UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 16, 2020

Mr. Don Moul
Vice President, Nuclear Division
and Chief Nuclear Officer
Florida Power & Light Company
Mail Stop: NT3/JW
15430 Endeavor Drive
Jupiter, FL 33478

SUBJECT: TURKEY POINT NUCLEAR GENERATING UNIT NO. 3 - ISSUANCE OF EXIGENT AMENDMENT NO. 291 CONCERNING THE DEFERRAL OF STEAM GENERATOR INSPECTIONS (EPID L-2020-LLA-0067)

Dear Mr. Moul:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 291 to Subsequent Renewed Facility Operating License No. DPR-31 for Turkey Point Nuclear Generating Unit No. 3 (Turkey Point Unit 3). The amendment consists of changes to the Technical Specifications in response to your application dated April 4, 2020, as supplemented by letter dated April 7, 2020.

The amendment revises the Turkey Point Unit 3 Technical Specifications to allow a one-time extension to the requirement to inspect each steam generator every other refueling outage. The extension would require the next inspection in the fall of 2021, when the next Unit 3 refueling outage is scheduled.

A copy of the related Safety Evaluation is enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Eva A. Brown, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-250

Enclosures:
1. Amendment No. 291 to DPR-31
2. Safety Evaluation

cc: Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

FLORIDA POWER & LIGHT COMPANY

DOCKET NO. 50-250

TURKEY POINT NUCLEAR GENERATING UNIT NO. 3

AMENDMENT TO SUBSEQUENT RENEWED FACILITY OPERATING LICENSE

Amendment No. 291
Subsequent Renewed License No. DPR-31

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

A. The application for amendment by Florida Power & Light Company (the licensee) dated April 4, 2020, as supplemented by letter dated April 7, 2020, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Subsequent Renewed Facility Operating License No. DPR-31 is hereby amended to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 291, are hereby incorporated into this subsequent renewed license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into this subsequent renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented prior to entering Mode 4 of the Spring 2020 (U3CY31 Refueling Outage).

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Undine Shoop, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Subsequent Renewed
Facility Operating License and
Technical Specifications

Date of Issuance: April 16, 2020

ATTACHMENT TO LICENSE AMENDMENT

TURKEY POINT NUCLEAR GENERATING UNIT NO. 3

AMENDMENT NO. 291

SUBSEQUENT RENEWED FACILITY OPERATING LICENSE NO. DPR-31

DOCKET NO. 50-250

Replace page 3 of Subsequent Renewed Facility Operating License No. DPR-31 with the attached page 3. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Replace the following page of the Appendix A Technical Specifications with the attached page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove	Insert
6-12	6-12

applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect, and is subject to the additional conditions specified below:

A. Maximum Power Level

The applicant is authorized to operate the facility at reactor core power levels not in excess of 2644 megawatts (thermal).

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 291, are hereby incorporated into this subsequent renewed license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into this subsequent renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

C. Final Safety Analysis Report

The licensee's Final Safety Analysis Report supplement submitted pursuant to 10 CFR 54.21(d), as revised on November 1, 2001, describes certain future inspection activities to be completed before the period of extended operation. The licensee shall complete these activities no later than July 19, 2012.

The Final Safety Analysis Report supplement as revised on November 1, 2001, described above, shall be included in the next scheduled update to the Final Safety Analysis Report required by 10 CFR 50.71(e)(4), following the issuance of this renewed license. Until that update is complete, the licensee may make changes to the programs described in such supplement without prior Commission approval, provided that the licensee evaluates each such change pursuant to the criteria set forth in 10 CFR 50.59 and otherwise complies with the requirements in that section.

D. Fire Protection

FPL shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment requests dated June 28, 2012 and October 17, 2018 (and supplements dated September 19, 2012; March 18, April 16, and May 15, 2013; January 7, April 4, June 6, July 18, September 12, November 5, and December 2, 2014; and February 18, 2015; October 24, and December 3, 2018; and January 31, 2019), and as approved in the safety evaluations dated May 28, 2015 and March 27, 2019. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

Risk-Informed Changes that May Be Made Without Prior NRC Approval

A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods, and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the

PROCEDURES AND PROGRAMS (Continued)

d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube plugging criteria. The portion of the tube below 18.11 inches from the top of the tubesheet is excluded from inspection. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. A degradation assessment shall be performed to determine the type and location of flaws to which the tube may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

1. Inspect 100% of the tubes in each SG during the first refueling outage following SG installation.

2. After the first refueling outage following SG installation, inspect each SG at least every 48 effective full power months or at least every other refueling outage (whichever results in more frequent inspections)*. In addition, the minimum number of tubes inspected at each scheduled inspection shall be the number of tubes in all SGs divided by the number of SG inspection outages scheduled in each inspection period as defined in a, b, and c below. If degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with technique capable of detecting this type of degradation at this location and that may satisfy the applicable tube plugging criteria, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated. The fraction of locations to be inspected for this potential type of degradation at this location at the end of the inspection period shall be no less than the ratio of the number of times the SG is scheduled to be inspected in the inspection period after the determination that a new form of degradation could potentially be occurring at this location divided by the total number of times the SG is scheduled to be inspected in the inspection period. Each inspection period defined below may be extended up to 3 effective full power months to include a SG inspection outage in an inspection period and the subsequent inspection period beings at the conclusion of the included SG inspection outage.

