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

February 1, 2016

Mr. Mano Nazar
President and Chief Nuclear Officer
Nuclear Division
NextEra Energy
P.O. Box 14000
Juno Beach, FL 33408-0420

SUBJECT: TURKEY POINT NUCLEAR GENERATING UNIT NOS. 3 AND 4 – SAFETY EVALUATION FOR RELIEF REQUEST NO. 2 FOR THE FIFTH 10-YEAR INSERVICE INSPECTION INTERVAL REGARDING THE AMOUNT OF COVERAGE OBTAINED DURING SPECIFIC EXAMINATIONS OF THE REGENERATIVE HEAT EXCHANGER WELDS (CAC NOS. MF6384 AND MF6385)

Dear Mr. Nazar:

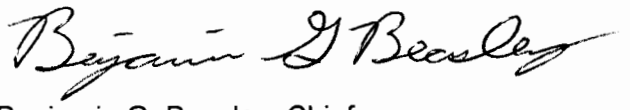
By letter dated June 8, 2015, as supplemented by letter dated November 13, 2015, Florida Power & Light Company (FPL or the licensee) submitted Relief Request No. 2 for the fifth 10-year inservice inspection (ISI) interval of Turkey Point Nuclear Generating Unit Nos. 3 (Turkey Point Unit 3) and 4 (Turkey Point Unit 4). Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 55a(z)(2), FPL requested U.S. Nuclear Regulatory Commission (NRC) relief from the American Society of Mechanical Engineers (ASME) Code required examinations on the regenerative heat exchanger shell welds, support welds, and component supports. Further, FPL proposed to perform a VT-2 visual examination at the beginning of the outage for leakage and boric acid accumulation and a VT-2 visual examination at startup during the system leakage test.

Based on the review of the licensee's submittals, the NRC staff has concluded that the proposed alternatives provide an acceptable level of quality and safety. The alternatives proposed provide reasonable assurance of structural integrity and, therefore, are authorized pursuant to 10 CFR 50.55a(z)(2). These reliefs are authorized for the fifth 10-year ISI interval for Turkey Point Unit 3, which began on February 22, 2014, and for the fifth 10-year ISI interval for Turkey Point Unit 4, which began on April 15, 2014.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact the Project Manager, Ms. Audrey Klett, at (301) 415-0489 or Audrey.Klett@nrc.gov.

Sincerely,



Benjamin G. Beasley, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosure:
Safety Evaluation

cc w/enclosure: Distribution via Listserv

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

# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

# RELIEF REQUEST NO. 2

# FOR THE FIFTH 10-YEAR INSERVICE INSPECTION INTERVAL

# FLORIDA POWER & LIGHT COMPANY

# TURKEY POINT NUCLEAR GENERATING UNIT NOS. 3 AND 4

# DOCKET NOS. 50-250 AND 50-251

## 1.0 INTRODUCTION

By letter dated June 8, 2015,[1] as supplemented by letter November 13, 2015,[2] Florida Power & Light Company (FPL or the licensee) submitted Relief Request (RR) No. 2 for the fifth 10-year inservice inspection (ISI) interval of Turkey Point Nuclear Generating Unit Nos. 3 (Turkey Point Unit 3) and 4 (Turkey Point Unit 4).

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 55a(z)(2), the licensee requested U.S. Nuclear Regulatory Commission (NRC) relief from the American Society of Mechanical Engineers (ASME) Code required examinations on the regenerative heat exchanger (RHE) shell welds, support welds, and component supports. Further, FPL proposed to perform a VT-2 visual examination at the beginning of the outage for leakage and boric acid accumulation and a VT-2 visual examination at startup during the system leakage test.

