amount of heat discharged to the CCS from Units 1 through 4 has decreased since implementation of the EPU.

At the time of FPL's submittal of the EPU LAR, Units 1 and 2 were producing about 1260 MWt per unit based on a "rule-of-thumb" power conversion efficiency of 34 percent, and Units 3 and 4 were producing about 2300 MWt per unit. After the EPU modifications were completed, Units 3 and 4 have been producing about 2644 MWt per unit (an increase of 688 MWt total combined for both units). However, since 2010, Unit 2 is no longer being operated as a power generator, which is a decrease of approximately 1260 MWt of generation. Unit 2 is not discharging as much heat to the CCS because it's being used as a synchronous generator. The net MWt generation from the four units is 572 MWt less after the EPU. Assuming a "rule-of-thumb" 34 percent power conversion efficiency (ratio of MWe to MWt) for all four units (the actual power conversion efficiency may differ among the units and pre- and post-EPU), means the MW rejected to losses is 66 percent of the MW generated. The estimated total heat rejected after the EPU is 1.3×10^9 BTU/hr less than the heat rejected from all four units prior to the EPU.

Although the heat discharged from Units 3 and 4 to the CCS increased with the EPU, the total heat discharged from Units 1, 3, and 4 after the EPU is less than the total heat discharge from all four units prior to the EPU.

Q44. After the EPU was issued, did the CCS conditions change?

A44. (AK, BG) Yes. An algae bloom appeared and worsened in 2013 and 2014 likely because of the lower than average rainfall amounts in those years. According to the licensee's root cause evaluation for the increase in the CCS temperature, the fossil operation has decreased and impacts the flow back into the CCS. In addition, the two prolonged outages for the EPU modifications resulted in extended operation with no flow from one of the nuclear

plants. This affected the flow through the CCS, which can promote more algae. The algae bloom absorbed heat and impacted the CCS's capability to dissipate heat. (Ex. NRC-025, Florida Power and Light, Root Cause Evaluation for CR Number 1979235, "Canal Temperature Exceeded 100 degrees F" (Nov. 21, 2014) (ADAMS Accession No. ML15128A656)). Had the algae bloom not existed, the Staff would have expected the CCS to have experienced the previously projected natural variations and impacts from the EPU.

Q45. Can you explain the natural variations that occur in the CCS system?

A45. (AK, BG) The CCS temperatures vary seasonally and diurnally. The temperatures peak high during the summer time (usually above 90 °F at the plant intake) and decline to lows in winter time (usually below 80 °F). The CCS temperatures also vary daily with sun exposure; temperatures fall at night. Meteorological conditions also significantly affect CCS temperatures. For example, the CCS temperatures dropped significantly when it rained (about 5 to 10 °F afterwards). However, in 2013 and 2014, lower-than-usual rainfall amounts have been measured at the CCS.

Prior to 2014, I'm not aware of any instances where the CCS inlet temperature has exceeded 100 °F, and I'm not aware of any instances where the inlet temperature has exceeded 100 °F since Summer 2014. During Summer 2014, the temperature exceeded 100 °F for a few days, which was concurrent with an algae bloom. The algae bloom increased the temperatures in the CCS above what the CCS would have experienced without the high concentration of algae.

Evaporative losses from the CCS are replenished by rainfall, plant storm water runoff, and treated process wastewater. Recharge of the groundwater at the site varies seasonally between surface recharge during the rainy season and saline recharge from the ocean during the dry season. As a result, salinity in the CCS varies seasonally, diurnally, and with meteorological conditions.

Q46. Has the Staff looked at variations of conditions within the CCS system from changes in operations at Turkey Points, Units 3 and 4?

A46. (AK, BG) Yes, the Staff looked at changes within the CCS system. The Staff compared the 4 °F change authorized in the UHS TS license amendments to the natural temperature variations within the CCS and determined that the authorized change was insignificant compared to the natural variations experienced in the CCS.

Q47. Did the Staff consider the current condition of the CCS when making its determination regarding environmental impacts?

A47. (BG) Yes, the staff considered the current condition of the CCS when making its determination regarding environmental impacts of the UHS TS LAR. The current condition of a resource (here, the CCS) is known as the environmental baseline. The environmental baseline is the condition of the resource without action. The baseline represents the actual condition of the environmental resource regardless of what actions have influenced that baseline in the past and regardless of whether past assessments accurately predicted the future condition of the resource. For instance, the changes that potentially resulted from the EPU license amendment have contributed to the current condition of the CCS and were, therefore, factored into the environmental baseline upon which the Staff assessed the potential impacts of the UHS TS LAR. Because the environmental baseline represents the actual condition of the resource, it included any changes to environmental resources that potentially resulted from the EPU even if those changes were not anticipated at the time the NRC undertook a NEPA review and prepared an EA and FONSI for the EPU in 2012. In the EA, the environmental baseline is described in the "Plant Site and Environs" section as well as in the introduction to the Staff's discussion of impacts on each of the various environmental resources in the "Nonradiological Impacts" and "Radiological Impacts" sections. (Ex. NRC-009 at 44465-67.)

Q48. Are previously authorized license amendments material to the Staff's FONSI?

A48. (BG) Previously authorized license amendments are material to the Staff's FONSI to the extent that those actions influence the environmental baseline, as described above. However, the FONSI only applies to the proposed action at hand—in this case, the UHS TS LAR. As specified in 10 C.F.R. § 51.32, the FONSI will, among other requirements, identify the proposed action; state that the Commission has determined not to prepare an EIS for the proposed action; and briefly present the reasons why the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the FONSI applies to the proposed action and not on previously authorized license amendments.

Q49. In preparing the EA and FONSI, did the Staff consider actions that had been approved by other regulatory agencies and/or were being sought by FPL?

A49. (BG) Yes, the Staff considered both actions that had already been approved by other regulatory agencies as well as actions that might occur in the future as a result of approvals that were being sought by FPL from other regulatory agencies at that time.

Q50. What actions that were already approved were considered by the Staff?

A50. (BG) The Staff considered the environmental impacts of the FDEP's approval to treat the algae bloom in the CCS with use of copper sulfate, hydrogen peroxide, and a bio-stimulant (collectively referred to as "algaecides" in this testimony). The Staff also considered the SFWMD's approval for FPL to withdraw a portion of Unit 5's water allowance from the Floridan Aquifer and the SFWMD's temporary approval for FPL to withdraw water from the Biscayne Aquifer for use in the CCS. Additionally, the Staff considered the EPU, which the NRC granted in 2012. Each of these past actions and their resulting environmental impacts were factored into the environmental baseline for the EA, were described in the cumulative impacts section of the EA, or both. These actions were also considered in the Staff's biological

assessment.

Q51. What actions that were being contemplated by FPL or other regulatory agencies were considered?

A51. (BG) The Staff considered an Administrative Order being contemplated by FDEP that would require FPL to install new wells to pump water from the Floridan Aquifer into the CCS for the purpose of reducing CCS salinity levels. The Staff also considered the possible future construction of Units 6 and 7, the application for which is currently under NRC review. These actions were considered in the cumulative impacts section of the EA as well as in the Staff's biological assessment.