a) After the first refueling outage following SG installation, inspect 100% of the tubes during the next 120 effective full power months. This constitutes the first inspection period;

b) During the next 96 effective full power months, inspect 100% of the tubes. This constitutes the second inspection period; and

c) During the remaining life of the SGs, inspect 100% of the tubes every 72 effective full power months**. This constitutes the third and subsequent inspection periods.

* One-time extension for Unit 3 to perform SG inspections during the Cycle 32 refueling outage in Fall 2021.

** One-time extension of the 4th inspection period for Unit 3 until the Cycle 32 refueling outage in Fall 2021.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 291

TO SUBSEQUENT RENEWED FACILITY OPERATING LICENSE NO. DPR-31

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR GENERATING UNIT NO. 3

DOCKET NO. 50-250

1.0 INTRODUCTION

By application dated April 4, 2020, as supplemented by a letter dated April 7, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML20095J926 and ML20098F341, respectively), Florida Power & Light Company (the licensee) requested changes to the Technical Specifications (TSs) for Turkey Point Nuclear Generating Unit No. 3 (Turkey Point 3), which are contained in Appendix A of Subsequent Renewed Facility Operating License No. DPR-31. The licensee proposed to revise the Turkey Point 3 TSs to allow a one-time extension to the requirement to inspect each steam generator (SG) every other refueling outage from the current refueling outage to the fall of 2021, when the next Unit 3 refueling outage is scheduled.

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.91(a)(6), the licensee requested that the proposed amendment be issued under exigent circumstances. A detailed discussion of the exigent circumstances is contained in Section 4.0 of this safety evaluation.

2.0 REGULATORY EVALUATION

2.1 Description of System

The SG tubes function as an integral part of the reactor coolant pressure boundary (RCPB) and serve to isolate radiological fission products in the primary coolant from the secondary coolant and the environment. For the purposes of this safety evaluation, SG tube integrity means that the tubes can perform this safety function in accordance with the plant design and licensing basis.

2.2 Regulatory Requirements and Guidance

Fundamental regulatory requirements with respect to the integrity of the SG tubing are established in 10 CFR Part 50. Specifically, General Design Criterion (GDC) 14 in Appendix A,

"General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, states that the RCPB shall be:

> …designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture.

GDC 15 states that the RCPB shall be:

> …designed with sufficient margin to assure that the design conditions of the reactor coolant pressure boundary are not exceeded during any condition of normal operation, including anticipated operational occurrences.

In addition, GDC 30 states that the RCPB shall be "designed, fabricated, erected, and tested to the highest quality standards practical," and GDC 32 states that RCPB components shall be "designed to permit . . . periodic inspection and testing of important areas and features to assess their structural and leaktight integrity."

For plants that were issued construction permits before the effective date of 10 CFR Part 50, Appendix A, the plant-specific principal design criteria in the plant design basis established similar fundamental regulatory requirements pertaining to the integrity of the SG tubing. Turkey Point 3 received a construction permit prior to May 21, 1971, which is the date the GDC in Appendix A to 10 CFR Part 50 became effective. Sections 4.1.2 and 4.1.3 of the Turkey Point 3 Updated Final Safety Analysis Report discuss commitments to the 1967 U.S. Nuclear Regulatory Commission (NRC or the Commission) Proposed GDC. For Turkey Point 3, the requirements for the RCPB with respect to structural and leakage integrity are defined in 1967 NRC Proposed GDC 1, 2, 5, 9, 16, 33, 34, 36, and 40.

Section 182(a) of the Atomic Energy Act requires nuclear power plant operating licenses to include TSs as part of any license. The NRC regulatory requirements related to the content of the TS are established in 10 CFR 50.36, "Technical specifications." Given the importance of SG tube integrity, all current pressurized-water reactor licensees have TSs governing the surveillance of SG tubes. The TSs require that a SG program be established and implemented to ensure that SG tube integrity is maintained. Programs established by the licensee, including the SG program, are listed in the administrative controls section of the TSs to operate the facility in a safe manner. For Turkey Point 3, the requirements for performing SG tube inspections and repair are in TS Section 6.8.4, while the requirements for reporting the SG tube inspections and repair are in TS Section 6.9.1.8.

