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

June 3, 2014

Charles R. Pierce
Regulatory Affairs Director
Southern Nuclear Operating Company, Inc.
40 Inverness Center Parkway
P.O. Box 1295 / BIN 038
Birmingham, AL 35201-1295

SUBJECT: JOSEPH M. FARLEY NUCLEAR 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. MF0226 AND MF0227)

Dear Mr. Pierce:

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*, Subpart 50.54(f) (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 to 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, Southern Nuclear Operating Company, Inc., submitted a Flooding Walkdown Report as requested in Enclosure 4 of the 50.54(f) letter for the Joseph M. Farley Nuclear Plant, Units 1 and 2. By letter dated January 29, 2014, Southern Nuclear Operating Company, Inc., provided a response to an 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) 415-1009 or by e-mail at Shawn.Williams@nrc.gov.

Sincerely,

Shawn Williams

Shawn Williams, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-348 and 50-364

Enclosure:
Staff Assessment of Flooding Walkdown Report

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STAFF ASSESSMENT OF FLOODING WALKDOWN REPORT

NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO

THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-348 AND 50-364

1 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*, Subpart 50.54(f) (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.

Enclosure 4 of 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 discussed in Requested Information item 1.j, including actions taken in response to the peer review.
f. 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 Issues Summary 2005-20, Revision 1, Revision to the NRC Inspection Manual Part 9900 Technical Guidance,

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1 ADAMS Accession No. ML12053A340.

2 ADAMS Accession No. ML12056A050.

"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 A, "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], Southern Nuclear Operating Company, Inc. (Southern Company, the licensee), provided a response to Enclosure 4 of the 50.54(f) letter Required Response Item 2, for the Joseph M. Farley Nuclear Plant, Units 1 and 2 (FNP). 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 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 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 Criteria (GDC) 2: "Design Bases for Protection Against Natural Phenomena;" and Appendix A to 10 CFR Part 100, "Reactor Site Criteria." 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 that an SSC of a facility must perform, and the specific values or ranges of values chosen for controlling parameters as reference bounds for the design.

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3 ADAMS Package Accession No. ML121440522.

4 ADAMS Accession No. ML12144A142.

5 ADAMS Accession No. ML12333A146.

6 ADAMS Accession No. ML13325A891.

7 ADAMS Accession No. ML14031A209.

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, including the licensee's docketed 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 facility operating license.

3 TECHNICAL EVALUATION

3.1 Design Basis Flooding Hazard For Joseph M. Farley Nuclear Plant, Units 1 & 2

The design basis flood hazard for the site is a Probable Maximum Flood (PMF) in combination with upstream Chattahoochee River dam failures and a 40 mile per hour (mph) wind as the current licensing basis (CLB) flood. The maximum flood elevation from these combined events including wind induced wave run-up is 153.7 ft. mean see level (MSL). The finished plant grade is at elevation 154.5 ft. MSL. Based on the flood hydrograph for the probable maximum precipitation (PMP) storm event as developed in the FNP UFSAR, the resulting peak Chattahoochee River discharge and stage is estimated to occur approximately 17 days after the initiation of the PMP storm event.

The licensee stated that FNP is considered a dry site as per definition provided in NRC Regulatory Guide 1.59. The licensee also described probable maximum precipitation impacts to the site, on-site storage pond failure, and groundwater conditions. However, the PMF on the Chattahoochee River as described above is the CLB flood event. Flooding from ice-dams was considered highly unlikely as there is no historical record of the Chattahoochee River freezing. The design groundwater level for the plant is 140.0 ft MSL.

Based on its review, the NRC staff concludes that the licensee has described the design basis flood hazard level(s) as indicated in Requested Information item 2.a of the 50.54(f) letter, consistent with Appendix D, Walkdown Report, of the walkdown guidance.

3.2 Flood Protection and Mitigation

3.2.1 Flood Protection and Mitigation Description

The licensee stated that there are no safety-related systems or components located below the CLB flood level with the powerblock finished grade and floor elevations at 154.5 and 155.0 ft MSL, respectively. The current licensing basis flood protection features at FNP are passive. The licensee stated that passive features are credited for mitigating floods from surface and subsurface sources and are independent of operating mode and include topography and exterior walls (including penetrations, seals and waterstops). The licensee stated that none of safety-related facilities are susceptible to flooding as the powerblock area is at 154.5 ft. MSL while the PMF is at 153.7 ft. MSL. In addition, the licensee stated that the powerblock area is protected from failure of the ultimate heat sink (UHS) cooling water storage pond, as the water released is diverted away from the power block by the dam and dike, as well as the topography between the pond and the power block.

