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

June 27, 2014

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

SUBJECT: ST. LUCIE PLANT, UNITS 1 AND 2 – 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. MF0274 AND MF0275)

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 27, 2012, Florida Power and Light Company (FPL) submitted a Flooding Walkdown Report as requested in Enclosure 4 of the 50.54(f) letter for the St. Lucie Plant Units 1 and 2 site. By letter dated January 27, 2014, FPL provided a response to the NRC request for additional information.

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

If you have any questions, please contact me at (301) 415-1447 or by e-mail at farideh.saba@nrc.gov.

Sincerely,

Farideh E. Saba

Farideh E. Saba, Senior Project Manager
Plant Licensing Branch LPL2-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-335 and 50-389

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 AND LIGHT COMPANY

ST. LUCIE, UNITS 1 AND 2

DOCKET NOS. 50-335 AND 50-389

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* (10 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:

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

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

discussed in Requested Information item 1.j, including actions taken in response to the peer review.

f. Results of the walkdowns 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 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 corrective action program.

g. Document any cliff-edge effects identified and the associated basis. Indicate those that were entered into the corrective action program. 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," 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 27, 2012,[5] Florida Power and Light Company (FPL) provided a response to Enclosure 4 of the 50.54(f) letter Required Response Item 2, for the St. Lucie Plant, Units 1 and 2 (St. Lucie). The NRC staff issued a request for additional information (RAI) to the licensee regarding the available physical margin (APM) dated December 23, 2013.[6] The licensee responded by letter dated January 27, 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 Appendix A to 10 CFR Part 50, General Design Criterion (GDC) 2: "Design Bases for Protection Against Natural Phenomena"; and Appendix A, "Seismic

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[3] ADAMS Package Accession No. ML121440522.
[4] ADAMS Accession No. ML12144A142.
[5] ADAMS Accession No. ML12335A202.
[6] ADAMS Accession No. ML13325A891.
[7] ADAMS Accession No. ML13036A069.

and Geological Criteria for Nuclear Plants," to 10 CFR Part 100. GDC 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 loss of capability to perform their safety functions.

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.

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

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, that are in effect.

3.0 TECHNICAL EVALUATION

3.1 Design Basis Flooding Hazard for the St. Lucie Plant, Units 1 and 2

The licensee reported that the design basis flood hazard for the St. Lucie Units 1 and 2 site is the probable maximum hurricane (PMH) that results in a stillwater level of 17.2 feet mean low water (MLW). Accounting for wind wave and maximum tide elevation, the maximum water level is 18.8 feet MLW. The design basis flood has a duration of 4.5 hours.

The plant grade for Unit 1 is plus 18.0 feet, and it is plus 18.5 feet for Unit 2. The building entrances are at plus 19.5 feet. The design basis includes one location at the Fuel Handling Building where the wave splash and spray could exceed the elevation of 18.0 feet MLW. Wave runup at the discharge canal nose area could reach an elevation of 28.0 feet MLW.

Based on the NRC staff's review, the licensee appears to have described the design basis flood hazard level as requested Information Item 2.a of 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 is designed to an elevation of 22.0 feet MLW. The flood protection and mitigation features were designed to protect against the PMH with wind wave at all site structures. The discharge canal includes a steel sheet-piling barrier with its top elevation of 22.0 feet MLW. The design assumes that a postulated 28.0 feet MLW wave runup occurs at the canal nose barrier (where there are no Category I structures in the vicinity)

causing water to exceed the sheet-pile barrier, with interior drainage allowing water to drain back into the canal.

3.2.2 Incorporated and Exterior Barriers

The licensee stated that it has incorporated exterior barriers at the St. Lucie site that are permanently in-place and require no operator manual actions. These barriers include:

- Reinforced concrete flood walls are provided around structures with the top elevation of 22.0 feet MLW.
- The perimeter plant road crown is designed with a minimum crown (top of road) elevation of 19.0 feet MLW.
- The immediate east face of the plant island includes structures that form a concrete barrier to inhibit wave runup from that direction, thus reducing the effects of the PMH.
- Category 1 buildings are designed with openings at 19.5 feet MLW.
- Site drainage is designed to mitigate interior flooding from rainfall during a PMH, with the exception of the Component Cooling Water Structures, where all safety related components are located above the wave runup elevation.
- Overtopping at the discharge canal nose barrier my occur, however no safety related structures, components or systems are located where this overtopping would cause impacts.
- All manhole penetrations are sealed to prevent site drainage water entering into structures from the manholes.
- Buildings that have basements below elevation 17.5 feet MLW are waterproofed to prevent inleakage.

3.2.3 Temporary Barriers and Other Manual Actions

The licensee stated that it has temporary barriers and other manual actions at the site that require operator action. The actions/barriers include installing stoplogs at the south side of the Unit 2 Reactor Auxiliary Building.

3.2.4 Reasonable Simulation and Results

The licensee performed a reasonable simulation of the installation of the stoplogs as part of a separate procedure validation (Institute of Nuclear Power Operations document no. IRRL1-11-1, dated March 28, 2011, and March 30, 2011). These reasonable simulations determined that staffing levels were adequate, material conditions of the stoplogs were acceptable, and the

procedure could be implemented as written. The stoplogs are to be installed in the event of a hurricane warning according to Unit 2 Technical Specification 3/4.7.6.