2.2 Proposed Technical Specification Changes

For Turkey Point 3, SG tube integrity is maintained by meeting the performance criteria specified in TS Section 6.8.4.j.b for structural and leakage integrity, consistent with the plant design and licensing basis. TS Section 6.8.4.j.a requires that a condition monitoring (CM) assessment be performed during each outage in which the SG tubes are inspected to confirm that the performance criteria are being met. TS Section 6.8.4.j.d includes provisions regarding the scope, frequency, and methods of SG tube inspections. These provisions require that the inspections be performed with the objective of detecting flaws of any type that may be present along the length of a tube and that may satisfy the applicable tube repair criteria. The applicable tube repair criteria specified in TS Section 6.8.4.j.c, are that tubes found during inservice inspection to contain flaws with a depth equal to or exceeding 40 percent of the

nominal wall thickness shall be plugged, unless the tubes are permitted to remain in service through application of alternate repair criteria provided in TS Section 6.8.4.j.c.

Turkey Point 3 TS Section 3.4.6.2 includes a limit on operational primary-to-secondary leakage beyond which the plant must be promptly shut down. Should a flaw exceeding the tube repair limit not be detected during the periodic tube surveillance required by the plant TSs, the operational leakage limit provides added assurance of timely plant shutdown before tube structural and leakage integrity are impaired, consistent with the design and licensing bases.

As part of the plant's licensing basis, applicants for pressurized-water reactor licenses are required to analyze the consequences of postulated design-basis accidents (DBAs) such as a SG tube rupture and a steam line break. These analyses consider primary-to-secondary leakage that may occur during these events and must show that the offsite radiological consequences do not exceed the applicable limits of 10 CFR 50.67 or 10 CFR 100.11 for offsite doses and 1967 NRC Proposed GDC 70 (GDC 19 of 10 CFR Part 50, Appendix A) and 10 CFR 50.67 for control room operator doses (or some fraction thereof as appropriate to the accident) or the NRC-approved licensing basis (e.g., a small fraction of these limits). No accident analyses for Turkey Point 3 are being changed because of the proposed amendment and, thus, no radiological consequences of any accident analysis are being changed. The proposed changes maintain the accident analyses and consequences that the NRC staff has reviewed and approved for the postulated DBAs for SG tubes.

2.2.1 Current TS Requirements

The licensee's TSs currently specify the following requirements regarding the SG tube integrity and the SG tube inspection program:

TS 3.4.5, "Steam Generator (SG) Tube Integrity," states that SG tube integrity shall be maintained and that all SG tubes satisfying the tube plugging criteria shall be plugged in accordance with the SG program.

TS 3.4.6.2, "Reactor Coolant System Operational Leakage," requires that the reactor coolant system (RCS) operational primary to secondary leakage through any one SG shall be limited to 150 gallons per day.

TS Surveillance Requirement 4.4.5.1 requires verification of SG tube integrity in accordance with the SG program. TS Surveillance Requirement 4.4.5.2 requires verification that each inspected SG tube that satisfies the tube plugging criteria is plugged in accordance with the SG program prior to entering hot shutdown following an SG tube inspection.

The SG inspection scope is governed by TS Section 6.8.4.j, "Steam Generator (SG) Program," requirements. Specifically, Item j.d.2 states that after the first refueling outage following SG installation, inspect each SG at least every 48 effective full power months or at least every other refueling outage (whichever results in more frequent inspections). In addition, the minimum number of tubes inspected at each scheduled inspection shall be the number of tubes in all SGs divided by the number of SG inspection outages scheduled in each inspection period, as defined in a, b, and c below.

- TS Section 6.8.4.j Item d.2.a) defines the SG tube inspection requirements after the first refueling outage following SG installation for the next 120 effective full power months – the first inspection period.

- TS Section 6.8.4.j Item d.2.b) defines the SG tube inspection requirements during the next 96 effective full power months – the second inspection period.

- TS Section 6.8.4.j Item d.2.c) defines the SG tube inspection requirements for the remaining life of the SGs.

- TS Section 6.8.4.j, Item d.2.c) states that during the remaining life of the SGs, inspect 100 percent of the tubes every 72 effective full power months. This constitutes the third and subsequent inspection periods. Turkey Point 3 is currently in the fourth inspection period.

The licensee's proposed change would extend on a one-time basis the TS Sections 6.8.4.j.d.2 and 6.8.4.j.d.2.c requirements of inspecting each SG at least every other refueling for Unit 3 until the next refueling outage scheduled for Fall 2021, as specified below.

