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

June 11, 2014

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

SUBJECT: TURKEY POINT NUCLEAR GENERATING UNIT NOS. 3 AND 4 - STAFF ASSESSMENT OF THE FLOODING WALKDOWN REPORT SUPPORTING IMPLEMENTATION OF NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT (TAC NOS. MF0291 AND MF0292)

Dear Mr. Nazar:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued a request for information letter per Title 10 of the *Code of Federal Regulations*, Section 50.54(f) (the 50.54(f) letter). The 50.54(f) letter was issued to power reactor licensees and holders of construction permits requesting addressees to provide further information to support the NRC staff's evaluation of regulatory actions that may be taken in response to lessons learned from Japan's March 11, 2011, Great Tōhoku Earthquake and subsequent tsunami. The request addressed the methods and procedures for nuclear power plant licensees to conduct flooding hazard walkdowns to identify and address degraded, nonconforming, or unanalyzed conditions through the corrective action program, and to verify the adequacy of the monitoring and maintenance procedures.

By letter dated November 20, 2012, Florida Power & Light Company (the licensee) submitted its Flooding Walkdown Report for Turkey Point Nuclear Generating Unit Nos. 3 and 4, as requested in Enclosure 4 of the 50.54(f) letter. By letter dated December 23, 2013, the NRC staff requested additional information from the licensee. By letter dated January 29, 2014, the licensee provided a response to the NRC staff's request.

The NRC staff reviewed the information provided and, as documented in the enclosed assessment, determined the licensee provided sufficient information to be responsive to Enclosure 4 of the 50.54(f) letter.

If you have any questions, please contact me at (301) 415-0489 or by e-mail at audrey.klett@nrc.gov.

Sincerely,

Audrey L. Klett, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosure:
Staff Assessment of Flooding Walkdown Report

cc w/encl: Distribution via Listserv

STAFF ASSESSMENT OF FLOODING WALKDOWN REPORT

NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO

THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR GENERATING UNIT NOS. 3 AND 4

DOCKET NOS. 50-250 AND 50-251

1.0 INTRODUCTION

On March 12, 2012,[1] the U.S. Nuclear Regulatory Commission (NRC) issued a request for information per Title 10 of the *Code of Federal Regulations* (CFR), Section 50.54(f) (the 50.54(f) letter) to all power reactor licensees and holders of construction permits in active or deferred status. The request was part of the implementation of lessons learned from the accident at the Fukushima Dai-ichi nuclear power plant. Enclosure 4, "Recommendation 2.3: Flooding,"[2] to the 50.54(f) letter requested licensees to conduct flooding walkdowns to identify and address degraded, nonconforming, or unanalyzed conditions using the corrective action program (CAP), verify the adequacy of monitoring and maintenance procedures, and report the results to the NRC.

The 50.54(f) letter requested licensees to include the following in the reports to the NRC:

a. Describe the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress.

b. Describe protection and migration features that are considered in the licensing basis evaluation to protect against external ingress of water into structures, systems and components (SSCs) important to safety.

c. Describe any warning systems to detect the presence of water in rooms important to safety.

d. Discuss the effectiveness of flood protection systems and exterior, incorporated, and temporary flood barriers. Discuss how these systems and barriers were evaluated using the acceptance criteria developed as part of Requested Information item 1.h.

e. Present information related to the implementation of the walkdown process (e.g., details of selection of the walkdown team and procedures) using the documentation template discussed in Requested Information item 1.j, including actions taken in response to the peer review.

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[1] Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340.
[2] ADAMS Accession No. ML12056A050.

f. Present the results of the walkdown, including key findings and identified degraded, nonconforming, or unanalyzed conditions. Include a detailed description of the actions taken or planned to address these conditions using guidance in Regulatory Issue Summary (RIS) 2005-20, Revision 1, Revision to the NRC Inspection Manual Part 9900 Technical Guidance, "Operability Conditions Adverse to Quality or Safety," including entering the condition in the CAP.

g. Document any cliff-edge effects identified and the associated basis. Indicate those that were entered into the CAP. Also include a detailed description of the actions taken or planned to address these effects.

h. Describe any other planned or newly installed flood protection systems or flood mitigation measures, including flood barriers that further enhance the flood protection. Identify results and any subsequent actions taken in response to the peer review.