3.2.5 Conclusion for Flood Protection and Mitigation

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 the internal room water level warning systems are not credited for external flood protection in the St. Lucie CLB.

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 of all flood protection features, and verified that features were configured in accordance with the as-built drawings and vendor documents. Any observations that were not immediately judged acceptable were entered into the CAP for further evaluation.

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 that it intended to utilize the NRC endorsed walkdown guidelines contained in NEI 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features."[9]

The licensee's walkdown submittal dated November 27, 2012, indicated that the licensee implemented the walkdowns consistent with the intent of the guidance provided in NEI 12-07. The licensee did not identify any exceptions from NEI 12-07.

Based on the NRC staff's review of the flooding walkdown report, 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.

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[8] ADAMS Accession No. ML12172A143.
[9] ADAMS Accession No. ML12173A215.

The NRC staff notes that, subsequent to submission of the flooding walkdwon report, on January 9, 2014, heavy rains evidenced that 6 concuits to the Reactor Auxiliary Building lacked flood seals. The licensee submitted its license event report (LER) for St. Lucie Unit 1 (LER-2014-001) on March 10, 2014. Any inspection findings that may result from this issue will be processed in accordance with the NRC policy.

3.6 Walkdown Results

3.6.1 Walkdown Scope

The licensee performed walkdowns of flood protection features including the concrete flood walls, penetration seals, interior drainage features, nosewall sheet-pile barrier, and stoplog installation.

The licensee stated that it 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. All barriers were evaluated as being effective and the stoplog installation for Unit 2 could be performed in the timeframe required.

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 deficiencies because of the flood walkdowns. Penetration seals at many electrical manholes in Unit 1 and Unit 2 Reactor Auxiliary Building were deemed deficient due to missing or degraded material. All seals that were identified as degraded were repaired or replaced, as necessary, prior to completion of the walkdowns.

NEI 12-07 requires the licensees to identify observations in the CAP that were not yet dispositioned at the time the walkdown report was submitted. FPL did not identify any observations awaiting disposition.

3.6.3 Flood Protection and Mitigation Enhancements

The licensee has initiated a Preventative Maintenance Change Request to develop a penetration seal preventative maintenance program to periodically inspect seals in conduits penetrating waterproofed, safety-related structures. This improvement initiative is being tracked in the licensee's CAP program.

3.6.4 Planned or newly installed features

The licensee determined that changes were not necessary due to the flood walkdowns.

3.6.5 Deficiencies Noted and Actions Taken or Planned to Address

The licensee previously noted that the manhole penetration seals were missing or degraded. This deficiency was considered reportable by the licensee, in accordance with 10 CFR 50.73, and LER-2012-010 was submitted on December 27, 2012.[10] The licensee reported in this LER that all degraded seals were repaired per design requirements.

3.6.6 Staff Analysis of Walkdowns

The NRC staff reviewed the licensee walkdown report dated November 27, 2012. The licensee responded by a letter dated January 27, 2014. In its response, the licensee described the design basis flood hazards and CLB flood protection features. The licensee provided a discussion regarding the effectiveness of the flood protection features including any deficiencies noted. The licensee stated that it made appropriate repairs to all deficiencies prior to the completion of the walkdowns.

Based on the NRC staff's review, the licensee appears to have provided adequate results of the walkdowns 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

NRC staff issued an RAI to the licensee regarding the APM dated December 23, 2013.[11] The licensee responded with a letter dated January 27, 2014.[12] The licensee has reviewed its APM determination process, and entered any unknown APMs into the site CAP. 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. Further, staff reviewed the response and concluded that the licensee met the intent of the APM determination per NEI 12-07.

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." In accordance with the TI,

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[10] ADAMS Accession No. ML13004A096.
[11] ADAMS Accession No. ML13325A891.
[12] ADAMS Accession No. ML14036A069.

NRC inspectors independently verified that the licensee walkdown packages contained the elements prescribed in the NEI walkdown guidance. Additionally, the inspectors independently performed walkdowns of a sample of flood protection features. The inspection report dated April 25, 2013,[13] documents the results of this inspection.

Subsequent to submission of the flooding walkdown report, heavy rain on January 9, 2014, evidenced lack of seals for 6 conduits in the Reactor Auxiliary Building. The licensee submitted LER 2014-001) on March 10, 2014. Any inspection findings that may result from this issue will be processed in accordance with the NRC policy.

4.0 STRUCTURES, SYSTEMS, AND COMPONENTS NOT WALKED DOWN

The licensee did not identify inaccessible or restricted access or inaccessible features.

5.0 CONCLUSION

The NRC staff concludes that the licensee's implementation of flooding walkdown methodology meets the intent of the walkdown guidance. The 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. The NRC staff reviewed the information provided and determined that sufficient information was provided to be responsive to Enclosure 4 of the 50.54(f) letter.

As discussed in Sections 3.5 and 3.7.1, any inspection findings from the subsequent LERs will be processed in accordance with NRC policy.

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[13] ADAMS Accession No. ML13115A594.

If you have any questions, please contact me at (301) 415-1447 or by e-mail at farideh.saba@nrc.gov.

Sincerely,

/RA/

Farideh E. Saba, Senior Project Manager
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Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-335 and 50-389

Enclosure:
Staff Assessment of Flooding Walkdown Report

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