## 2.0 REGULATORY EVALUATION

The ISI of ASME Code Class 1, 2, and 3 components is performed in accordance with Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the ASME Code and applicable edition and addenda, as required by 10 CFR 50.55a(g). When conformance to these requirements is determined to be impractical, relief may be granted by the NRC pursuant to 10 CFR 50.55a(g)(6)(i). Additionally, pursuant to 10 CFR 50.55a(g)(6)(i), the NRC may impose such alternative requirements as it determines are authorized by law that will not endanger life or property or the common defense and security and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements set forth in the ASME Code, Section XI, to the extent practical, within the limitations of design, geometry, and materials of construction of the

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[1] Agencywide Documents Access and Management System (ADAMS) Accession No. ML15177A085
[2] ADAMS Accession No. ML15331A036

components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals complies with the requirements in the latest edition and addenda of Section XI of the ASME Code, incorporated by reference in 10 CFR 50.55a(a), 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed in 10 CFR 50.55a(b)(2). The Code of record for Turkey Point Units 3 and 4 for the fifth 10-year ISI interval is the 2007 Edition with the 2008 Addenda of the ASME Code, Section XI.

## 3.0 TECHNICAL EVALUATION

### 3.1 ASME Code Components Affected and Applicable Code Edition and Addenda

For the fifth ISI 10-year interval, the ASME Code of record for Turkey Point Units 3 and 4 is the 2007 Edition with the 2008 Addenda of the ASME Boiler and Pressure Vessel Code, Section XI, as modified by 10 CFR 50.55a. The 1998 Edition with Addenda through 2000 was utilized for ASME Section XI, Appendix VIII.

The ASME Code components affected are the Class 1 RHE welds. The licensee requested relief for the ASME Code Class 1 components listed in Table 1 below. The ASME Code examination requirements are shown in Table 2 below.

Table 1. ASME Code Components Affected

| Weld Description | Weld Numbers |
|---|---|
| Head to Shell | RGX I-1<br>RGX II-1<br>RGX III-1 |
| Shell to Tubesheet - Primary | RGX I-2<br>RGX II-2<br>RGX III-2 |
| Tubesheet to Shell - Secondary | RGX I-3<br>RGX II-3<br>RGX III-3 |
| Channel Head Weld - Secondary | RGX I-4<br>RGX II-4<br>RGX III-4 |
| Shell I Nozzle Welds | RGX I-9<br>RGX I-10<br>RGX I-11<br>RGX I-12 |
| Shell II Nozzle Welds | RGX II-9<br>RGX II-10<br>RGX II-11<br>RGX II-12 |

| | |
|---|---|
| Shell III Nozzle Welds | RGX III-9<br>RGX III-10<br>RGX III-11<br>RGX III-12 |
| Integrally Welded Supports | RGX I-LUG<br>RGX II-LUG<br>RGX III-LUG |
| Clamp Restraint | RGX I-CR<br>RGX II-CR<br>RGX III-CR |

Table 2. ASME Code Examination Categories and Requirements

| Examination Category [1] | Item No. [1] | Examination Requirements [1] |
|---|---|---|
| B-B | B2.51<br>B2.80 | Volumetric examination, to include 100-percent of the length of circumferential tube sheet to shell welds and head to shell welds. |
| B-D | B3.150<br>B3.160 | Volumetric examination, to include 100-percent of each nozzle to vessel weld and nozzle inside radius area. |
| B-K | B10.10 | Volumetric or surface examination to include 100-percent of each integrally welded attachments of one exchanger. |
| F-A | F1.40 | Examine welds, mechanical connections, clearances, alignment, sliding surfaces, and assembly of the supports. |

3.2 Licensee's Reason for RR

RHEs are located in locked high radiation areas. These areas typically have a general radiation field of 2 roentgen equivalent man (rem)/hour and are highly contaminated. Other conditions include limited accessibility to examination areas due to close proximity of the adjacent wall and floor, limited work area due to cubicle walls built to shield personnel in adjacent areas, and interference from other lines and supports in the immediate area.

During construction of Turkey Point Units 3 and 4, asbestos insulation was used extensively. Asbestos insulation is present in the area of the RHEs. Additional protection is required for personnel entering these areas to avoid possible spreading and ingestion of this hazardous material (i.e., an extra layer of protective clothing, tenting, and high-efficiency particulate arresting filters.)

Performing ASME Code required examinations would require large expenditures of man-hours and accumulated man-rem dose. These welds must be uninsulated for examination and also require installation of temporary shielding and scaffold. Effective shielding reduces accessibility

to the examination areas. Proper surface conditioning required to perform surface and volumetric examinations adds additional time and exposure. These areas must be tented to avoid spreading of asbestos fibers found in the insulation.