In accordance with the 50.54(f) letter, Enclosure 4, Required Response Item 2, licensees were required to submit a response within 180 days of the NRC's endorsement of the flooding walkdown guidance. By letter dated May 21, 2012,[3] the Nuclear Energy Institute (NEI) staff submitted NEI 12-07, Revision 0, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features" (referred to as NEI 12-07 in this assessment) to the NRC staff to consider for endorsement. By letter dated May 31, 2012,[4] the NRC staff endorsed the walkdown guidance.

By letter dated November 20, 2012,[5] the Florida Power & Light Company (the licensee) responded to Enclosure 4 of the 50.54(f) letter, Required Response Item 2, for the Turkey Point Nuclear Generating Unit Nos. 3 and 4 (TPNG 3 and 4). On December 23, 2013,[6] the NRC staff issued a request for additional information (RAI) to the licensee regarding the available physical margin (APM). The licensee responded by letter dated January 29, 2014.[7]

The NRC staff evaluated the licensee's submittals to determine if the information provided in the walkdown report met the intent of the walkdown guidance and if the licensee responded appropriately to Enclosure 4 of the 50.54(f) letter.

2.0 REGULATORY EVALUATION

The SSCs important to safety in operating nuclear power plants are designed either in accordance with, or meet the intent of, 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena," and Appendix A, "Seismic and Geological Criteria for Nuclear Plants," to 10 CFR Part 100. Criterion 2 states that SSCs important to safety at nuclear power plants shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without a loss of capability to perform their safety functions. The design bases for these SSCs shall

[3] ADAMS Accession No. ML121440522.
[4] ADAMS Accession No. ML12144A142.
[5] ADAMS Accession Nos. ML12340A410 and ML12340A411.
[6] ADAMS Accession No. ML13325A891.
[7] ADAMS Accession No. ML14057A795.

reflect appropriate consideration of the most severe natural phenomena that have been historically reported for the site and surrounding area. The design bases shall also reflect sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

For initial licensing, each licensee was required to develop and maintain design bases that, as defined by 10 CFR 50.2, identify the specific functions to be performed by an SSC and the specific values or ranges of values chosen for controlling parameters as reference bounds for the design.

As defined in 10 CFR 54.3, the current licensing basis (CLB) is the set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect.

3.0 TECHNICAL EVALUATION

3.1 Design Basis Flooding Hazard for Turkey Point Nuclear Generating Unit Nos. 3 and 4

The licensee stated that the design basis flood hazard for TPNG 3 and 4 is the probable maximum hurricane (PMH) with an elevation of 18.3 feet mean low water (MLW). The licensee's design basis documentation does not specify a wave run-up elevation or the design flood duration.

Based on the NRC staff's review, the licensee appears to have described the design basis flood hazard level requested in the 50.54(f) letter and consistent with the walkdown guidance.

3.2 Flood Protection and Mitigation

3.2.1 Flood Protection and Mitigation Description

The licensee stated that the CLB flood protection for TPNG 3 and 4 is to +20 feet above MLW to the north, south, and west of the facility by exterior walls, flood walls, a flood embankment, and stop logs for the door openings. The licensee has provided external flood protection to +22 feet above MLW to the east of the facility to provide protection for maximum wave run-up. The licensee designed its flood protection and mitigation features to protect various portions of the site, including the intake structure (including pumps), turbine building, radwaste building, auxiliary building, emergency diesel generator buildings, and containment structures. The licensee constructed TPNG 3 and 4 to an elevation of 18.0 feet MLW.

3.2.2 Incorporated and Exterior Barriers

The site has incorporated and exterior barriers that are permanently in-place, requiring no operator manual actions. These barriers include a perimeter wall, a splash wall at the intake structure, and penetration seals.

The intake structure is primarily protected against wave action with a seaward (east side of intake structure) concrete splash wall. The wall is 4 feet high; therefore, waves up to an elevation of 20.0 feet MLW are deflected, minimizing wave action and water levels at the intake structure. In addition, the intake cooling water (ICW) pump motor bases are at an elevation of 22.5 feet MLW. The ICW pumps are the only SSCs related to safety that are located outside of the flood protection barrier perimeter described later in this assessment. The licensee noted a discrepancy between the Updated Final Safety Analysis Report (UFSAR) and its other design basis documents. The UFSAR states that the wall provides protection up to 20.0 feet MLW, while the design basis documents state that the wall provides protection up to 22.0 feet MLW. Because the top of the intake structure east wall is 16.0 feet MLW, an additional 4-foot wall provides protection up to 20 feet MLW; therefore, the UFSAR is correct. The licensee entered this discrepancy into its CAP.

