



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

June 30, 2014

Mr. C. R. Pierce  
Regulatory Affairs Director  
Southern Nuclear Operating Company, Inc.  
Post Office Box 1295, Bin- 038  
Birmingham, AL 35201-1295

SUBJECT: VOGTLE ELECTRIC GENERATING 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. MF0294 AND MF0295)

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*, Section 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 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, as supplemented by letter dated October 31, 2013, Southern Nuclear Operating Company, Inc. submitted a Flooding Walkdown Report as requested in Enclosure 4 of the 50.54(f) letter for the Vogtle Electric Generating Plant, Units 1 and 2 (Vogtle) site. By letter dated January 29, 2014, Southern Nuclear Operating Company, Inc. provided a response to the NRC request for additional information for the NRC staff to complete its assessments.

C. Pierce

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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.

Sincerely,

  
Robert Martin, Senior Project Manager  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-424 and 50-425

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  
SOUTHER NUCLEAR OPERATING COMPANY, INC.  
VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2  
DOCKET NOS. 50-424 AND 50-425

1.0 INTRODUCTION

On March 12, 2012,<sup>1</sup> the U.S. Nuclear Regulatory Commission (NRC) issued a request for information per Title 10 of the *Code of Federal Regulations*, Section 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,"<sup>2</sup> 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 discussed in Requested Information item 1.j, including actions taken in response to the peer review.

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<sup>1</sup> ADAMS Accession No. ML12053A340.

<sup>2</sup> ADAMS Accession No. ML12056A050.

- 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, "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,<sup>3</sup> 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,<sup>4</sup> the NRC staff endorsed the walkdown guidance.

By letter dated November 27, 2012,<sup>5</sup> as supplemented October 31, 2013,<sup>6</sup> Southern Nuclear Operating Company, Inc. (Southern, the licensee) provided a response to Enclosure 4 of the 50.54(f) letter Required Response Item 2, for the Vogtle Electric Generating Plant, Units 1 and 2. The NRC staff issued a request for additional information (RAI) to the licensee regarding the available physical margin (APM) dated December 23, 2013.<sup>7</sup> The licensee responded by letter dated January 29, 2014.<sup>8</sup>

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 Criteria (GDC) 2: "Design Bases for Protection Against Natural Phenomena;" and Appendix A "Seismic 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

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<sup>3</sup> ADAMS Package Accession No. ML121440522.

<sup>4</sup> ADAMS Accession No. ML12144A142.

<sup>5</sup> ADAMS Accession No. ML12333A149.

<sup>6</sup> ADAMS Accession No. ML13305B036.

<sup>7</sup> ADAMS Accession No. ML13325A891.

<sup>8</sup> ADAMS Accession No. ML14030A260.

phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunamis, 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.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Design Basis Flooding Hazard Vogtle Electric Generating Plant, Units 1 and 2

The licensee stated that the Vogtle plant is a dry site per the definition provided in NRC Regulatory Guides 1.59 and 1.102 and is located on high ground with entrance to the power block buildings at six inches above the finished floor elevation of 220 ft. mean sea level (MSL), significantly above a probable maximum flood (PMF) level.

The design basis flood levels for the site are probable maximum precipitation (219.2 ft. MSL), a riverine probable maximum flood level of 165 ft MSL with wave runup, a dam break probable maximum flood of 168 ft. MSL with runup, and a groundwater level of 165 ft. MSL. None of the surface water flood sources are designated by the licensee as limiting for design of the Vogtle station. Groundwater flood elevation was listed by the licensee as a basis for design (i.e., hydrostatic loading). The probable maximum precipitation flood source was used as the basis for estimating the available physical margin.

Based on the NRC staff's review, the licensee appears to have described the design basis flood hazard level(s) as 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

In regards to the current licensing basis, the licensee indicated that the Vogtle site's power block floor elevation is 220 ft. MSL with entrances six inches above the floor. The elevation protects safety-related SSCs from external flooding from probable maximum precipitation (PMP) or probable maximum flood (PMF) during all plant operational modes. To prevent groundwater ingress, basement levels of the containment, auxiliary and fuel handling buildings, which are

located below the high groundwater table, are protected by 24 inch concrete walls and floors in addition to non-safety related waterproofing treatments, and waterstops in penetrations and joints.

The licensee indicated that the site's credited flood protection features are independent of operating mode, thus, changes in operational mode do not affect the ability of the flood protection features to protect safety-related SSCs.

### 3.2.2 Incorporated and Exterior Barriers

The licensee reported that the site has incorporated barriers that are permanently in-place, requiring no operator manual actions. The incorporated barriers are passive in nature and include walls and associated penetrations, topography and the yard drainage system.

### 3.2.3 Temporary Barriers and Other Manual Actions

The licensee reported that the site has no temporary barriers or other manual actions that require operator action.

### 3.2.4 Reasonable Simulation and Results

The licensee did not perform any reasonable simulations as there are no required manual actions.

### 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's report indicates that since the Vogtle plant is a dry site; water detection and warning systems are not relied upon in the CLB for protection against external floods.

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's report indicates that degraded conditions identified during the flood walkdowns were assessed and entered into the CAP. All degraded features were determined to be capable of performing their intended flood protection function when subject to a design basis flooding hazard.