- The revised TS 6.8.4.j.d.2 with the addition of the proposed note shown in the bolded text below, would state:

  > After the first refueling outage following SG installation, inspect each SG at least every 48 effective full power months or at least every other refueling outage (whichever results in more frequent inspections). **One-time extension for Unit 3 to perform SG inspections during the Cycle 32 refueling outage in Fall 2021.**

- The revised 6.8.4.j.d.2.c with the addition of the proposed note shown in the bolded text below, would state:

  > During the remaining life of the SGs, inspect 100% of the tubes every 72 effective full power months. **One-time extension of the 4th inspection period for Unit 3 until the Cycle 32 refueling outage in Fall 2021.**

3.0 TECHNICAL EVALUATION

3.1 Background

3.1.1 Steam Generator Design

Turkey Point 3 has three replacement Westinghouse Model 44F SGs, which were installed in April 1982. Each SG contains 3,214 thermally-treated Alloy 600 tubes (Alloy 600TT) with a nominal outside diameter of 0.875 inches and a nominal wall thickness of 0.050 inches. The tubes are hydraulically expanded at each end for the full depth of the tubesheet and are welded to the primary face of the tubesheet. The straight length of the tubes is supported by six Type 405 stainless steel quatrefoil broached-hole tube support plates (TSPs). Each SG has one stainless steel drilled-hole flow distribution baffle (FDB) between the tubesheet secondary face and the bottom tube support plate. The U-bend regions of the tubes are supported by two sets of chrome-plated Alloy 600 V-shaped anti-vibration bars (AVBs). To reduce residual stress, the U-bend Rows 1-8 (short radius) were stress-relieved after bending.

3.1.2 Operating Experience

All three SGs in Turkey Point 3 were last inspected in Spring 2014 (Refueling Outage (RFO) 27, End of Cycle (EOC) 26) and Spring 2017 (RFO 29, EOC 28). Additional information regarding the SG inspections at Turkey Point 3, including the eddy current examinations performed, is available in the Spring 2014 and Spring 2017 SG tube inspection reports (ADAMS Accession Nos. ML14302A079 and ML17325A998, respectively.

The only existing degradation mechanisms that have been detected in the Turkey Point 3 SGs are AVB wear, broached TSP wear (land and edge), foreign object (FO) wear near broached TSP edges, and hot-leg (HL) FDB plate wear. Following EOC 28, there were a total of 249 wear indications in all three Turkey Point 3 SGs. The table below summarizes the total number of wear indications by location.

Wear Location	Total No. of Indications in All Three SGs
AVB	212
Broached TSP (Land)	14
Broached TSP (Edge)	19
FO Near Broached TSP Edge	2
HL FDB Plate	2

Since the three Turkey Point 3 SGs were installed in 1982, a total of 196 tubes have been plugged (50 in SG-3A, 83 in SG-3B, and 63 in SG-3C). The licensee stated in its submittal that over one-half of the total tubes plugged were plugged at the preservice inspection or at the factory, due to having minor geometric variations associated with the tube-to-tubesheet joint fabrication process.

No stress corrosion cracking (SCC) has been detected in the Turkey Point 3 SGs. While SCC has not been detected, the degradation assessment for Turkey Point 3 includes the following potential degradation mechanisms for Alloy 600TT SG tube material: axial and circumferential outside diameter SCC and primary water stress corrosion cracking (PWSCC) at the top-of-tubesheet (TTS), axial outside diameter stress corrosion cracking (ODSCC) at TSP intersections on known and non-high residual stress tubes (see later discussion regarding high residual stress tubes), axial ODSCC at tube dings and dents, axial ODSCC in freespans, and PWSCC in small radius U-bends. The SG inspection strategy for Turkey Point 3 includes inspections for these potential degradation mechanisms with specialized eddy current probes.

The Alloy 600 TT fleet is known to have some tubes with higher residual stress that are more susceptible to SCC. Screening for high stress tubes in the Turkey Point 3 SGs began prior to the EOC 19 refueling outage. No high stress tubes were identified in the short-row tubes (Rows 1-8). Eighteen long-row tubes (Rows 9-45) were identified as having a U-bend offset of <2 volts. These 18 tubes were further reviewed during the EOC 19 refueling outage, and no degradation precursors were found. Forty-one additional tubes were found during the EOC 22 refueling outage using the new Electric Power Research Institute's (EPRI's) minus 2 sigma criteria. During the EOC refueling outage, the bobbin voltage offset was revaluated on a row-by-row basis identifying an additional 18 tubes. A total of 77 high stress tubes have been identified in the three Turkey Point 3 SGs (22 in SG-3A, 38 in SG-3B, and 17 in SG-3C). The SG inspection strategy for Turkey Point 3 includes eddy current examination with specialized probes to detect cracking if it initiates.

In Spring 2014 and Spring 2017, the secondary-side inspections (SSI) for all three Turkey Point 3 SGs included an upper bundle flush, sludge lancing, FO search and retrieval, and visual inspection of the upper internals of one selected SG. All newly discovered FOs have been removed, including all discovered loose parts shortly after the steam generator feed pump (SGFP) strainer failure, which occurred in May 2013.

No detectable primary-to-secondary leakage was reported during Cycles 26 and 28. In addition, the licensee stated in its submittal that there has been no detectable primary-to-secondary leakage since the last SG tube inspection (EOC 28).

3.2 NRC Staff Evaluation of Proposed TS Changes

The NRC staff evaluation of the proposed exigent one-time TS changes was performed within the context of the COVID-19 pandemic and the potential impacts of this virus to plant personnel safety. Therefore, this evaluation should not be considered precedent setting for future routine plant amendments or generic industry licensing actions related to SG inspection intervals.