External flood protection is provided at the remainder of the site with a flood perimeter that is constructed with a top elevation of 20.0 feet MLW along the north, south, and west sides of the nuclear island, and a top elevation of 22.0 feet MLW along the east side (seaward) of the nuclear island. The flood perimeter protects all safety-related SSCs, other than the ICW pumps. The flood perimeter consists of a continuous barrier building exterior walls, floodwalls, a flood embankment, and stoplogs at door openings. The walls are concrete masonry that extend between buildings that are not adjacent to one another to create the continuous barrier.

Penetration seals have been constructed at the TPNG 4 emergency diesel generator building conduits. The seals are provided at the last manhole prior to crossing the flood protection barrier.

3.2.3 Temporary Barriers and Other Manual Actions

The licensee stated that the site has temporary barriers, flood mitigation equipment, and other actions that require operator action. TPNG operating procedures include a hurricane season readiness procedure that outlines actions to be taken within 72 hours of a hurricane arrival. The licensee credits these actions as part of the flood protection system. The actions include:

a. Installation of portable dewatering pumps and associated equipment,
b. Installation of the drain plugs in the plant,
c. Installation of stoplogs at exterior door openings, and
d. Construction of sandbag dikes at specific doors, drains, and manhole covers, including filling of sandbags.

The licensee inspected the physical condition of the temporary equipment to determine that the equipment functions could be performed. The licensee inspected storage locations to determine the accessibility of equipment and whether storage was appropriate (i.e., above flood elevation).

3.2.4 Reasonable Simulation and Results

The licensee stated that it performed reasonable simulations for the installation of the portable dewatering pump, sandbag operations, drain plug installation, and stoplog installation. The

licensee analyzed the required staffing and necessary timing to perform these actions and deemed them sufficient.

For the sandbag construction, the licensee used a sampling method to determine the timing to fill and place sandbags at the radwaste building's north door. The licensee then applied the timing estimate to determine that there would be sufficient time and staffing to complete all of the sandbags.

The licensee discussed additional SSCs and procedures that could be used for flood mitigation, such as a structure monitoring program and flood protection features as part of the residual heat removal pump rooms. These flood protection features and procedures are not considered part of the site's CLB and are not being evaluated as part of this assessment.

3.2.5 Conclusion

Based on the NRC staff's review, the licensee appears to have described protection and mitigation features as requested in the 50.54(f) letter and consistent with the walkdown guidance.

3.3 Warning Systems

The licensee stated that it credited water level alarms for internal flooding. The licensee referenced Appendix 5F of the UFSAR for a detailed description. The licensee reported that reliable information on approaching severe weather disturbances is available from the National Weather Service and the National Oceanic and Atmospheric Administration.

The licensee stated that the site does not depend upon water level alarms for flood warning of external floods; therefore, the licensee did not take credit for external flooding.

Based on the NRC staff's review, the licensee appears to have provided information to describe any warning systems as requested in the 50.54(f) letter and consistent with the walkdown guidance.

3.4 Effectiveness of Flood Protection Features

The licensee performed visual inspections to identify material degradation, evaluated flood protection configuration, performed reasonable simulations of manual actions, checked implementation and preventive maintenance procedures, examined site topography and inspected below-grade exterior walls and floors for signs of groundwater ingress. The licensee stated that all features were inspected based on acceptance criteria in accordance with the walkdown guidance in NEI 12-07. The licensee stated that it entered all observations not immediately judged as acceptable by NEI 12-07 criteria into the site's CAP, where it made an evaluation of the observation.

Based on the NRC staff's review, the licensee appears to have discussed the effectiveness of flood protection features as requested in the 50.54(f) letter and consistent with the walkdown guidance.