3.3 Licensee's Proposed Alternative

FPL will perform a VT-2 visual examination at the beginning of the outage for leakage and boric acid accumulation and a VT-2 visual examination at startup during the system leakage test.

3.4 Licensee's Basis for Use of RR No. 2

FPL has performed examinations on the RHEs for both Turkey Point Units 3 and 4 during the first inspection interval (approximately early 1972 through late 1983) before the original RR was approved. This experience showed that the design arrangement and accessibility are not conducive to meaningful examinations. The configuration, limited accessibility, high radiation levels, and interference from supports, walls, and the floor do not support ASME Code required examination coverage for volumetric and/or surface examinations.

Since 1985, FPL has performed VT-2 examinations on the items listed in this RR. These examinations were performed in accordance with the previously approved RR, which required FPL to look for evidence of leakage around the RHE just after shutdown for a refueling outage and a second time during the system pressure test at plant startup. No evidence of leakage from the RHE or its attached piping has been noted in either unit during any of the previous examinations.

FPL concluded that the proposed alternative visual examinations at the stated frequency provides an acceptable level of quality and safety to the Code required examinations conducted once per interval.

3.5 NRC Staff Evaluation

Section 3.1 of this safety evaluation (SE) summarizes the ASME Code examination requirements for the RHE components listed in Tables 1 and 2. The licensee's discussion of the basis for hardship, pursuant to 10 CFR 50.55a(z)(2), is presented in Section 3.2 of this SE. In summary, the basis for hardship is high man-rem dose to personnel due to significant man-hour effort that would be needed for the ASME Code required examinations. In Section 3.4 of this SE, the licensee stated that it has performed the required volumetric examinations on the RHEs for both Turkey Point Units 3 and 4 during the first 10-year ISI interval and concluded that the design arrangement and accessibility were not conducive to meaningful examinations. Therefore, the NRC staff determines that the licensee has an acceptable case of "hardship without a compensating increase in quality and safety" pursuant to 10 CFR 50.55a(z)(2).

The licensee proposes VT-2 examinations for leakage and boric acid accumulation conducted at the beginning of each refueling outage for both units. Additionally, the licensee proposes VT-2 examinations at startup during the system leakage tests for both units. In the submittal, the licensee stated that since 1985, FPL has performed VT-2 examinations on the components listed in RR No. 2 and that no evidence of leakage from the RHE or its attached piping has been noted in either unit during any previous examinations. Therefore, the NRC staff concludes that the service history of the RHEs has been satisfactory. The NRC staff notes that the same VT-2

examination alternative for the RHE components listed in Table 1 for Turkey Point Units 3 and 4 was proposed by the licensee during the previous (fourth) 10-year ISI interval. The NRC staff approved the alternative in a March 3, 2005, SE for RR No. 1.[3]

With respect to degradation mechanisms, the referenced SE for the fourth 10-year ISI interval discussed that fatigue crack growth rate is extremely small, even in highly stressed areas, and that since the heat exchanger material is made of austenitic stainless steel (which has a high fracture toughness), a postulated flaw in the heat exchanger weld would be more likely to cause a leak first before a gross failure occurs under normal service loading conditions. This postulated leak would be detectable during operation or during a system leakage test.

## 4.0 CONCLUSION

On the basis of the evaluation set forth above and pursuant to 10 CFR 50.55a(a)(z)(2), the staff concludes that compliance with the ASME Code requirements for performing ISI examination of the subject RHE components would result in hardship to the licensee without a compensating increase in the level of quality and safety, and that the alternative proposed by the licensee provides reasonable assurance of structural integrity. Therefore, the NRC staff authorizes the proposed alternative in RR No. 2 for the fifth 10-year ISI interval of Turkey Point Units 3 and 4, which began on February 22, 2014, and April 15, 2014, respectively.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: David Dijamco
Gary Steven

Date: February 1, 2016

[3] ADAMS Accession No. ML050350363

If you have any questions regarding this issue, please contact the Project Manager, Ms. Audrey Klett, at (301) 415-0489 or Audrey.Klett@nrc.gov.

Sincerely,

***/RA/***

Benjamin G. Beasley, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

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Safety Evaluation

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