Q52. Did the Staff's analysis supporting the EA consider the potential impacts that could result from these authorized and contemplated surface and groundwater actions?

A52. (BG) Yes, the EA considered the authorized and contemplated actions described above.

The FDEP-approved algaecide treatments to eradicate the algae bloom in the CCS are described in the cumulative impacts section of the EA. (Ex. NRC-009 at 44468.) The EA describes the purpose of the treatments, the history of the FDEP's approval of the treatments, and the cumulative impacts that the treatments might have on surface water resources, aquatic resources, and the American crocodile. The EA concludes that the algaecide treatments will not have a significant impact on any environmental resources and notes that any unanticipated effects would be addressed by FDEP through monitoring required as a condition of that agency's approval.

Authorized and contemplated water withdrawals from the Biscayne and Floridan Aquifers are described in the cumulative impacts section of the EA. (*Id.* at 44469.) In this section, the EA briefly describes the aquifers, describes the SFWMD's approvals regarding

withdrawals from the two aquifers, describes an anticipated FDEP Administrative Order concerning aquifer withdrawals to mitigate salinity in the CCS, and addresses the cumulative impacts of these actions. The EA concludes that the withdrawals would not have a significant environmental impact and would have a positive impact on aquatic resources and American crocodiles.

The EPU is incorporated into the environmental baseline of the EA, which is described in the “Plant Site and Environs” section as well as in the introduction to the Staff’s discussion of impacts on each of the various environmental resources in the “Nonradiological Impacts” and “Radiological Impacts” sections. (*Id.* at 44465-44467.)

The possible future construction and operation of Units 6 and 7 is addressed in the cumulative impacts section of the EA. (*Id.* at 44468-44469.) The EA describes FPL’s application for Units 6 and 7. The EA determines that Units 6 and 7 would not contribute cumulative impacts on the environmental resources affected by the LAR other than the radiological environment. The EA addresses radiological impacts in detail and concludes that the cumulative radiological impacts would not be significant because FPL would be required to meet dose limits specified in NRC’s regulations. The EA also notes that any impacts from Units 6 and 7 on the American crocodile and its critical habitat would be addressed in a future ESA consultation between NRC and FWS.

B. The License Amendments are Unlikely to Impact Groundwater

Q53. Are you familiar with the Staff’s conclusion in the EA that the UHS license amendments would not have a likely impact on the groundwater around Turkey Point?

A53. (AK, BG, NH, WF) Yes.

Q54. Could you explain how the Staff made the conclusion that the LAR was not likely to impact the groundwater at Turkey Point?

A54. (AK, BG, NH, WF) The Staff concluded that the LAR was not likely to significantly affect groundwater at Turkey Point because: (1) the change in the temperature limit and FPL's mitigating actions do not impact saltwater intrusion; (2) the time that the CCS was expected to exceed the previous temperature limit was of short duration; (3) the increase in the temperature limit reduces the plants' need to consume additional water; and (4) the State was already directing the licensee to address the salinity within the CCS.

1. **The Amendments and FPL's Mitigating Actions Do Not Impact Saltwater Intrusion**

Q55. Referring back to the study described in Answer A31 that CASE cited concerning the "Effect of hypersaline cooling canals on aquifer salinization," what factors did the authors model?

A55. (WF) The authors used a two-dimensional cross-section model to evaluate the effects of hydraulic heterogeneities, cooling canal salinity, heat transport, and cooling canal geometry on Biscayne Aquifer salinization and the movement of the freshwater/saltwater interface within the Biscayne Aquifer. Four different hydraulic conductivity configurations, with values ranging over several orders of magnitude, were evaluated with the model. For all of the conditions evaluated, aquifer salinization that was initiated by the formation of dense, hypersaline fingers.

Q56. From their evaluation of CCS water salinities, what did the authors conclude?

A56. (WF) The authors concluded that temperature increases in the CCS has a mitigating effect on Biscayne Aquifer salinization. The reasons stated by the authors was that the increased temperature reduced the density contrast between the water in the CCS and the underlying Biscayne Aquifer. (Ex. NRC-044, Hughes et al., Effect of hypersaline cooling canals

on aquifer salinization, 18 Hydrogeology Journal 25, 36 (2010) (ADAMS Accession No. ML15301A928)).

Q57. What did CASE assert about this study?

A57. (WF) It appears to be listed as an exhibit, but it is not clear how CASE uses this study.

Q58. Is it your view that the study supports the temperature portion of CASE's contention?

A58. (WF) No. In fact, the study concluded temperature effects did not increase the rate of aquifer salinization:

Results of the simulations indicate that temperature has a mitigating effect on aquifer salinization by reducing the density contrast between the CCS and the aquifer. Isothermal simulations show a 4–10% increase in total aquifer salt content at the end of the 25-year simulation period when compared to equivalent simulations with temperature effects included.

Ex. NRC-044 at 36.

Q59. What did the study say about salinity in the Biscayne Aquifer?

A59. (WF) Salinity would eventually increase, but it would take years. The study concluded:

In general, CCS salinity had a large affect on aquifer salinization. Larger TDS concentrations naturally result in larger aquifer salinization rates because of the concentration values themselves; but they also result in increased salinization rates and extent of salinization because of the larger density contrast.

(*Id.*)

Q60. In your view, did the amendment cause significant changes in temperature in the CCS, such as those described in the study above?

A60. (WF) No, the conditions in the CCS did not change long enough to cause a significant change in temperature within the CCS. As mentioned before, seasonal and daily

changes affect the CCS, which prevent it from reaching equilibrium and a new higher temperature.

Q61. In your view, did the amendment cause significant changes in salinity?

A61. (WF) No, the conditions in the CCS did not change long enough to cause a significant change in salinity. For significant salinity changes to occur, the new conditions would have to be sustained for a long time. By contrast, CCS inlet temperatures greater than 100 °F have not occurred outside of a few days in the summer of 2014. As mentioned before, seasonal and daily changes affect the CCS, which prevent it from reaching equilibrium.

Q62. In your view, did the amendment cause significant changes in the salinity of the Biscayne Aquifer?

A62. (WF) No, as stated in answer A61, the conditions in the CCS did not change long enough to cause a significant change in salinity within the CCS. Therefore, significant salinity changes in the Biscayne Aquifer would not occur as a result of the CCS changes.

Q63. How might the CCS impact the freshwater/saltwater interface?

A63. (WF) As previously stated in the answer A62, the freshwater/saltwater interface is located 6 mi west of Turkey Point. For the CCS to impact that interface, higher salinity groundwater would have to move 6 mi west. Because the higher salinity groundwater has a higher density than the surrounding saltwater, if enough high salinity groundwater moved that far, it might push the freshwater/saltwater interface further west.

Q64. In your view did the amendment impact the freshwater/saltwater interface?

