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

March 26, 2014

Mr. Mano Nazar
Executive Vice President and
Chief Nuclear Officer
Florida Power & Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: TURKEY POINT NUCLEAR GENERATING UNIT NOS. 3 AND 4 – SAFETY EVALUATION FOR RELIEF REQUEST NO. 14 FOR FOURTH 10-YEAR INSERVICE INSPECTION INTERVALS – REACTOR VESSEL FLANGE LEAK-OFF LINES (TAC NOS. MF3564 AND MF3565)

Dear Mr. Nazar:

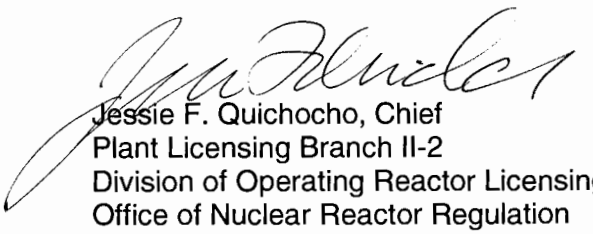
By letter to the U.S. Nuclear Regulatory Commission (NRC or the Commission) dated March 14, 2014, Florida Power & Light Company (the licensee) submitted Relief Request No. 12 for the Turkey Point Nuclear Generating Unit Nos. 3 and 4 (Turkey Point 3 and 4). Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Paragraph 50.55a(a)(3)(ii), the licensee proposed alternatives to the requirements of the Section XI of American Society of Mechanical Engineers (ASME) Code, Section XI because complying with the specific requirement would result in hardship and unusual difficulty without a compensating increase in the level of quality and safety. Relief Request No. 14 pertains to the ASME Code, Section XI, 1998 Edition with Addenda through 2000, Table IWC-2500-1 and paragraph IWC-5221 requirements for pressure testing the reactor vessel flange leak-off lines. The licensee's proposed alternative is to examine the Class 2 accessible portions of the leak-off detection system using the VT-2 visual examination method at ambient conditions after filling the refueling cavity to its normal refueling water level for at least 4 hours.

The NRC staff reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that the licensee adequately addressed all regulatory requirements in 10 CFR 50.55a(a)(3)(ii). Accordingly, the NRC staff authorizes Relief Request No. 14 at Turkey Point 3 and 4 for the remainder of the fourth 10-year inservice inspection (ISI) intervals of Turkey Point 3 and 4, which are currently scheduled to end on February 21 and April 14, 2014, respectively. The licensee may invoke the provision of the ASME Code, Section XI, paragraph IWA-2430, which allows the licensee to extend the fourth 10-year ISI intervals by 1 year. The licensee may perform the proposed alternative in the 1-year extension periods.

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

If you have any questions regarding this issue, please contact the project manager, Ms. Audrey Klett, at (301) 415-0489 or by e-mail at Audrey.Klett@nrc.gov.

Sincerely,



Jessie F. Quichocho, 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/encl.: 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. 14

FOR THE FOURTH 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 March 14, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14078A301), Florida Power & Light Company (the licensee) submitted Relief Request No. 14 for the fourth 10-year inservice inspection (ISI) intervals of Turkey Point Nuclear Generating Unit Nos. 3 and 4 (Turkey Point 3 and 4). Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Paragraph 50.55a(a)(3)(ii), the licensee requested the U.S. Nuclear Regulatory Commission (NRC) authorization of an alternative to the requirements of Section XI of the American Society of Mechanical Engineers (ASME) Code, because hardship or unusual difficulty exists without a compensating increase in the level of quality and safety. Relief Request No. 14 pertains to the ASME Code, Section XI, 1998 Edition with Addenda through 2000, Table IWC-2500-1 and paragraph IWC-5221 requirements for pressure testing the reactor vessel flange leak-off lines. The licensee's proposed alternative is to perform the system leakage test of the reactor pressure vessel (RPV) flange O-ring leak-off lines at Turkey Point 3 and 4 using the pressure developed when the refueling cavity is filled to the normal refueling water level in lieu of the pressure required by the ASME Code, Section XI, paragraph IWC-5221.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g)(4), "Inservice Inspection Requirements," ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. Pursuant to 10 CFR 50.55a(g)(4)(i) and 10 CFR 50.55a(g)(4)(ii), inservice examination of components and system pressure tests conducted during the first 10-year inspection interval and subsequent 10-year inspection intervals must comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month inspection interval, subject to the limitations and modifications listed therein.