The NRC staff's review focused on the potential impact to SG tube integrity, since maintaining SG tube integrity ensures the plant will meet its SG program-related TSs, thereby protecting the public's health and safety. In particular, the NRC staff assessed whether the licensee's requested amendment demonstrates that the structural integrity performance criterion (SIPC) and accident-induced leakage performance criterion (AILPC) will be met for Cycle 31 until Fall 2021. These criteria are defined in Section 4.1, "Applicable Regulatory Requirements/ Criteria," of the submittal and in TS Section 6.8.4.j.b.

The Turkey Point 3 SG operating experience has shown tube degradation related to wear at various support structures and wear from FOs. These existing degradation mechanisms are addressed in the Turkey Point 3 exigent submittal in a deterministic manner. The licensee's analysis takes the tubes with wear, applies bounding nondestructive examination uncertainty to the wear size, applies an upper 95th percentile growth rate during the operating time between the last inspection and EOC 31, and evaluates the projected EOC 31 wear size to determine if the SIPC and AILPC will be met.

3.2.1 Evaluation of Existing Tube Degradation Mechanisms

Tube Wear at Anti-Vibration Bars (AVB)

The EOC 28 examination for AVB wear consisted of full-length bobbin probe examinations of 100 percent of the active tubes in Rows 3 and higher, and 50 percent examinations of the U-bend regions in Rows 1 and 2 by +Point™. Wear indications were sized based on an EPRI qualified examination technique. The largest indication allowed to remain inservice at EOC 28 was 36 percent through-wall (TW). Based on the licensee's review of historical tube wear data for AVB supports (2010 through 2017), the licensee concluded that AVB wear rates are low, with a large percentage of indications showing no growth. This supports the licensee's conclusion that there has been no significant impact on wear rates due to the extended power uprate implemented in 2012. The general trend is for both the average and upper 95th percentile wear rates to attenuate over time. The applied wear rate for AVB wear is 3.3 percent TW per effective full power year (EFPY) and represents an upper 95th percentile bound. The projected wear depth is less than the EOC structural limit of 64.9 percent TW (determined by 3 times normal operating pressure differential (3xNOPD)) after a 3-cycle operating period to the EOC 31. Therefore, the SIPC will be satisfied. The cumulative

projected accident leakage will be negligible over the next operational period based on the projected limiting depth sizes for this mechanism. Therefore, the AILPC will be satisfied.

Wear at Tube Support Plates

For wear indications at TSP locations occurring at the broached-hole lands and at the outside surface edges, the projected wear rate in the deterministic operational assessment (OA), provided in the April 7, 2020 supplement, was established from current and past inspection data. The OA structural limit for comparing with the projected limiting wear depth is calculated as 66.6 percent TW from the geometric profile model for wear at the lands of the broached holes or TSP edges. The largest wear depth from the EOC 28 examination is 14 percent TW and 19 percent TW for wear at the lands and the edges, respectively. Depth sizing for TSP wear uses a +Point™ probe. The results from the OA evaluation for 3-cycles of operation are shown in Figures 5-3 and 5-4. The applied wear rates are bounding as described in the OA report evaluation. After a 3-cycle operating period to EOC 31, the projected depths for both broached-hole lands and outside surface edges of the TSP locations are less than the Structural Limit (3 times NOPD). Therefore, the SIPC will be satisfied. The cumulative leakage rate for TSP wear indications was determined to be negligible based on the upper 95th percentile one-sided tolerance limit on peak depth. Therefore, the AILPC will be satisfied.

Wear at Flow Distribution Baffle Plates

The EOC 28 examination, which consisted of full-length bobbin probe examination of 100 percent of the active tubes, detected wear/volumetric indications at FDB plates. The indications were sized with +Point™ probe. The EOC structural limit used for comparison with the projected limiting wear depth at EOC has been established at 71.4 percent TW. The maximum nondestructive examination depth of the indication returned to service is 9 percent TW. Due to limited inspection data (i.e., a total of 2 indications in the EOC 28 examination), a bounding wear rate is estimated from the past inspections for Turkey Point and other industry information. Since the EOC 28 examination results showed little or no growth observed from the EOC 26 examination, the upper 95th percentile wear rate was conservatively defined as 6.5 percent TW per EFPY, consistent with TSP wear rates. The results of the depth projection over 3 cycles until the end of Cycle 31 are bounded by the EOC structural limit. Therefore, the SIPC will be satisfied. The cumulative projected accident leakage will be negligible over the next operational period, based on the projected limiting depth sizes for this mechanism. Therefore, the AILPC will be satisfied.