A64. (WF) No, as stated in answer A61, the conditions in the CCS did not change long enough to cause a significant change in salinity within the CCS. As stated in answer A62, the conditions in the Biscayne Aquifer did not significantly change. Therefore, there should not be any impact of the freshwater/saltwater interface as a result of the UHS TS license

amendments.

Q65. If water was added to the CCS, how would the salinity of the CCS be effected?

A65. (WF) If water with salinity values that were lower than the CCS (i.e. freshwater, brackish water, or saltwater) was added to the CCS, the salinity values in the CCS should decrease. This water could be added from any source (rain, canals, aquifers, etc.).

Q66. Over the long run, what would be the impact of adding additional water to the CCS on the Biscayne Aquifer?

A66. (WF) Decreasing the salinity values in the CCS should decrease the addition of saltier water into the Biscayne Aquifer by the CCS. As explained above in A65, this should lessen the potential for saltier water from the CCS to impact the freshwater/saltwater interface within the aquifer.

Q67. Did the EA discuss pumping from the Biscayne Aquifer?

A67. (WF) Yes, the EA discussed pumping from the aquifer. Specifically the EA it is pointed out that FPL had received temporary approval from SFWMD withdraw 30 MGD from the Biscayne Aquifer from wells near the CCS. (Ex. NRC-009 at 44467-68.)

Q68. How would pumping water out of the Biscayne Aquifer affect the freshwater/saltwater interface?

A68. (WF) The freshwater/saltwater interface is too far away to be affected by pumping from the Biscayne Aquifer near the CCS. However, if pumping could have any affect, it would be to decrease saltwater intrusion into the Biscayne Aquifer. Pumping would reduce the hydrostatic pressure on the saltwater side of the freshwater/saltwater interface and cause the freshwater interface to move eastward towards Biscayne Bay.

Q69. Did the EA discuss pumping from the Floridan Aquifer?

A69. (WF) Yes, at the time the EA was written, SFWMD had recently granted FPL approval to withdraw a portion (approximately 5 MGD) of the Unit 5 withdrawal allowance for use in the CCS. FPL began pumping Floridan Aquifer water into the CCS in early July 2014. (Ex. NRC-009 at 44468). The EA had also discussed the possibility that to reduce salinity concentrations in the CCS, the FDEP might issue an Administrative Order requiring FPL to install up to six new wells that will pump approximately 14 MGD of water from the Floridan Aquifer into the CCS. (Ex. NRC-009 at 44467-68.)

Q70. How would pumping water out of the Floridan Aquifer affect the freshwater/saltwater interface?

A70. (WF) Removing groundwater from the Floridan Aquifer would not affect the freshwater/saltwater interface in the Biscayne Aquifer because the Floridan Aquifer is isolated from the Biscayne Aquifer.

Q71. Was the Staff aware that FPL had sought authorization to pump water from local State canals such as L-31?

A71. (BG) Yes, the Staff was aware that FPL was seeking authorization from the State to pump water from the L-31 canal system.

Q72. How would pumping water from a local State canal, such as the L-31 canal, impact the freshwater/saltwater interface?

A72. (WF) It should not impact the freshwater/saltwater interface. For example, water in the L-31 canal came from other canals that drain from the land on either side of the Biscayne Aquifer freshwater/saltwater interface. If water is not diverted for other uses, it will eventually reach Biscayne Bay. The amount of water drained from the land does not increase by diverting it to the L-31 canal. Therefore, no negative impacts on the freshwater/saltwater interface by the

use of local canal water is anticipated.

Q73. One of the issues raised by the contention is how the saltwater plume in the aquifer would be impacted by the license amendments. Do you have any opinion regarding the impact on the UHS TS amendments on the saltwater plume?

A73. (WF) The amendment does not change the amount of heat energy that is being added to the closed-cycle cooling canal system. Instead it provides operational flexibility during periods when the closed-cycle cooling canal system is less efficient in removing heat energy (i.e. during times of high outside temperature, low rainfall, high blue-green algae concentrations, or poor water circulation). Any temperature increases in the closed-cycle cooling canal system as a result of license amendments would be temporary and short in duration (a few weeks). For short periods of time temperature increases could result in higher temperature increases and higher salinity levels within the closed-cycle cooling canal system. However, this effect would be temporary and of short duration and therefore average salinity levels are not expected to increase in the closed-cycle cooling canal system as a result of the UHS increase or in water that moves from the closed-cycle cooling canal system into the Biscayne Aquifer.

Q74. Has water from the CCS migrated into either of the aquifers?

A74. (WF) Yes, water from the CCS has migrated into the Biscayne Aquifer, but it has not migrated into the Floridan Aquifer.

Q75. Why has water from the CCS not migrated into the Floridan Aquifer?

A75. (WF) Water from the CCS is prevented from migrating into the Floridan Aquifer because of the Intermediate Confining Unit.

Q76. What about indirect effects between the CCS and the Floridan?

A76. (WF) No, even if the CCS interacts with the Biscayne Aquifer, the Floridan Aquifer is isolated from the Biscayne Aquifer. Thus it would very difficult for the CCS to

indirectly effect the Floridan.

2. Temperatures Exceeding the Previous Limitation Are Expected to Be of Short Duration and Without Impact

Q77. As previously discussed, FPL asked to raise the UHS TS temperature limit.

Do you expect the four degree change to have an impact on the CCS?

A77. (AK, BG, WF, NH) No, the four degree change would not appreciably change conditions in the CCS. The 4 °F limit change authorized by the UHS TS amendments is within the natural variations in temperature experienced by the CCS. The CCS temperature peaks are expected to occur for brief durations during the summer months and/or low rainfall conditions. The licensee would likely reduce the power level of the units if it expected the temperature to exceed 104 °F prior to the temperature getting to that value. To my knowledge, the previous limit of 100 °F was exceeded during one summer (2014) throughout the operation history of Units 3 and 4.

Q78. Did the Staff expect that the CCS inlet temperature would continuously be at the new 104 °F limit?

A78. (AK, BG, WF, NH) No, the Staff did not expect the amendment to result in the CCS operating at a constant value of 104 °F 24 hours a day, 365 days a year. The CCS temperature varies daily and seasonally in response to a number of conditions, such as thermal output of the Units 1 through 4, air temperature and humidity, sun exposure, rainfall, drought conditions, and algae concentrations. In 2014, the intake water temperature exceeded 100 °F for a few days, most of which were nonconsecutive (the temperature typically dropped below 100 °F at night).

Q79. In your expert opinion, would you expect that there is any significant environmental impact from the four degree increase in the UHS Technical Specification limit?

A79. (BG, WF) No, I do not expect any significant environmental impacts from the four degree increase in the UHS TS temperature limit.

Q80. Can you describe how the conditions in the CCS are expected to change as a result of the UHS TS amendments?