Pursuant to 10 CFR 50.55(a)(3)(ii), alternatives to the requirements of 10 CFR 50.55a(g) may be used when authorized by the Director of the NRC Office of Nuclear Reactor Regulation if compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Based on its analysis of the regulatory requirements, the NRC staff finds that the regulatory authority exists to authorize the licensee's proposed alternative on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff reviewed and evaluated the licensee's request pursuant to 10 CFR 50.55a(a)(3)(ii).

The code of record for the Turkey Point 3 and 4 fourth 10-year ISI intervals is the 1998 Edition with Addenda through 2000 of the ASME Code, Section XI.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Proposed Alternative

Components for which Relief is Being Requested

Turkey Point 3: ASME Code Class 2 RPV flange leak-off piping, tubing and isolation valve 3-502, originating at the RPV flange and terminating at the last boundary isolation valve; approximately 20 feet of 1 inch diameter stainless steel schedule 160 piping and approximately 42 feet of 3/8 inch diameter stainless steel tubing.

Turkey Point 4: ASME Code Class 2 RPV flange leak-off piping, tubing and isolation valve 4-502, originating at the RPV flange and terminating at the last boundary isolation valve; approximately 20 feet of 1 inch diameter stainless steel schedule 160 piping and approximately 38 feet of 3/8 inch diameter stainless steel tubing.

ASME Code Requirements

The Code of Record for the Fourth ISI Intervals at Turkey Point 3 and 4, which began February 22, 2004, and April 15, 2004, respectively, and is scheduled to end on February 21, 2014, and April 14, 2014, respectively, is the ASME Code, Section XI, 1998 Edition through the 2000 Addenda.

Paragraph IWC-2500 of the ASME Code, Section XI, Table IWC-2500-1, Category C-H, Item Number C7.10, requires that a system leakage test with a VT-2 visual examination of Class 2 pressure retaining components be performed each inspection period. Paragraph IWC-5221 requires that the system leakage test be conducted at the pressure obtained while the system, or portion of the system, is in service performing its normal operating function or at the system pressure developed during a test conducted to verify system operability.

The NRC staff notes that the licensee has invoked the provision of ASME Code, Section XI, IWA-2430(d)1 to extend the Fourth 10-Year ISI interval by 1 year for both Turkey Point Units 3 and 4 to complete the required in-service inspections during the refueling outage for Cycle 27 and Cycle 28 for Unit 3 and Unit 4, respectively, and to credit those inspections/examinations to the Fourth 10-Year ISI Interval.

Licensee's Proposed Alternative

In lieu of the requirements of IWC-5221, the following alternative examination is proposed: The Class 2 accessible portions of the leak-off detection system will be examined using the VT-2 visual examination method. For Code Class 2 components whose external surfaces are inaccessible for direct VT-2 visual examination, the provisions of paragraph IWA-5241(b) will apply. The test will be conducted at ambient conditions after the refueling cavity has been filled to its normal refueling water level for at least 4 hours. The test will be performed with the frequency specified by Table IWC-2500-1 for a System Leakage Test for the remainder of the Fourth 10-Year ISI Interval.

Licensee's Basis for Requesting Relief

Any leakage due to a through-wall leak of the leak-off line or failure of the inner O-ring would be expected to clearly exhibit boric acid residue accumulation that would be discernible during the proposed alternative VT-2 visual examination that would be performed during a refueling outage. Additionally, the static head developed on the leak detection line filled with water, and the time the line is filled with water, will allow for the detection of any indications in the line.

Performing the proposed test with only static head pressure in the leak-off line does not reduce the margin of safety in operating the plant or detecting leaks and, therefore, provides reasonable assurance of structural integrity or leak tightness of the subject Code Class 2 components.

The licensee has cited four precedents:

1. Arkansas Nuclear One, Unit 2, Fourth Inspection Interval Alternative Request for Relief from American Society of Mechanical Engineers (ASME) Code, Section XI-Request for Relief ANO2-ISI-015, authorized by NRC in a letter dated June 27, 2013, ADAMS Accession No. ML13161A241.