Evaluation Summary for Wear at AVBs, TSPs, and FDB Plates

The NRC staff finds the licensee's evaluation of tube wear at AVBs, TSPs, and at the FDB plates to be acceptable. Wear at these locations in the Turkey Point 3 SGs has been effectively managed for many cycles without challenging tube integrity. Wear at support structures is readily detected with standard eddy current examination techniques, and wear sizing errors are considered in the projection of existing flaws until the EOC 31. During tube inspections, licensees are required to perform CM to assess whether the inspection results are bounded by the previous OA projections of additional tube degradation (in this case, wear). During the most recent Turkey Point 3 inspection after EOC 28, the OA worst case projections for each of the tube wear mechanisms bound the tube inspection results with margin, providing confidence that the OA methods and input assumptions can conservatively predict future performance. Figures 5-2 to 5-5 in the Turkey Point 3 OA through EOC 31 show the predicted largest flaw

size from wear at the AVBs, TSP broached lands, TSP edges, and FDB baffle plates. These results, with conservative wear rates through EOC 31, predict that tube integrity will be maintained. Therefore, the NRC staff finds the evaluation of wear at support structures to be acceptable since the SIPC and AILPC will be satisfied.

Foreign Object Wear

In addition to wear at support structures, Turkey Point 3 has also experienced tube wear from FOs that have been transported into the SGs. The licensee evaluated FO wear as follows:

> Secondary-side foreign objects found in the steam generators and PLP [possible loose part] locations identified by ECT [eddy-current test] at EOC 28 were evaluated. All newly discovered foreign objects have been removed including all discovered loose parts shortly after the steam generator feed pump (SGFP) strainer failure, which occurred in May 2013. There were no significant parts resulting from the SGFP strainer found at EOC 26 or EOC 28. The potential of having additional loose parts enter the tube bundle has also been evaluated.
>
> Although it is not likely to have any strainer failure debris remaining in the SGs after multiple secondary-side inspections (SSI), any possible foreign objects remaining in the feedwater train (from the SGFP suction strainer failure) that have the potential to migrate to the SGs have been evaluated; the more likely debris arising from strainer failure were considered. The most limiting wear time from this assessment is 3.68 years, and is based on wear time projections to the Technical Specification repair limit of 40% TW, which is generally much less than an appropriate structural limit to meet the SIPC margin requirements. Assuming a wear scar from a foreign object that is a 1-inch-long of uniform depth (flat shape), the CM structural limit is 53% TW. By scaling the wear time for the postulated loose strainer part, the adjusted wear time becomes 4.88 EFPY. All known historical foreign objects that still remain in the steam generators and are actively tracked have been evaluated. The limiting object has been classified as metallic slag and resides in SG-3B. The limiting operating time for this loose part is 4.92 years, which is longer than the extended operating interval of 4.26 EFPY for Cycles 29 through and 31. Therefore, any potential future wear caused from historical foreign objects will be bounded for the 3-cycle interval between ECT inspections.

The NRC staff finds the licensee's evaluation of loose parts to be acceptable since it accounts for tube wear from known loose parts within the SGs and considers the debris most likely to remain in the feedwater system from the SGFP strainer failure and be transported to the SGs. Based on this analysis, the NRC staff finds that the licensee has demonstrated that the SIPC will be met until the EOC 31.

The NRC staff also acknowledges that predicting future loose part generation is not possible since past fleetwide operating experience has shown that new loose part generation, transport to the SG tube bundle, and interactions with the tubes cannot be reliably predicted. However, plants can reduce the probability of loose parts by maintaining robust foreign material exclusion programs and applying lessons learned from previous industry operating experience with loose parts. Plants in general, including Turkey Point 3, have demonstrated the ability to conservatively manage loose parts once they are detected by eddy current examinations or by secondary-side FO search and retrieval inspections. If unanticipated aggressive tube wear from

new loose parts should occur in Turkey Point 3 SG, operating experience has shown that a primary-to-secondary leak will probably occur rather than a loss of tube integrity. In the event of a primary-to-secondary leak, the NRC staff will interact with the licensee to confirm the licensee's conservative decisionmaking.

3.2.2 Evaluation of Potential Tube Degradation Mechanisms

In addition to existing tube degradation mechanisms, the licensee considered other potential degradation mechanisms. In a safety evaluation dated November 5, 2012 (ADAMS Accession No. ML12292A342), the NRC staff approved an H* amendment, which concludes that potential tube degradation beyond the H* depth in the tubesheet does not affect tube integrity. Therefore, the licensee is not required to consider potential tube degradation between the Turkey Point 3 H* distance and the tube end.

Some plants in the Alloy 600TT fleet have experienced SCC initiating from either the primary side of the tube (PWSCC) or outside diameter of the tube (ODSCC). This has occurred at multiple locations. The SCC mechanism is known to be dependent on temperature. In general, plants operating at higher temperatures are more prone to SCC, compared to plants operating at lower temperature. Similarly, in general, hotter portions of the tubing are more susceptible to SCC than colder sections of the tubing. SCC in SG tubing can also be accelerated by higher residual stress in the tubing. The Alloy 600TT fleet is known to have some tubes with higher residual stress that are more susceptible to cracking. Turkey Point 3 has identified 77 high stress tubes, as previously discussed in this safety evaluation.