A80. (WF, NH) CCS conditions are unlikely to change as a result of the UHS TS amendments. The amendments do not allow FPL to operate at higher thermal power levels than those already approved by the NRC. The amendments do not change the amount of heat energy that is being added to the closed-cycle cooling canal system. Instead, the amendments provides operational flexibility for FPL and State agencies implementing the CoC during periods when the CCS is less efficient in removing heat energy (i.e. during times of high outside temperature, low rainfall, high blue-green algae concentrations, or poor water circulation).

Any temperature increases in the CCS above the previously authorized limit of 100 °F would be temporary and short in duration. For a short periods of time, temperature increases could result in higher temperature increases and higher salinity levels within the CCS. However, this effect would be temporary and of short duration and, therefore, average salinity levels at not expected to increase in the CCS or in water that moves from the CCS into the Biscayne Aquifer.

3. The Increase in Allowable Temperature Reduces the Plant's Need to Consume Additional Water

Q81. Are you familiar with CASE's assertion that increasing the CCS inlet temperature would result in additional water consumption?

A81. (AK, BG, WF, NH) Yes.

Q82. Would you expect that granting FPL the authority to operate Turkey Point at higher CCS inlet temperatures would result in additional need to inject water from other sources, including the L-31 canal or onsite wells?

A82. (NH) No. The increase in temperature allowance will actually reduce the need for external water injection to the CCS.

Q83. Can you explain why the higher TS LCO inlet water temperature values would result in less need for water injection?

A83. (NH) Prior to granting FPL the authority to operate at 104 °F, the CCS would have required more external water injection to continue operating. If FPL were still subject to the previous limit of 100 °F, then FPL would either have to take action to control the CCS temperature below 100 °F or initiate a dual-unit shut down once the temperature reached 100 °F. With the new limit of 104 °F, the CCS inlet temperature may rise up to 104 °F before FPL would need to take one of the actions described above. Thus, the higher temperature limit grants FPL additional operational flexibility, resulting in less need for water injection.

Q84. Can you explain how water stores heat?

A84. (NH) The heat storage capability of water is governed by its specific heat capacity. This is a measure of the amount of energy required to increase some mass of water by some specific temperature. Water has a relatively high specific heat capacity. This is largely due to the presence of hydrogen bonds in the water molecules, which require a high amount of energy to break. As water is heated, much of the heat must be used to break these high-energy bonds in order to raise the water's temperature. Thus, water is highly resilient to temperature changes.

Q85. What effect does increasing the UHS TS temperature limit have on the CCS's carrying capacity for heat?

A85. (NH) The increase in temperature has a very minor impact on the specific heat of CCS water. Over the range of 100-104 °F, the specific heat capacity will increase by less than 1% (Ex. NRC-045, Sharqawy, et al., Thermophysical properties of seawater: a review of existing correlations and data, 16 Desalination and Water Treatment 354 (2010).) This effect is negligible.

Q86. By increasing the inlet CCS temperature, what impact would that have on the carrying capacity for heat?

A86. (NH) The increase in temperature has a minor impact on the specific heat capacity of CCS water. Over the range of 100-104 °F, the specific heat capacity will increase by less than 0.1%. (*Id.*) This effect is very small.

Q87. If the evaporation rate increases, how would that impact the CCS's heat carrying capacity?

A87. (NH) An increase in water temperature will increase the evaporation rate. Evaporation is the water's mechanism for cooling itself by removing the highest energy particles, so this increase in evaporation then reduces the temperature of the water.

Q88. In your expert opinion, would allowing FPL to operate at a higher CCS inlet temperature limit result in an increased or a decreased need to use water to control the temperature or salinity within the CCS?

A88. (NH) A short term increase in evaporation rate will increase the heat removal rate of the CCS. Because evaporation removes the highest energy water particles from CCS, this acts as a self-correcting process for CCS temperature regulation. As these high energy particles are removed, the average CCS temperature will return back to lower levels.

Over the temperature range of 100-104 °F, the evaporation rate will increase by about 10%. (*Id.*) Because the CCS has such a large volume of water and such a large surface area, this increase in evaporation rate is significant, and it provides a strong temperature-regulating effect. A short-term rise in CCS temperature will be mitigated quickly by evaporation. This water would need to be replenished naturally (i.e., rainfall) or via water injection if elevated temperatures were sustained over a long period of time.

Q89. In your expert opinion, would allowing FPL to operate with a four degree increase in inlet temperature from the CCS result in increased or a decreased need to utilize water to control the temperature or salinity within the CCS?

A89. (NH) If the CCS temperature increases from 100-104 °F, evaporation rate would experience a minor increase. Based on this alone, it may seem that this would require extra water injection. However, because the shutdown temperature limit was raised, FPL would require less water to cool the CCS inlet in order to remain within operational limits. For example, if the inlet water temperature was 103 °F, FPL would have to cool the water by at least 3 °F to be within the 100 °F limit and continue operating. With a higher limit of 104°F, FPL would not need any external water injections to remain operational. The net result is a decreased need for external water injections.

4. The State Was Already Directing FPL to Address the Salinity within the CCS

Q90. Does the State have any requirements applicable to FPL that would mitigate saltwater intrusion into the Biscayne Aquifer?

A90. (AK, BG, WF) FPL must comply with the Fifth Supplemental Agreement and Turkey Point's CoC. These documents are described in detail in A11 and A12. The Fifth Supplemental Agreement required FPL to monitor CCS conditions and lists measures that may be taken to mitigate those conditions. At the time the NRC Staff was reviewing the UHS TS

LAR, FPL was anticipating that the FDEP would issue an Administrative Order requiring FPL to install up to six new wells that will pump approximately 14 MGD of water from the Floridan Aquifer into the CCS. Modeling performed by FPL consultants and the SFWMD indicated that the withdrawals would reduce the salinity of the CCS to the equivalent of Biscayne Bay over a period of two years. (Ex. NRC-009 at 44468.)

Q91. How does reducing the CCS salinity to the salinity of the Biscayne Bay reduce saltwater intrusion in the Biscayne Aquifer?

A91. (WF) Reducing CCS salinity to the salinity of the Biscayne Bay would reduce the amount of salt available to be transferred from the CCS to the Biscayne Aquifer.

Q92. Was the Staff aware of the source of water that FPL planned to use to mitigate the CCS salinity?

A92. (WF) At the time the Staff was preparing the EA, FPL informed the Staff that it anticipated an order from the FDEP authorizing the withdrawal of 14 MGD of water from the Floridan Aquifer for the purposes of mitigating CCS conditions. (*Id.*)

Q93. Would withdrawing water from the Floridan Aquifer affect the freshwater/saltwater interface in the Biscayne Bay?

A93. (WF) No, withdrawing water from the Floridan Aquifer would not affect the Biscayne Bay's freshwater/saltwater interface because the Floridan Aquifer is isolated by a confining unit.

Q94. Are you familiar with CASE's SOP regarding its concern with withdrawing freshwater from the Biscayne Aquifer?

A94. (WF) Yes.

Q95. At the point where FPL is proposing to withdraw water, what kind water is being withdrawn?