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 November 27, 2012,<sup>9</sup> 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."<sup>10</sup> The licensee's walkdown submittal dated November 27, 2012, as supplemented, 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, 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 eight flood protection areas including site topography, nuclear service cooling water, diesel building, control building, nuclear service cooling water, cable tunnels, auxiliary building and auxiliary feedwater pump house. Walls and associated penetration seals and waterstops, piping and electrical tunnels, topography and the yard drainage system were inspected during the walkdowns.

The licensee used/developed 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 walkdown report indicates that none of the safety-related facilities at Vogtle, Units 1 and 2, are susceptible to flooding by severe external flooding at the site.

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 did not identify any deficiencies during the course of the flood walkdowns.

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. The licensee did not report observations awaiting disposition.

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<sup>9</sup> ADAMS Accession No. ML12333A149.

<sup>10</sup> ADAMS Accession No. ML12173A215.

### 3.6.3 Flood Protection and Mitigation Enhancements

The licensee determined that no additional or enhanced flood protection features were necessary as a result of the flood walkdowns.

### 3.6.4 Planned or newly installed features

The licensee determined that no additional or enhanced flood protection features were necessary as a result of the flood walkdowns.

### 3.6.5 Deficiencies Noted and Actions Taken or Planned to Address

No deficiencies were identified by the licensee.

### 3.6.6 Staff Analysis of Walkdowns

The NRC staff reviewed the licensee walkdown report dated November 27, 2012, as supplemented. The licensee identified eighty areas for inspection containing flood protection features. The walkdown inspection identified 54 degraded conditions with respect to flood protection and APM features. The licensee stated that a total of 27 condition reports were written against flood protection features and 27 were written against APM features with any degraded conditions evaluated and entered into the site CAP. The licensee indicated that during the inspection some areas were restricted or partially restricted and one area was inaccessible. In total, there are eleven delayed walkdowns: five due to high radiation and six as a result of heavy hatches or floor plugs covering the areas to be inspected. The applicant provided a schedule for completing the delayed inspections of these areas in Appendix B of the walkdown report, and described in a followup letter dated October 31, 2013.

The licensee stated that the walkdown team verified that external flood protection and mitigation capabilities were in place, functional and maintained, and gathered information relevant to determining the APM. The licensee stated that degraded conditions identified during the walkdowns were evaluated and entered into the CAP. The licensee stated that all degraded features were determined to be capable of performing their intended flood protection function according to the design basis flooding hazard.

Based on the NRC staff's review, the licensee appears to have provided 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

The NRC staff issued a request for additional information (RAI) to the licensee regarding the available physical margin (APM) dated December 23, 2013.<sup>11</sup> The licensee responded with a

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<sup>11</sup> ADAMS Accession No. ML13325A891.

letter dated January 29, 2014.<sup>12</sup> 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 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, 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 Vogtle Electric Generating Plant, Units 1 and 2, 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 inspection report dated May 02, 2013,<sup>13</sup> documents the results of this inspection. No findings of significance were identified.

### 4.0 SSCS NOT WALKED DOWN

The licensee identified restricted access and inaccessible features.

#### 4.1 Restricted Access

The report indicates that two areas could not be inspected and nine areas contained some features that were not inspected. In total there are eleven delayed walkdowns: five due to high radiation and six as a result of heavy hatches or floor plugs covering the areas to be inspected.

Appendix B of the walkdown report indicates that the walkdown for restricted areas of the Vogtle, Units 1 and 2, was scheduled for December 2013. The licensee's followup letter dated October 31, 2013, provided an update to the inspection of restricted items indicating that all remaining restricted items were walked down, and that portions of these items (as described below), were reclassified as inaccessible due to personnel safety concerns. The October 31, 2013, letter stated that condition reports were issued for two open penetrations; however, these items were not required for the site CLB. The licensee stated that all restricted items inspected were within the plant maintenance and monitoring programs and that no deficiencies were found in the supplemental walkdown.

#### 4.2 Inaccessible Features

The report indicates that the inaccessible areas (originally classified as restricted access)

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<sup>12</sup> ADAMS Accession No. ML14030A260.

<sup>13</sup> ADAMS Accession No. ML13123A119.

consisted of two rooms where spent radioactive resins are stored for processing. As stated in, "Flood protection features – inaccessible," of the licensee's walkdown report, two condition reports were issued to address two unidentified plant areas containing one to two inches of standing water most likely the result of groundwater seepage past water stops not directly visible in seismic gaps. No further description of these issues or basis for reasonable assurance was provided by the licensee.

By later dated October 31, 2013, the licensee re-classified some level B rooms in the Auxiliary Building as inaccessible. As reasonable assurance, the licensee noted that there are no penetrations in the only exterior (south facing) walls of the Auxiliary Building at this location and that the remainder of these walls were inspected September 2012 and showed no signs of structural deficiency.

## 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 NRC staff notes that no immediate safety concerns were identified. 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.

C. Pierce

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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.

Sincerely,

*/RA/*

Robert Martin, Senior Project Manager  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-424 and 50-425

Enclosure:  
Staff Assessment of Flooding  
Walkdown Report

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**ADAMS Accession No.: ML14169A599**

\* concurrence by e-mail

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