Although Turkey Point 3 has not detected SCC in the SG tubing, eddy current examinations with specialized probes are performed to detect cracking if it initiates. The probabilistic analysis for the potential SCC mechanisms made the following conservative assumptions:

- All potential mechanisms are assumed to be existing and are evaluated in the OA.

- Prior to the most recent tube inspection, SCC had initiated and was missed during the most recent inspection. This assumption will create a population of undetected flaws that will exist at the start of the cycle prior to the most recent inspection.

- The default crack growth rates used in the OA followed recommendations for Alloy 600TT tubing in the EPRI Steam Generator Management Program [SGMP] Integrity Assessment Guidelines [IAGL], Revision 4, dated June 2016.

- For mechanisms that were sampled at the last inspection, the tube population was divided into two groupings per the implemented sampling plan (inspected and non-inspected) in accordance with Section 8.6 of the EPRI SGMP IAGL. The probability of burst and leakage assessment was individually computed for each partially inspected group and later numerically combined to give the total tube bundle probabilities for the mechanism.

A Monte Carlo simulation was performed with the application of a Weibull function to determine crack initiation. The Weibull model was adjusted to set the time for first initiation such that at least two cracks were present at the last inspection and not detected. The NRC staff questioned the limitations placed on the beginning of cycle crack distribution and how the model was benchmarked to fleet operating experience. In its April 7, 2020, supplement, the licensee

indicated that the beginning of cycle size distribution is checked to confirm the median depth and the 95th percentile is effective as measures of performance without excessively predicting failures. The model has been benchmarked to fleet operating experience. Once initiated, cracks can grow using the EPRI default crack growth rate distribution.

The calculated probability of burst for all evaluated mechanisms satisfies the SIPC margin performance standard (3xNOPD) for a 3-cycle operating period through the EOC 31. The cumulative accident-induced leakage is determined by summing the projected leak rates at the EOC 31. It would not be credible to assume that all potential mechanisms would be active in one operating period. Assuming the three limiting mechanisms become active in one SG (i.e., axial ODSCC at TSPs, circumferential ODSCC at TTS, and axial ODSCC at dings/dents), the cumulative leak rate was determined to be approximately one-half the AILPC leak limit for the limiting SG.

The NRC staff reviewed the licensee's probabilistic evaluation of potential mechanisms. The staff considers the probabilistic evaluation assumptions to be conservative for Turkey Point 3. Although no SCC has been detected in any inspection, the model assumes that cracks existed at the previous inspection, were missed, and grow until the EOC 31. The model predicts that axial and circumferential cracks will be detected at the TTS, axial cracks will be detected at the TSP intersections, and axial cracks will be detected at dents/dings at the next inspection. The calculated probability of burst for all potential mechanisms satisfies the SIPC margin requirements until the EOC 31. The AILPC is also satisfied when assuming the three limiting SCC mechanisms are active during Cycle 31.

Therefore, based on the evaluation discussed above, the NRC staff finds that there is reasonable assurance that both the tube structural integrity and leakage integrity performance criteria will be met for all tubes with existing known degradation (wear) and potential degradation (cracking) until the EOC 31.

3.3 Evaluation of TS Change

The NRC staff evaluated the submittal to determine if the proposed notes, discussed above in Section 2.2.1, added to TS administrative controls continue to support the requirements of 10 CFR 50.36. As discussed in the submittal, the licensee did not propose any change to its current TS limiting conditions for operation and surveillance requirements. As such, those TS requirements remain unaffected by the proposed changes.

The proposed notes would modify the TS 6.9.2 SG to support deferral of the SG inspection program. As the structure, format, and content of the proposed notes support the determination that the proposed changes to the SG inspection schedule are appropriate and do not impact the safe operation of the plant, the NRC staff determined that the notes support continued conformance to the 10 CFR 50.36 regulations. Therefore, the NRC staff finds that the operation of the facility in a safe manner is not affected, and therefore, the modified SG inspection program is acceptable.

3.4 Technical Evaluation Conclusion

Based on the information submitted, the NRC staff finds that the licensee has demonstrated that there is reasonable assurance that the structural and leakage integrity of the Turkey Point 3 SG tubes will be maintained until the next SG tube inspections during RFO 32 in Fall 2021. Further, the NRC staff finds that the proposed notes support continued conformance with the

requirements of 10 CFR 50.36. Therefore, the NRC staff concludes that the licensee may incorporate the proposed changes into the Turkey Point 3 TSs.

4.0 EXIGENT CIRCUMSTANCES

Background

The NRC's regulations contain provisions for issuance of amendments when the usual 30-day public comment period cannot be met. These provisions are applicable under exigent circumstances. Consistent with the requirements in 10 CFR 50.91(a)(6), exigent circumstances exist when: (1) a licensee and the NRC must act quickly; (2) time does not permit the NRC to publish a *Federal Register* notice allowing 30 days for prior public comment; and (3) the NRC determines that the amendment involves no significant hazards consideration. As discussed in the licensee application dated April 4, 2020, as supplemented by letter dated April 7, 2020, the licensee requested that the proposed amendment be processed by the NRC on an exigent basis.