A95. (WF) The Staff's understanding of the water to be withdrawn from the Biscayne Aquifer would be from onsite wells. The water located underneath the site is saltwater.

Q96. Based on where FPL is proposing to withdraw water from the Biscayne Aquifer, what impact would the withdrawals have on saltwater intrusion?

A96. (WF) Withdrawal of Biscayne Aquifer water from onsite wells would not have an effect or would decrease the saltwater intrusion occurring in the Biscayne Aquifer.

Q97. Can you explain why CASE might think that Biscayne Aquifer water being pumped from onsite wells is freshwater?

A97. (WF) Regionally, the Biscayne Aquifer contains both freshwater and saltwater. The Biscayne Aquifer in Miami-Dade County and southern Broward County is prone to saltwater intrusion because this area has low land-surface altitude and a low topographic gradient and is bordered to the east and south by sources of saltwater in the Atlantic Ocean, Biscayne Bay, and Florida Bay. Prior to land development, much of Miami-Dade County was covered by the shallow marshes of the Everglades. The freshwater in the aquifers flowed towards the bays and the ocean, the water quality in the aquifer transitioned to brackish and then saltwater. To provide land for urban development, flood control, irrigation, and agriculture, a large part of the Everglades in this county was drained by a network of canals that connected to salt water bays and the ocean. This reduced the volume of freshwater flowing towards the bays and the ocean and allowed salt water to flow inland until it was balanced by the now reduced pressure of the freshwater flowing towards the coast. Therefore near the bay and ocean the aquifers may contain salt water and also contain freshwater some distance away from the bays and ocean.

V. ERRORS AND INCONSISTENCIES WITH CASE'S STATEMENT OF POSITION

Q98. Are you familiar with CASES document called the "Science of Turkey Point Wetlands" (Ex. INT-001)?

A98. (WF) Yes, it contains a random assortment of quotes from various locations on groundwater and saltwater intrusion. The thrust of the document appears to be that saltwater intrusion is an issue in coastal aquifers.

Q99. Does Ex. INT-001 make any claims with respect to Turkey Point and the UHS TS amendments?

A99. (WF) The exhibit does not directly make any claims with respect to the UHS TS amendments. However, it does have a few pictures of the CCS and a groundwater map of tritium concentrations in the Biscayne Aquifer around Turkey Point (Slide 10). However, the tritium in the groundwater is characterized as a tracer showing the effluent from the CCS, which is hypersaline, and carries all the chemicals in the CCS. This is not a correct characterization. Assuming the tritium came from the CCS, it only represents water molecules that came from the CCS and does not represent any increased concentrations of salt in the aquifer.

Q100. Can you briefly explain why CASE's discussion on pages 19 through 27 of CASE's SOP are incorrect?

A100. (WF) In this section, CASE discusses the temperature element of Contention 1, but CASE incorrectly states the temperature change in the CCS as a result of the UHS TS amendments is a 14 °F increase (15.5 percent). Citizens Allied for Safe Energy Initial Statement of Position, Testimony, Affidavits, and Exhibits." ("CASE's SOP") at 25.

In fact, the increase is a 4 °F change in the TS limit. CASE makes this error because it confuses an average seasonal CCS temperature cited in the 2012 EPU EA with the TS limit authorized by the UHS TS amendments. The seasonal average is not the TS limit. As a

consequence of CASE's error, its various hypothetical questions, CASE's SOP at 26, about what a 14 °F increase would do are irrelevant.

For example, evaporation rates are not increased by 14 °F because no such increase is being authorized. Accordingly, CASE's concerns to replace water lost to evaporation by a 14 °F increase are misplaced.

Q101. Can you briefly explain why CASE's discussion on pages 51 through 58 of CASE's SOP are incorrect?

A101. (WF) CASE discusses freshwater and attempts to relate the issues to the contention. First, CASE discusses some hydrological principles and its general concerns over the limited supply of freshwater, as well as how the aquifers in southern Florida function. CASE's SOP at 51-53. Then CASE asserts that an adequate EA would provide a discussion that included a comprehensive analysis of the movement of water between aquifers. CASE's SOP at 53.

However, the EA contained the sufficient level of information. The CCS sits atop the Biscayne Aquifer, and the Biscayne Aquifer is isolated from the Floridian Aquifer by a thick confining layer. There is no meaningful exchange of water between the Biscayne and Floridan Aquifers. Therefore, no additional information is needed to understand the function of the aquifers for the purpose of this EA.

Next, CASE discusses pre-1960 conditions, which is not relevant to the UHS TS amendments. Then CASE asserts several errors in the Staff's EA. CASE's SOP at 54. CASE incorrectly, and without citation to any documents, asserts that the Biscayne Aquifer is freshwater. However, the Biscayne Aquifer is saltwater below the CCS, and the freshwater interface is 6 mi west of the Turkey Point site.

CASE asserts that the NRC should have calculated how much water is needed to reduce the salinity of the CCS to the level of seawater. CASE's SOP at 55-56. But the UHS TS

amendments don't have anything to do with salinity reduction. CASE's calculations, which stated that 10,680,000,000 gallons would be needed in one day to reduce CCS salinity, are simply irrelevant to the LAR submitted by FPL. Lastly, on the topic of freshwater withdrawals, CASE observes that FPL submitted to FDEP its mitigation plan one month after the EA was issued, which shows that CASE is aware that mitigation of the CCS salinity is happening.

Q102. Are you familiar with CASE's assertion on page 20 of its SOP that the UHS TS temperature amendments increased the temperature of the CCS, the temperature of the water being discharged from the reactors, and the heat generated by the interaction of the CCS water and the algae in the CCS?

A102. (AK) Yes.

Q103. Do you agree with CASE's assertion?

A103. (AK) No.

Q104. Why do you disagree with CASE's assertion?

A104. (AK) The amendments raised the value of the TS limit for the inlet water temperature from the CCS. The amendments did not raise the actual temperatures of the CCS. The amendments did not increase the power level of the reactors or the heat loading to the CCS. The amendments allow Turkey Point to continue operating when the prior limit of 100 °F is exceeded. CCS temperature is affected by the BTU/hr heat loading from the plants, which the amendments did not change, and natural variances, such as seasonal and diurnal changes, sun exposure, meteorological conditions, and the presence of algae. The algae bloom was present and caused the CCS temperatures to increase prior to the NRC's issuance of the amendments. Additionally, all of these items were addressed in the Staff's EA.

Q105. Are you familiar with CASE's assertion on pages 19, 21, and 22 of its SOP that the UHS TS amendments would increase the average daily temperature of water in the CCS to 108 °F?

A105. (AK) Yes.

Q106. Do you agree with CASE's assertion?

A106. (AK) No.

Q107. Why do you disagree with CASE's assertion?

A107. (AK) The CCS temperature varies diurnally and seasonally and with meteorological conditions and plant thermal output. The CCS temperatures also vary significantly within the canal system. Therefore, without context, an average daily temperature has little meaning. CASE does not state how it calculated its value of 108 °F. The UHS TS amendments are not related to daily average temperatures; the amendments are related to the intake water TS limit.