3.2.2 Incorporated and Exterior Barriers

The site has incorporated and/or exterior barriers that are permanently in-place, requiring no operator manual actions. The licensee stated that the topography at the site is such that no safety-related facilities are exposed to flooding as the final plant grade is above the flood elevation level and wall penetrations below elevation 154.5 ft. MSL are sealed. In addition, any possible flooding from the failure of the UHS cooling water storage pond is mitigated by natural drainage features and the topography between the powerblock and the storage pond.

3.2.3 Temporary Barriers and Other Manual Actions

The licensee stated that FNP does not rely upon active or temporary features for protection.

3.2.4 Reasonable Simulations and Results

The licensee did not discuss reasonable simulations in the flood walkdown report. No operator actions or instrumentation are credited to protect the FNP from external floods for Units 1 and 2.

3.2.5 Conclusion

Based on the NRC staff's review, the staff concludes that the licensee has described protection and mitigation features as indicated in Requested Information item 2.b of the 50.54(f) letter consistent with Appendix D, Walkdown Report, of the walkdown guidance.

3.3 Warning Systems

The licensee stated that there are installed warning systems at the FNP site for internal plant flooding conditions, such as control room annunciation of high water level in drain sumps, but they are outside the scope of the NTTF 2.3 recommendations since they are not intended for external flooding events.

The licensee refers to the FNP FSAR Chapter 9 for several design features that provide sufficient warning time for an operator to identify and isolate a postulated flood prior to affecting safety-related equipment; however, no details on these features or warning times are provided. Preparation in advance of these adverse weather conditions is governed by corporate programs and procedures, including abnormal operating procedure FNP-O-AOP-21.0 "Severe Weather".

Based on the NRC staff's review, the staff concludes that the licensee has provided information to describe any warning systems as indicated in Requested Information item 2.c of the 50.54(f) letter, consistent with Appendix D, Walkdown Report, of the walkdown guidance.

3.4 Effectiveness of Flood Protection Features

The licensee stated that flood protection features are considered acceptable if they are within FNP's current licensing basis (CLB) and have no identified adverse quality conditions. The licensee reaffirmed that none of the safety-related facilities are susceptible to surface flooding as the powerblock is at a higher elevation than the PMF. In addition, the licensee confirmed that no operator actions, temporary barriers or non-CLB structures are credited for protection against flooding in the FNP CLB. Additionally, the licensee stated that corporate programs and procedures govern FNP's preparation against adverse weather conditions.

Regarding incorporated barriers, the licensee stated that all barriers at FNP are passive and include: walls and sealed penetrations, topography and yard drainage systems. The licensee discussed that during the flooding walkdowns, these features were inspected and assessed.

Based on the NRC staff's review, the staff concludes that the licensee has discussed the effectiveness of flood protection features as indicated in Requested Information item 2.d of the 50.54(f) letter consistent with Appendix D, Walkdown Report, of the walkdown guidance.

3.5 Walkdown Methodology

The licensee's walkdown submittal dated November 27, 2012, indicated that the licensee implemented the walkdowns in accordance with the NRC endorsed guidance provided in NEI 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features."[8] 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 its review, the NRC staff concludes that the licensee has presented information related to the implementation of the walkdown process as indicated in Requested Information item 2.e of the 50.54(f) letter, consistent with Appendix D, Walkdown Report, of the walkdown guidance.

3.6 Walkdown Results

3.6.1 Walkdown Scope

The licensee performed walkdowns of 86 flood protection areas for features that include site topography, exterior walls (including penetration seals and waterstops), piping and electrical tunnels, and the UHS storage pond dike. The licensee noted that the site topography has not been altered significantly from the CLB. Condition reports were issued for 32 degraded conditions, including deteriorated door seals and thresholds, minor cracks in concrete walls, piping and electrical seals, and stains on walls.

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, as described previously, stated that flood prevention features at FNP are passive. The walkdowns focused on the adequacy of features such as site topography, walls, penetration seals, doors, and piping and electrical tunnels.