2. Palo Verde Nuclear Generating Station, Units 1, 2 and 3, Third Inspection Interval Alternative, Request for Relief from ASME Code, Section XI, Reactor Vessel Head Flange Leak Detection Piping-Relief Request No. 49, authorized by the NRC in a letter dated April 4, 2013, ADAMS Accession No. ML13085A254.

3. Callaway Plant, Unit 1, Third Inspection Interval Alternative, Proposed Alternative to ASME Section XI Requirements for Leakage Testing of Reactor Pressure Vessel Head Flange Leak-off Lines, Relief Request 13R-14, authorized by the NRC in a letter dated August 13, 2013, ADAMS Accession No. ML13221A091.

4. Vogtle Electric Generating Plant-Units 1 and 2, ISI Program Alternative VEGP-ISI-ALT-10, Version 1, dated January 16, 2014, ADAMS Accession No. ML14016A488.

3.2 NRC Staff's Evaluation

The reactor vessel flange leak-off lines are essentially a leakage collection/detection system. The inner and outer leak-off lines conduct potential leakage of the RPV head flange O-rings to a common header and a thermal detector (TE 401) where the elevated temperature of any leakage is sensed and an alarm in the control room is tripped when a temperature of 150 degrees Fahrenheit (°F) is reached. The common header is open to the Reactor Coolant Drain Tank (RCDT). During normal operation, the inner O-ring leak-off line is open to the common header and the outer O-ring leak-off line is isolated at valve 501.

If there is significant leakage past the inner O-ring, isolation valve 502 on the inner O-ring leak-off line would be closed and isolation valve 501 on the outer O-ring leak-off line would be opened, allowing any potential leakage past the outer O-ring to travel to the thermal detector. The inner O-ring leak-off line would only function as a Class 2 pressure boundary if the inner O-ring fails and valve 502 is isolated, thereby pressurizing the piping, tubing, and valve.

The NRC staff notes that the licensee states that the outer O-ring leak-off line is classified as non-code class piping since the inner and outer O-rings will serve as two isolation barriers in series and, therefore, the outer O-ring leak-off line is not subject to ASME Code, Section XI examination requirements.

The subject leak-off line is heavy walled schedule 160 stainless steel (A-376, Type 316) piping with a plant design pressure of 2510 pounds per square inch gauge (psig) at 680 °F and tubing (A-249 or A-213, stainless steel) with a plant design pressure of 2500 psig at 650 °F. The licensee states that a historical search of station operating experience for the past 10 years has found no incidents of RPV flange O-ring leakage or leak-off line degradation.

The licensee has identified two methods of pressurizing the subject line to the system pressure required by ASME Code, Section XI, paragraph IWC-5221, prior to performing the required VT-2 visual examination. These methods are: Modification of the RPV flange to install mechanical threads and installation of a threaded plug into each leak-off line to establish a boundary for leakage testing with the RPV head removed; and pressurizing the leak-off line while the RPV head is installed.

Modification of the RPV flange to install a threaded plug into the leak-off line would require a design modification to install mechanical threads at the RPV flange. A threaded plug would then have to be installed prior to the pressure test and removed after the test was complete. The NRC staff finds that performing the modification, as well as installation and removal of the plug for each leakage test, would result in additional radiological dose, which would be contrary to As Low As Reasonably Achievable (ALARA) considerations. Furthermore, installation and removal of the plug could present foreign material exclusion issues.

Applying system pressure to the leak-off line for the purpose of system leakage testing with the RPV head installed would require pressurizing the line with a hydrostatic test pump. The licensee states that if the test were to be performed with the vessel head installed either at the beginning or at the end of an outage, a vent would need to be added to allow any air to escape, and the vent installation would require work in an area where radiological dose rates are elevated. The NRC staff finds that this evolution would be contrary to ALARA considerations. Further, if the subject leak-off line is pressurized at the end of a refueling outage, the inner

O-ring would be pressurized in the direction opposite to the intended design function, likely resulting in the need to replace the O-ring. The licensee states that removal and reinstallation of the head to replace the O-ring would be accompanied by an additional 3.1 roentgen equivalent man radiological dose, contrary to ALARA considerations.