Q108. Are you familiar with CASE's assertions on pages 21, 22, 25, and 26 of its SOP about the average and authorized CCS temperatures assumed in the 2012 EA for the EPU?

A108. (AK) Yes.

Q109. Do you agree with CASE's assertions?

A109. (AK) No.

Q110. Why do you disagree with CASE's assertions?

A110. (AK) The EPU amendments and the related EA did not authorize any changes to the inlet water temperature limit in the TSs. (Ex. NRC-022.) That TS temperature limit remained at 100 °F following the EPU amendments. The licensee's EPU application described

the expected impact of the EPU on the CCS and stated that the maximum CCS water temperature was assumed to vary seasonally throughout the year for cooldown analyses. Temperatures were adjusted from 92 °F (spring/fall) to 97 °F (summer) based on the season. The licensee's application also stated that a maximum cooling water temperature of 100 °F is used for the safety analyses, which rely on the UHS for heat removal. The licensee's EPU application stated that the maximum increase in cooled water temperature leaving the CCS to return to Units 3 and 4 (i.e., the inlet water temperature) is approximately 0.9 °F. The licensee's application then showed what the temperature difference would like for the spring/fall adjusted temperature of 92 °F. For the summer temperatures, this temperature difference would increase from 97 °F to approximately 98 °F, which is still within the UHS TS temperature limit. (Ex. NRC-046, Florida Power and Light, Turkey Point, Units 3 and 4 – License Amendment Request for Extended Power Uprate, Attachment 4; Licensing Report (December 14, 2010) (ADAMS Accession No. ML103560177).)

The EPU application also stated that the higher circulating water temperature during normal plant power generation has no impact on the current NPDES permit which does not limit the maximum discharge temperature, differential temperature across the condenser, or total discharge heat.

Had the algae bloom not existed, the staff would have expected the inlet water temperature to have been what the EPU analysis evaluated. As previously stated, CASE does not explain how it derived an average daily CCS temperature of 108 °F. CASE also compared its "average daily CCS temperature" to the adjusted spring/fall inlet temperatures used in the EPU application rather than to the adjusted summer inlet temperatures.

Q111. Are you familiar with CASE's assertion on page 33 of the SOP that when Turkey Point was licensed in 1973, the CCS salinity level was required to be 44 ppt?

A111. (BG) Yes.

Q112. Do you agree with CASE's assertion?

A112. (BG) No.

Q113. Why do you disagree with CASE's assertion?

A113. (BG) The value of 44 ppt never applied to the CCS as a closed-cycle system. FPL originally proposed Turkey Point to be a once-through plant that discharged to Card Sound. (Ex. NRC-032 at 3.1-4.) However, FPL created a closed-cycle system in agreement with the U.S. Environmental Protection Agency and the State of Florida as a mitigative action to protect the Biscayne Bay and Card Sound aquatic environment. (*Id.* at 3.1-4 – 3.1-5.) The reference that CASE makes to the requirement for water to be at or below 44 ppt as measured at the outlet to Card Sounds never applied to the CCS as it currently exists. This requirement arose from a Final Judgement issued by the U.S. District Court for the Southern District of Florida on September 30, 1971, prior to the re-design of the cooling system. (Ex. NRC-047 at C-8.) Accordingly, a salinity level that was required under a different cooling system design and at a different location—at the outlet to Card Sound—is not an appropriate comparisons of CCS salinity levels over time.

VI. ISSUES OUTSIDE THE SCOPE OF THE ADMITTED CONTENTION

A. Consultation with the FWS

Q114. Can you briefly describe CASE's assertion regarding the Staff's consultation process with FWS?

A114. (BG) CASE asserts that the Staff did not consult with the FWS prior to the issuance of the EA.

Q115. Are CASE's concerns valid?

A115. (BG) No, CASE's concerns are not valid because the Staff began its consultation

with the FWS for the UHS TS LAR prior to the development of the EA and concluded its consultation prior to the NRC's approval of the UHS license amendments.

Q116. Could you explain how the consultation with FWS proceeded?

A116. (BG) Following receipt of FPL's July 10, 2014, LAR, the Staff initiated communications with the FWS pursuant to 50 C.F.R. §402.13. On July 22, 2014, the Staff met with FWS and FPL representatives at the FWS's Vero Beach, Florida office to discuss the potential impacts of the license amendments on the population of American crocodiles that inhabit the Turkey Point site and to determine whether the NRC should reinstate consultation under section 7 of the ESA in conjunction with its LAR review. The Staff documented the July 22, 2014, meeting in a meeting summary. (Ex. NRC-019, Memorandum from Briana Grange and Dennis Logan, N.R.C., to David J. Wrona, Chief, Environmental Review and Guidance Update Branch, N.R.C., Summary of Meeting with U.S. Fish and Wildlife Service's South Florida Ecological Services Office Regarding Endangered Species Act Section 7 Consultation for Turkey Point Nuclear Generating Station Units Nos. 3 and 4 (July 22, 2014) (ADAMS Accession No. ML14216A533).) During that meeting, attendees also discussed recent State approval to chemically treat the CCS to eradicate blue green algae as well as current and future withdrawals from the Floridan and Biscayne Aquifers at the Turkey Point site to the extent that these issues might cumulatively impact crocodiles. During the meeting, FWS recommended that the Staff develop a biological assessment.

By letter dated July 25, 2014 (Ex. NRC-020, Letter from David J. Wrona, Chief, Environmental Review and Guidance Update Branch, N.R.C., to Larry Williams, Field Supervisor, U.S. Fish and Wildlife Service, Request to Reinitiate Informal Consultation for a Proposed License Amendment to Increase the Ultimate Heat Sink Temperature Limit at Turkey Point Nuclear Generating Station Unit Nos. 3 and 4 (July 25, 2014) (ADAMS Accession No. ML14206A800)), the Staff transmitted its biological assessment to the FWS for review. In the

biological assessment, the Staff concluded that the license amendments “may affect, but is not likely to adversely affect” the American crocodile and that the license amendments would have “no effect” on designated American crocodile critical habitat. (Ex. NRC-010 at 10-11.) The NRC requested the FWS’s concurrence with the Staff’s conclusions in the letter transmitted with the biological assessment. The Staff and FWS were in communication via telephone until the FWS concurred on the Staff’s biological assessment conclusions in a letter dated July 29, 2014. (Ex. NRC-021, Letter from Craig Aubrey, Field Supervisor, U.S. Fish and Wildlife Service, to David J. Wrona, Chief, Environmental Review and Guidance Update Branch, N.R.C., Endangered Species Act Section 7 Consultation Concurrence (July 29, 2014) (ADAMS Accession No. ML14210A170).)

In accordance with 50 C.F.R. 402.13(a), the FWS’s written concurrence terminated consultation and precluded the need for further action pursuant to ESA section 7.

Q117. Did the Staff complete its consultation prior to issuing the license amendment?