3.5 Walkdown Methodology

By letter dated June 11, 2012,[8] the licensee responded to the 50.54(f) letter and stated that it intended to use the NRC-endorsed walkdown guidelines contained in NEI 12-07.[9] The licensee indicated in its walkdown submittal dated November 20, 2012, that it implemented the walkdowns consistent with the intent of the guidance provided in NEI 12-07. The licensee did not identify any exceptions to NEI 12-07.

Based on the NRC staff's review, the licensee appears to have presented information related to the implementation of the walkdown process as requested in the 50.54(f) letter and consistent with the walkdown guidance.

3.6 Walkdown Results

3.6.1 Walkdown Scope

The licensee performed walkdowns of flood protection features, including the intake structure vertical splash wall, the perimeter barrier (including building walls, embankments, and flood walls), penetration seals, and temporary flood mitigation and protection equipment. In addition, the licensee performed a reasonable simulation of manual actions, including all of those listed in Section 3.2.3 above. The licensee used acceptance criteria consistent with the intent of NEI 12-07.

3.6.2 Licensee Evaluation of Flood Protection Effectiveness, Key Findings, and Identified Deficiencies

The licensee performed an evaluation of the overall effectiveness of the plant's flood protection features. The licensee stated that the flood protection system would perform its intended function and that it is effective.

NEI 12-07 defines a deficiency as follows: "a deficiency exists when a flood protection feature is unable to perform its intended function when subject to a design basis flooding hazard." The licensee identified potential deficiencies during its flooding walkdowns. In Section 4.f of the walkdown report, the licensee provided a list of the potential deficiencies. The potential deficiencies include degraded and missing penetration seals, incorrect stoplog heights, degraded drain plugs, an incorrect drain location map, and no specific fuel oil quantities noted for fuel oil pumps. In some cases, the licensee noted that the degraded and missing seals are above the design basis flood height and, therefore, are not safety concerns. The licensee noted that several potential deficiencies could be resolved by redundancies. For example, the drain locations are described correctly in a table but not located correctly on the drain location map. The licensee evaluated the deficiencies identified above to ensure that there are no operability or functionality concerns.

NEI 12-07 specifies that licensees identify observations in the CAP that were not yet dispositioned at the time the walkdown report was submitted. The licensee identified

[8] ADAMS Accession No. ML12174A206.
[9] ADAMS Accession No. ML12173A215.

observations awaiting disposition. The licensee committed to bringing all identified issues into full compliance in accordance with the guidance in RIS 2005-20.

3.6.3 Flood Protection and Mitigation Enhancements

The licensee implemented or planned the following enhancements that improve or increase flood protection or mitigation:

a. Installation of stoplogs at door openings of the cask handling facility, and

b. Additional seals at manholes that are not the last manhole prior to the final flood barrier; the licensee stated that this would provide defense-in-depth.

3.6.4 Planned or Newly Installed Features

Based on the results of its flooding walkdowns, the licensee determined that changes were not necessary.

3.6.5 Deficiencies Noted and Actions Taken or Planned to Address

Licensee noted the following deficiencies and actions taken or planned to address the deficiencies:

a. Incorrect stoplog height,
b. Missing or degraded penetration seals,
c. Degraded drain plugs,
d. Degraded flood barrier walls, and
e. No specified fuel oil quantity.

The licensee noted the following corrective actions in response to the above identified deficiencies:

a. To be consistent with the UFSAR, Stoplog SL-2 will be modified to a height of 48".

b. Penetration seals will be sealed as described in the design documents.

c. Drain plugs will be replaced, and a periodic inspection to assess the material condition of the storm drain system plugs will be created.

d. Degraded portions of the flood barrier and underground structures will be repaired.

e. An exact quantity of fuel will be determined to ensure that the dewatering pumps can function for the duration of the PMH. Procedure revision may be required depending on the quantity determined.

The licensee stated that it is tracking all actions in the CAP and that it will disposition the actions.

3.6.6 NRC Staff Analysis of Walkdowns

The NRC staff reviewed the licensee's walkdown report dated November 20, 2012. The NRC staff noted that most of the potential deficiencies require minimal action (e.g. replacing a missing penetration seal). The procedures to perform the reasonable simulations were effective in determining the ability of the licensee to perform those manual actions. The visual inspections did not reveal any significant safety concerns.