The NRC staff has reviewed these options and finds that there is a hardship associated with each. The NRC staff concludes that performing the VT-2 visual examination while the subject leak-off line is at ASME Code-required system pressure would present a hardship.

The licensee is proposing to conduct a VT-2 visual examination of the leak-off line after the refueling cavity has been filled to its normal refueling water level for at least 4 hours. The licensee states that the static pressure at the RPV flange due to the refueling water level is approximately 16 psig. To ensure the piping is water solid prior to the beginning of the 4-hour pressurization hold time, the licensee states that the RCDT will be used as a flow path to remove any air trapped in the leak-off line after the refueling cavity has been filled to its normal refueling level. The NRC staff finds that the procedure is adequate to produce a water-solid line where any leakage would be detected during a VT-2 visual examination. The NRC staff also notes that the flushing procedure will clear the leak-off line of internal contaminants that could promote stress corrosion cracking. Therefore, the NRC staff finds the flushing procedure acceptable.

The NRC staff notes that the system leakage test requirements of the ASME Code, IWC-5220 are focused on demonstrating leak tightness rather than structural integrity. The NRC staff has considered whether the proposed low test pressure would be sufficient to demonstrate the ability of the leak-off line to perform its required function. If a leak-off line has a large through-wall flaw, leakage would be evident under either a high or low pressure test condition. However, a leak from a small, tight crack may not be evident in the 4-hour time when the piping is subjected to the low pressure of the refueling water head. The NRC staff notes that the subject piping is pressurized for approximately 14 days during each refueling outage when the refueling cavity is filled. Any coolant leakage during either the present or a previous refueling outage would result in boric acid accumulation that would be evident during a VT-2 visual examination of the leak-off line. For those areas where the external surface is inaccessible for direct VT-2 visual examination, examination of the surrounding area for evidence of leakage will be performed in accordance with ASME Code, paragraph IWA-5241(b). The NRC staff finds that visual examination after the leak-off line has been subjected to the refueling water head of approximately 16-psig pressure provides evidence of leak tightness and provides evidence that the leak-off line can transport potential O-ring leakage to the thermal detector.

The NRC staff recognizes that an opportunity exists to examine the inner O-ring leak-off line while at reactor operating pressure if there is leakage past the inner O-ring and the isolation valve on the inner O-ring leak-off line is closed. The licensee states that performing a VT-2 visual examination of the reactor vessel flange leak-off line is not justified since the Code Class 2 line is located inside the bio-wall and, in accordance with ALARA principles, entry into the bio-wall at power is not permitted. The NRC staff finds that the licensee's explanation is justified.

The NRC staff finds, based on evaluation of past performance, as well as service conditions, and materials of construction, that service induced degradation of the subject leak-off line is unlikely. The NRC staff also finds that the static pressure head developed in the leak-off line

while the refueling cavity is filled with water will allow for the detection of leakage if significant leakage were to occur. Furthermore, even a small leak, if it were to occur, would result in boric acid accumulation during the extended pressurization time in each refueling outage, and that accumulation would be detected in a subsequent VT-2 visual examination. The NRC staff, therefore, finds that the proposed low test pressure will provide reasonable assurance of the leak tightness of the subject leak-off line and will demonstrate that the leak-off line can perform its intended function. The NRC staff also finds that requiring compliance with the system leakage test pressure requirements would result in a hardship without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

As set forth in the aforementioned evaluation, the NRC staff determines that the licensee's proposed alternative – Relief Request No. 14 – provides reasonable assurance of structural integrity and leak tightness, and that complying with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii) and, therefore, authorizes use of the proposed alternative during the Fourth ISI Intervals at Turkey Point 3 and 4, which began February 22, 2004, and April 15, 2002, respectively, and is scheduled to end on February 21, 2014, and April 14, 2014, respectively.

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

Principal Contributor: Jay Wallace

Date: March 26, 2014

If you have any questions regarding this issue, please contact the project manager, Ms. Audrey Klett, at (301) 415-0489 or by e-mail at Audrey.Klett@nrc.gov.

Sincerely,

/RA/

Jessie F. Quichocho, 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

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