A117. (BG) Yes, the Staff completed its consultation prior to issuing the license amendments. The Staff documented the results of the Staff’s consultation with FWS in the safety evaluation that was issued with the license amendments on August 8, 2014. (Ex. NRC-006 at 21-22.)

Q118. Does NEPA require that consultation under the ESA be completed prior to issuing an EA?

A118. (BG) No, neither NEPA nor the NRC regulations at 10 C.F.R. § 51 require the Staff to complete ESA consultation prior to issuing an EA.

B. The Use of Algaecide in the CCS

Q119. Can you briefly describe CASE's assertions regarding the Staff's disposition of FPL's use of algaecide in the CCS?

A119. (BG) CASE asserts that the NRC did not consider existing or proposed monitoring that should occur related to FPL's chemical treatments of the CCS algal bloom, that the Staff did not evaluate the impacts of the algaecide on the reproductive cycle of the American crocodile, and that the Staff did not consider the impacts of the algaecide on the aquifers.

Q120. Are CASE's concerns valid?

A120. (BG) No, CASE's concerns are not valid because the Staff appropriately addressed FPL's use of algaecide in the Staff's EA and biological assessment.

Q121. How did the Staff consider existing or proposed monitoring related to FPL's chemical treatments of the CCS algal bloom?

A121. (BG) The Staff discusses FDEP's conditions for FPL to monitor the CCS following chemical treatments in the "Cumulative Impacts" section of the EA. (Ex. NRC-009 at 44468.) Additionally, the Staff discusses monitoring required by FPL related to the chemical treatments in the Staff's biological assessment. (Ex. NRC-010 at 5.) The biological assessment also included copies of letters between FPL, FDEP, and the Florida Fish and Wildlife Conservation Commission that discuss the monitoring requirements in more detail. (Ex. NRC-010, Appendix A.)

Q122. How did the Staff address the impacts of algaecide on the reproductive cycle of the American crocodile?

A122. (BG) The Staff relied on the expertise of the Florida Fish and Wildlife Commission and the FWS concerning impacts of the algaecide on the American crocodile. In a July 1, 2014, letter from the Florida Fish and Wildlife Commission to the FDEP, no concerns

regarding the effects of the algaecide on the American crocodile's reproductive cycle were stated. (Ex. NRC-010 at A-28 – A-29.) The effects of algaecide were discussed at the July 22, 2014, meeting between NRC, FWS, and FPL, and during that meeting, FWS raised no concerns regarding CASE's stated issue. (Ex. NRC-019 at 3.) The FWS's July 29, 2014, letter to FWS concurring on the NRC's biological assessment provides a detailed description of the algal bloom, chemical treatments, related monitoring, and effects on crocodiles, but makes no mention of effects of algaecide on the crocodile's reproductive cycle. (Ex. NRC-021.) In fact, the FWS's letter states that the algal bloom could "threaten the long-term viability of the crocodile population within and near the CCS" if left untreated. (Ex. NRC-021 at 3.) Further, the FWS notes that the concentration of copper resulting from the treatment is not anticipated to exceed drinking water standards and is, therefore, not expected to harm crocodiles. (Ex. NRC-021 at 4.) Accordingly, the NRC staff, relying on the expertise of the Florida Fish and Wildlife Commission and the FWS, determined that addressing impacts of the algaecide on the crocodile's reproductive cycle was not necessary in either the EA or in the biological assessment.

Q123. How did the Staff consider the impacts of the algaecide on the aquifers?

A123. (BG) The FDEP did not anticipate effects to groundwater as a result of the short-term algaecide treatments and did not require FPL to monitor for such effects. Therefore, the Staff did not speculate as to whether long-term impacts to groundwater might occur. The NRC relied on the expertise of the FDEP, the agency responsible for approving the use of algaecide in the CCS, to evaluate impacts of algaecide on water resources, including aquifers. As indicated in the EA, the FDEP required FPL to monitor impacts of the algaecide. (Ex. NRC-009 at 44468.) FPL's monitoring plan, which the FDEP approved, required FPL to monitor various parameters, including total recoverable copper and dissolved oxygen, at several locations within the CCS. (Ex. NRC-010 at 5.) The plan did not require FPL to monitor groundwater quality or to

monitor any other surface waters. Accordingly, the Staff focused its analysis of the algaecide treatments in the EA on effects that were documented as having a potential to occur by FPL or by other agencies, including impacts to CCS surface water resources, aquatic resources, and the American crocodile.

C. Consultation with Other Agencies

Q124. Can you briefly describe CASE's assertions regarding consultation with other agencies?

A124. (BG) CASE asserts that the NRC did not comply with NEPA in regards to consultation with other Federal, State, or local agencies in preparing the EA.

Q125. Is the Staff required to consult with other Federal, State, or local agencies on actions requiring the preparation of an EA?

A125. (BG) No, the NRC regulations implementing NEPA at 10 C.F.R. § 51 do not require Staff to consult with other agencies when preparing EAs. However, LIC-203 directs the Staff to engage in consultation with other agencies during preparation of an EA to meet the requirements of other statutes, such as the ESA (Ex. NRC-028 at 11-13), the Magnuson-Stevens Fishery Conservation and Management Act (Ex. NRC-028 at 17), and the National Historic Preservation Act (Ex. NRC-028 at 13-17). If the Staff consults with any agencies, the Staff must provide a list of the agencies and persons consulted in the EA in accordance with 10 C.F.R. § 51.30(2).

Q126. What agencies or persons did the Staff consult with during the preparation of the EA?

A126. (BG) The Staff consulted with Ms. Cindy Becker of the Florida Department of Health and with staff at the FWS Vero Beach office pursuant to the Staff's consultation under ESA section 7.

Q127. Did the Staff list these agencies and persons in the EA?

A127. (BG) Yes, the EA lists these agencies and persons in the section entitled, "Agencies and Persons Consulted," (Ex. NRC-009 at 44469.)

D. The Range of Alternatives

Q128. Can you provide a brief overview of the range of alternatives discussed in the EA?

A128. (BG) The EA considers the impact of the proposed action (i.e., issuance of the UHS license amendments) and the no-action alternative (i.e., denial of the UHS license amendments) in accordance with 10 CFR 51.30(a)(1)(ii) and (iii).

Q129. Why was this an appropriate range of alternatives?

A129. (BG) LIC-203 directs the Staff to identify, describe, and evaluate reasonable alternatives to the proposed action, including at a minimum, the no-action alternative (Ex. NRC-028 at C-1, C-4). LIC-203 also states that "[f]or those actions where impacts are not significant, it is reasonable to consider only a limited range of alternatives" (Ex. NRC-028 at C-4). The Staff determined that it was reasonable to only consider the proposed action and the no-action alternative in the UHS TS EA because impacts of the proposed action would not be significant and because consideration of this limited range of alternatives is consistent with NRC guidance.

Q130. What does grid reliability mean?