Under the provisions in 10 CFR 50.91(a)(6), the NRC notifies the public in one of two ways: (1) by issuing a *Federal Register* notice providing an opportunity for hearing and allowing at least 2 weeks from the date of the notice for prior public comments or (2) by using local media to provide reasonable notice to the public in the area surrounding the licensee's facility. In this case, the NRC provided notice in the *Miami Herald*.

The licensee provided the following information to support its need for this exigent license amendment request. The licensee indicated that this change is necessary due to unforeseen circumstances related to the 2020 COVID-19 virus pandemic. Specifically, due to the emergent nature of the coronavirus pandemic, the licensee determined that reducing the number of employees required for the Turkey Point 3 refueling outage and a reduction in outage scope and duration would be necessary to prevent the spread of the coronavirus. Because the Turkey Point 3 TSs require operability of the SGs prior to entering Mode 4, which is planned for April 18, 2020, the licensee determined that the need for this amendment is exigent and does not allow for the standard public comment period.

NRC Staff Conclusion

Based on the above circumstances, the NRC staff finds that the licensee made a timely application for the proposed amendment following identification of the issue. In addition, the NRC staff finds that exigent circumstances exist in that the licensee and the NRC must act quickly and that time does not permit the NRC staff to publish a *Federal Register* notice allowing 30 days for prior public comment. Further, the NRC staff finds that the licensee could not avoid the exigency due to unforeseen circumstances related to the 2020 COVID-19 virus pandemic. Based on these findings and the determination that the amendment involves no significant hazards consideration as discussed below, the NRC staff has determined that a valid need exists for issuance of the license amendment using the exigent provisions of 10 CFR 50.91(a)(6).

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the NRC staff notified the State of Florida official (Ms. Cynthia Becker, M.P.H., Chief of the Bureau of Radiation Control, Florida

Department of Health) on April 13, 2020 of the proposed issuance of the amendment on April 13, 2020. The State official had no comments.

6.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION

The NRC's regulation in 10 CFR 50.92(c) states that the NRC may make a final determination, under the procedures in 10 CFR 50.91, that a license amendment involves no significant hazards consideration if operation of the facility, in accordance with the amendment, would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.
An evaluation of the issue of no significant hazards consideration provided by the licensee is presented below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed license amendment modifies the Turkey Point TS by extending the Unit 3 Steam Generator inspection by one cycle until the Unit 3 refueling outage scheduled for Fall 2021. The SG tubes continue to meet the SG Program performance criteria and remain bounded by the plant's accident analyses. The operational assessment reanalysis demonstrates that the SG tubes meet the SG Program performance criteria throughout the 18-month one-time extension of the SG inspection.

   Therefore, facility operation in accordance with the proposed changes would not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed license amendment modifies the Turkey Point TS by allowing a one-time extension of the Unit 3 Steam Generator inspection by one cycle until the Unit 3 refueling outage scheduled for Fall 2021. The proposed change does not alter the design function or operation of the SGs or the ability of an SG to perform their design function. The SG tubes continue to meet the SG Program performance criteria. The proposed change does not create the possibility of a new or different kind of accident due to credible new failure mechanisms, malfunctions, or accident initiators that are not considered in the design and licensing bases.

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

   Response: No.

   The proposed license amendment modifies the Turkey Point TS by allowing a one-time extension of the Unit 3 Steam Generator inspection by one cycle until the Unit 3 refueling outage scheduled for Fall 2021. Extending the inspection schedule does not involve changes to any limit on accident consequences specified in the Turkey Point licensing bases or applicable regulations, does not modify how accidents are mitigated and does not involve a change in a methodology.

   Therefore, operation of the facility in accordance with the proposed change will not involve a significant reduction in the margin of safety.

The NRC staff reviewed the licensee's no significant hazards consideration analysis. Based on the review and on the NRC staff's evaluation of the underlying license amendment request as discussed above, the NRC staff concludes that the three standards of 10 CFR 50.92(c) are satisfied. Therefore, the NRC staff has made a final determination that no significant hazards consideration is involved for the proposed amendment and that the amendment should be issued as allowed by the criteria contained in 10 CFR 50.91.

7.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has made a final finding that the amendment involves no significant hazards consideration. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

8.0 CONCLUSION

The Commission has concluded, based on the aforementioned considerations, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Date: April 16, 2020

SUBJECT: TURKEY POINT NUCLEAR GENERATING UNIT NO. 3 - ISSUANCE OF EXIGENT AMENDMENT NO. 291 CONCERNING THE DEFERRAL OF STEAM GENERATOR INSPECTIONS (EPID L-2020-LLA-0067)
DATED: APRIL 16, 2020

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ADAMS Accession No.: ML20104B527 *by memorandum **by e-mail

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