Based on the NRC staff's review, the licensee appears to have provided the results of the walkdown and described any other planned or newly installed flood protection systems or flood mitigation measures as requested in the 50.54(f) letter and consistent with the walkdown guidance. Based on the information provided in the licensee's submittals, the NRC staff concludes that the licensee's implementation of the walkdown process meets the intent of the walkdown guidance.

3.6.7 Available Physical Margin

By letter dated December 23, 2013,[10] the NRC staff submitted an RAI to the licensee regarding the APM. The licensee responded by letter dated January 29, 2014.[11] The licensee reviewed its APM determination process and entered any unknown APM into its CAP. The NRC staff reviewed the response and concluded that the licensee met the intent of the APM determination per NEI 12-07.

Based on the NRC staff's review, the licensee appears to have documented the information requested for any cliff-edge effects as requested in the 50.54(f) letter and consistent with the walkdown guidance.

3.7 NRC Oversight

3.7.1 Independent Verification by Resident Inspectors

On June 27, 2012, the NRC issued Temporary Instruction (TI) 2515/187, "Inspection of Near-Term Task Force Recommendation 2.3 Flooding Walkdowns."[12] In accordance with the TI, NRC inspectors independently verified that the licensee implemented the flooding walkdowns consistent with the intent of the walkdown guidance in NEI 12-07. Additionally, the inspectors independently performed walkdowns of a sample of flood protection features. The inspection report dated April 24, 2013,[13] documents the results of this inspection. No findings were identified.

4.0 SYSTEMS, STRUCTURES, AND COMPONENTS NOT WALKED DOWN

The licensee identified restricted access and inaccessible features.

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[10] ADAMS Accession No. ML13325A891.
[11] ADAMS Accession No. ML14057A795.
[12] ADAMS Accession No. ML12129A108.
[13] ADAMS Accession No. ML13115A425.

4.1 Restricted Access

The licensee identified restricted access features. The licensee stated that the below-grade walls of the Units 3 and 4 containment buildings were not entered for inspection. The NRC staff determined that the licensee's external inspections and periodic internal leak rate tests provide reasonable assurance that the buildings are watertight.

4.2 Inaccessible Features

Inaccessible areas are areas of the plant that cannot reasonably be inspected because of significant personnel safety hazards, very high radiation areas, major equipment disassemblies, or no reasonable means of access. The following list describes the inaccessible areas and the licensee's basis for reasonable assurance that the inaccessible access features are available and will perform credited functions:

a. Sump pit in Unit 4: obstructed views; no sign of water intrusion in areas where visual inspections could not be performed.

b. Sump pits in Radwaste Building: filled with water; normally designed for water in their vicinity. The licensee stated that any ingress of groundwater into the pit would overcome the sump capacity, and because there is no indication that this has occurred, the flood protection function of the walls and floor of the pit is acceptable.

c. Condenser pits (Units 3 and 4): filled with water; normally designed for water in their vicinity. The licensee stated that any ingress of groundwater into the pit would overcome the sump capacity, and because there is no indication that this has occurred, the flood protection function of the walls and floor of the pit is acceptable.

d. Fire Zone 005 in Unit 4: filled with water; normally designed for water in its vicinity. The licensee stated that any ingress of groundwater into the pit would overcome the sump capacity, and because there is no indication that this has occurred, the flood protection function of the walls and floor of the pit is acceptable.

5.0 CONCLUSION

The NRC staff concludes that the licensee's implementation of flooding walkdown methodology meets the intent of the walkdown guidance. The NRC staff concludes that the licensee, through the implementation of the walkdown guidance activities and, in accordance with plant processes and procedures, verified the plant configuration with the current flooding licensing basis; addressed degraded, nonconforming, or unanalyzed flooding conditions; and verified the adequacy of monitoring and maintenance programs for protective features. Furthermore, the licensee's walkdown results, which were verified by the staff's audit and inspection, identified no immediate safety concerns. The NRC staff reviewed the information provided and determined the licensee provided sufficient information to be responsive to Enclosure 4 of the 50.54(f) letter.

If you have any questions, please contact me at (301) 415-0489 or by e-mail at audrey.klett@nrc.gov.

Sincerely,

/RA/

Audrey L. Klett, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosure:
Staff Assessment of Flooding Walkdown Report

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ADAMS Accession No: ML14156A286 *** concurrence by e-mail**

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