A130. (AK) The term reliability or reliable operation of the grid components is defined in Title 12, Code of Federal Regulations, Subtitle A, "Reliability Standards," Section 1211, which cites Part II of the Federal Power Act (16 U.S.C. 824, Section 215), as "operating the elements of the bulk-power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated

failure of system elements.”

Q131. Can you explain how grid reliability impacted the Staff’s analysis of the license amendment?

A131. (AK) The shutdown or derating of a plant is a consideration for determining whether the staff should process an amendment request on an emergency or exigent basis. 10 C.F.R. 50.91(a)(5) for emergency amendments states that where the Commission finds that an emergency situation exists, in that failure to act in a timely way would result in derating or shutdown of a nuclear power plant, or in prevention of either resumption of operation or of increase in power output up to the plant's licensed power level, it may issue a license amendment involving no significant hazards consideration without prior notice and opportunity for a hearing or for public comment. The impact of the plant shutdown on grid reliability was a consideration in processing the amendment request on an emergency and exigent basis.

Q132. If Turkey Point had to unexpectedly shut down last summer, what impact would it have had on the grid?

A132. (AK) The Turkey Point site is located in the southern tip of the Florida peninsula adjacent to the Miami-Dade County area which is one of the major load centers in the United States. The generation resources available locally are not enough to supply the demand in this area. Therefore, the remaining amount of power necessary to serve this load center is imported via transmission facilities. These transmission facilities have a finite amount of power that they can import into the Miami-Dade area. If there is a loss of a large generator at a major load center, the system will need that lost power to be replaced in order to sustain the service to its customers. That lost power is typically provided from adjacent areas via transmission lines. If the transmission system is functioning close to its limits, it would not be possible to import the replacement power, and the system will not withstand the loss of the generator. As a result, if Turkey Point had to unexpectedly shut down last summer, the grid could have experienced load

curtailments and possible blackouts.

Q133. Which conditions affecting the grid could impact a plant's ability to import power from other locations?

A133. (AK) The reliability of offsite power to a nuclear power plant is assessed via an analysis of the grid stability around the immediate vicinity of the licensee's site.

As stated in NUREG-0800, "Standard Review Plan," Section 8.2, "Offsite Power System," a licensee, when submitting a license amendment, should include a grid stability analysis including the consideration of failure modes that could result in ac frequency variations exceeding the maximum rate of change determined in the accident analysis for loss of reactor coolant flow. Failure modes that could produce abnormal frequency events and the plant frequency protection schemes are reviewed. (Ex. NRC-048, NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition, Chapter 8.2, "Offsite Power System," Rev. 5 (May 2010) (ADAMS Accession No. ML100740246).)

The results of the grid stability analysis must show that loss of the largest single supply to the grid does not result in the complete loss of preferred power. The analysis should consider the loss, through a single event, of the largest capacity being supplied to the grid, removal of the largest load from the grid, or loss of the most critical transmission line.

E. The Speed of the NRC's Environmental Review

Q134. Can you briefly describe CASE's assertion regarding the speed on the Staff's environmental review?

A134. (BG) CASE asserts that the Staff issued the EA too soon after receiving FPL's LAR.

Q135. Are CASE's concerns valid?

A135. (BG) No, there are no statutory or regulatory requirements that dictate the speed

of the NRC's NEPA review.

Q136. Why did the Staff issue the EA on an expedited schedule?

A136. (BG) The Staff issued the EA on an expedited schedule to accommodate FPL's request to process the amendment on an emergency basis. When FPL submitted the LAR on July 10, 2014, it requested that NRC review and approve the action by August 30, 2014. (Ex. FPL-008 at 1.) However, on July 17, 2014, FPL submitted a supplement to the LAR that requested that the Staff process the amendment on an emergency basis per 10 C.F.R. § 50.91(a)(5) to avoid a dual unit shutdown and maintain grid voltage reliability because the UHS temperatures had approached the TS temperature limit. (Ex. NRC-011 at 1 – 2.) The Staff determined that, given the length of time it would take to complete the LAR review, it would have enough time to issue a notice to the public per 10 C.F.R. § 50.91(a)(6)(i)(A) for exigent circumstances. This notice was published in the Federal Register on July 30, 2014. (Ex. NRC-007.) The Staff performed an expedited environmental review to support the exigent circumstances. The EA was published in the *Federal Register* on July 31, 2014, and the NRC issued the amendment on August 8, 2014. (See Exs. NRC-009, NRC-006.)

November 10, 2015

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
)	
FLORIDA POWER & LIGHT CO.)	Docket No. 50-250-LA
)	50-251-LA
(Turkey Point Nuclear Generating)	
Unit Nos. 3 and 4))	

AFFIDAVIT OF AUDREY L. KLETT

I, Audrey L. Klett, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.

/Executed in Accord with 10 CFR 2.304(d)/

Audrey L. Klett
Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop O-8 G9A
Washington, DC 20555-001
Telephone: (301) 415-0489
Email: Audrey.Klett@nrc.gov

Executed in Rockville, Maryland
this 10th day of November 2015

November 10, 2015

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
)	
FLORIDA POWER & LIGHT CO.)	Docket No. 50-250-LA
)	50-251-LA
(Turkey Point Nuclear Generating)	
Unit Nos. 3 and 4))	

AFFIDAVIT OF BRIANA A. GRANGE

I, Briana A. Grange, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.

/Executed in Accord with 10 CFR 2.304(d)/

Briana A. Grange
General Scientist
U.S. Nuclear Regulatory Commission
Mail Stop O-11 F1
Washington, DC 20555-001
Telephone: (301) 415-1042
Email: briana.grange@nrc.gov

Executed in Rockville, Maryland
this 10th day of November 2015

November 10, 2015

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
)	
FLORIDA POWER & LIGHT CO.)	Docket No. 50-250-LA
)	50-251-LA
(Turkey Point Nuclear Generating)	
Unit Nos. 3 and 4))	

AFFIDAVIT OF WILLIAM FORD

I, William Ford, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.

/Executed in Accord with 10 CFR 2.304(d)/

William Ford
Senior Physical Scientist
U.S. Nuclear Regulatory Commission
Mail Stop O11F1
Washington, DC 20555-001
Telephone: (301) 415-1263
Email: william.ford@nrc.gov

Executed in Rockville, Maryland
this 10th day of November 2015

November 10, 2015

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
)	
FLORIDA POWER & LIGHT CO.)	Docket No. 50-250-LA
)	50-251-LA
(Turkey Point Nuclear Generating)	
Unit Nos. 3 and 4))	

AFFIDAVIT OF NICHOLAS P. HOBBS

I, Nicholas P. Hobbs, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.

/Executed in Accord with 10 CFR 2.304(d)/

Nicholas P. Hobbs
Reactor Systems Engineer
U.S. Nuclear Regulatory Commission
Mail Stop O-10 A01
Washington, DC 20555-001
Telephone: (301) 415-1023
Email: nicholas.hobbs@nrc.gov

Executed in Rockville, Maryland
this 10th day of November 2015