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 one deficiency during the course of the flood walkdowns. The deficiency was related to a partially blocked Service Water Culvert which was dispositioned and resolved through FNP's CAP system.

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8 ADAMS Accession No. ML12173A215.

NEI 12-07 specifies that licensees identify observations/potential deficiencies in the CAP that were not yet dispositioned at the time the walkdown report was submitted. FNP identified a total of 32 degraded conditions during the flooding walkdowns that were entered into the plant's CAP. These conditions include: exterior door seals and thresholds, minor cracks in concrete walls, piping and electrical seals, and stains on walls. The licensee determined that these features were capable of performing their intended flood protection functions and therefore were not reported to the NRC.

3.6.3 Flood Protection and Mitigation Enhancements

The licensee determined that no additional enhancements that improve or increase flood protection or mitigation are necessary.

3.6.4 Planned or newly installed features

The licensee did not determine that changes were necessary by the flooding walkdowns.

3.6.5 Deficiencies Noted and Actions Taken or Planned to Address

The licensee noted one deficiency related to debris blockage at the Service Water Culvert. This deficiency was dispositioned and resolved through FNP's CAP system. The culvert was blocked with soil and debris, thereby decreasing its discharge capacity which could impact the plant during a PMP event.

3.6.6 Staff Analysis of Walkdowns

The NRC staff reviewed the licensee walkdown report dated November 27, 2012. The NRC staff noted that the licensee followed the recommended walkdown guidance without exception. Degraded conditions for flood protection and available physical margin (APM) features were entered into the plant's CAP for dispositioning. The licensee identified one deficiency which was promptly resolved. The licensee stated that all other degraded flood protection features were determined to be capable of performing their intended flood protection function. The licensee did not discuss reasonable simulations and noted that preparation for adverse weather conditions is governed by corporate programs and procedures including procedure FNP-O-AOP-21.0 "Severe Weather".

Based on its review, the NRC staff concludes that the licensee has provided results of the walkdown and described any other planned or newly installed flood protection systems or flood mitigation measures as indicated in Requested Information items 2.f and 2.h of the 50.54(f) letter consistent with Appendix D, Walkdown Report, of 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

The NRC staff submitted a request for additional information (RAI) to the licensee regarding the available physical margin (APM) dated December 23, 2013[9]. The licensee responded with the

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9 ADAMS Accession No. ML13325A891.

letter dated January 29, 2014. The licensee has reviewed their APM determination process, and entered any unknown APMs into their 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 its review, the NRC staff concludes that the licensee has documented the information requested for any cliff-edge effects, as indicated in Requested Information item 2.g of the 50.54(f) letter consistent with Appendix D, Walkdown Report, of the walkdown guidance. Further, the NRC staff reviewed the response, and concludes 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, NRC inspectors independently verified that the licensee implemented the flooding walkdowns consistent with the intent of the walkdown guidance. Additionally, the inspectors independently performed walkdowns of a sample of flood protection features. The integrated inspection report dated May 2, 2013[10], documents the results of this inspection. No findings of significance were identified.

4 SSCS NOT WALKED DOWN

The licensee identified inaccessible features but no restricted access features.

4.1 Restricted Access

The licensee did not identify any restricted access features.

4.2 Inaccessible Features

The licensee stated that eight (8) areas were innaccesible to the walkdown teams. The licensee provided a basis for reasonable assurance that inaccessible access features are available and will perform credited functions. The inaccessible areas include walls in high radiation areas, walls in elevator shafts, and walls in the spent fuel pool. The licensee provided justification for walls in high radiation areas and elevator shafts being able to perform their intended as the condition of similar features in adjacent and accessible areas. Justification for the condition of walls in the spent fuel pool area included lack of penetrations or credible leakage pathways, thick walls, waterproofing membranes, and continual monitoring of the pool. The licensee noted that a work order was written to investigate and repair a possible in-leakage of ground water through the seismic joint between the Auxiliary and Containment building.

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10 ADAMS Accession No. ML13123A182.

5 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 NRC staff's inspection, identified no immediate safety concerns. 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.

If you have any questions, please contact me at (301) 415-1009 or by e-mail at Shawn.Williams@nrc.gov.

Sincerely,

/RA/

Shawn Williams, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-348 and 50-364

Enclosure:
Staff Assessment of Flooding Walkdown Report

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