



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

June 30, 2014

Mr. Michael J. Pacilio
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO)
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: LASALLE COUNTY STATION, 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. MF0240 AND MF0241)

Dear Mr. Pacilio:

On March 12, 2012,¹ the U.S. Nuclear Regulatory Commission (NRC) issued a letter requesting information pursuant to 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," 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 process, verify the adequacy of monitoring and maintenance procedures, and report the results to the NRC.

By letter dated November 27, 2012, as supplemented by letters dated June 19 and November 21, 2013, and June 4, 2014,² Exelon Generation Company, LLC (Exelon) submitted a flooding walkdown report as requested in Enclosure 4, "Recommendation 2.3: Flooding," of the 50.54(f) letter for LaSalle County Station, Units 1 and 2. In its November 27, 2012, letter, Exelon made three commitments to complete the walkdown of items located in restricted access areas. The completion of these commitments is documented in the supplemental letters. By letter dated January 31, 2014,³ Exelon provided a response to the NRC request for additional information for the NRC staff to complete its assessments.

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.

¹ Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340.

² ADAMS Accession Nos. ML12332A303, ML13171A220, ML13326A939, and ML14155A382, respectively.

³ ADAMS Accession No. ML14031A443

M. Pacilio

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If you have any questions, please contact me at (301) 415-1380 or by e-mail at blake.purnell@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Blake Purnell".

Blake Purnell, Project Manager
Plant Licensing III-2 and
Planning and Analysis Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-373 and 50-374

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
EXELON GENERATION COMPANY, LLC
LASALLE COUNTY STATION, UNITS 1 AND 2
DOCKET NOS. 50-373 AND 50-374

1.0 INTRODUCTION

On March 12, 2012,¹ the U.S. Nuclear Regulatory Commission (NRC) issued a letter requesting information pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), 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," 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 to the 50.54(f) letter requested licensees to submit a final report which includes the following (Requested Information item 2):

- 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 NRC Regulatory Issues Summary 2005-20, Revision 1, "Revision to the NRC Inspection Manual Part 9900 Technical Guidance,

¹ Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340.

- '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, 2012,² the Nuclear Energy Institute (NEI) submitted NEI 12-07, Revision 0, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features" (walkdown guidance), to the NRC staff to consider for endorsement. By letter dated May 31, 2012,³ the NRC staff endorsed the walkdown guidance.

By letter dated November 27, 2012, as supplemented by letters dated June 19 and November 21, 2013, and June 4, 2014,⁴ Exelon Generation Company, LLC (the licensee) submitted a flooding walkdown report as requested in Enclosure 4, "Recommendation 2.3: Flooding," of the 50.54(f) letter for LaSalle County Station (LSCS), Units 1 and 2. NRC staff issued a request for additional information to the licensee regarding the available physical margin (APM) by letter dated December 23, 2013.⁵ The licensee responded by letter dated January 31, 2014.⁶

The NRC staff evaluated the licensee's submittals to determine if the information provided in the flooding 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 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, "Definitions," 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.

² ADAMS Package Accession No. ML121440522

³ ADAMS Accession No. ML12144A142.

⁴ ADAMS Accession Nos. ML12332A303, ML13171A220, ML13326A939, and ML14155A382, respectively.

⁵ ADAMS Accession No. ML13325A891.

⁶ ADAMS Accession No. ML14031A443

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

The licensee stated that the design basis flood hazard for the site is a local intense precipitation event directly on the site. The licensee stated that the 24-hour probable maximum precipitation at the site is 32.1 inches and the maximum flood elevation, as documented in the updated final safety analysis report (UFSAR), is 710.41 feet (ft) mean sea level (MSL). The licensee stated that for three features, a slightly higher probably maximum flood of 710.48 ft MSL was used based on results of Design Calculation S-66 that showed that the northeast portion of the plant area would be affected by this new elevation. The licensee stated that this result has not been incorporated into the UFSAR, but this discrepancy is being tracked in the CAP.

The licensee provided a description of the design basis flood hazard level in response to Enclosure 4 of the 50.54(f) letter. Based on the NRC staff's review, this response appears to be consistent with the walkdown guidance.

3.2 Flood Protection and Mitigation

3.2.1 Flood Protection and Mitigation Description

The licensee stated that the flood protection features in the CLB for LSCS are considered incorporated passive barriers, which do not require operator actions. The licensee noted that flood duration is not considered in the CLB. In addition, the licensee stated that flood mitigation procedures are not relied on for flood protection. Passive features are located in the auxiliary, diesel generator, reactor, turbine, off-gas, lake screen house, and radioactive waste buildings.

3.2.2 Incorporated and Exterior Barriers

The walkdown report states the site has incorporated passive barriers that are permanently in place, requiring no operator manual actions. These features include: site drainage, exterior walls below grade (including penetration seals), roofs, basement floor slabs, and ground floor exterior access doors, openings, and removable wall panel thresholds.

3.2.3 Temporary Barriers and Other Manual Actions

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

3.2.4 Reasonable Simulation and Results

The walkdown report states that the licensee did not conduct reasonable simulations as part of the walkdown since LSCS does not rely on procedures for flood protection.

3.2.5 Conclusion

The licensee provided a description of the protection and mitigation features in response to Enclosure 4 of the 50.54(f) letter. Based on the NRC staff's review, this response appears to be consistent with the walkdown guidance.

3.3 Warning Systems

The licensee stated that LSCS does not have warning systems related to external flood events in response to Enclosure 4 of the 50.54(f) letter. Based on the NRC staff's review, this response appears to be consistent with the walkdown guidance.

3.4 Effectiveness of Flood Protection Features

The licensee stated that the purpose of the flooding walkdowns performed at LSCS was to ascertain if the plant's flood protection features conform to the LSCS CLB and meet the acceptance criteria established in the walkdown guidance. The licensee added that conditions that were not immediately judged to be acceptable during the walkdowns were entered into the CAP for further evaluation. In general, the licensee concluded that the majority of flood protection features inspected met the acceptance criteria and were considered acceptable, including basement floor slabs, exterior walls, penetration seals, roofs, topography, and drainage pathways.

The licensee provided a description of the effectiveness of flood protection features in response to Enclosure 4 of the 50.54(f) letter. Based on the NRC staff's review, this response appears to be consistent with the walkdown guidance.

3.5 Walkdown Methodology

By letter dated June 11 2012,⁷ the licensee stated that it would use the NRC endorsed walkdown guidelines contained in NEI 12-07. The licensee's walkdown report 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 to NEI 12-07.

The licensee provided a description of the implementation of the walkdown process in response to Enclosure 4 of the 50.54(f) letter. Based on the NRC staff's review, this response appears to be consistent with the walkdown guidance.

⁷ ADAMS Accession No. ML12164A569.

3.6 Walkdown Results

3.6.1 Walkdown Scope

The walkdown report, as supplemented, indicates that the walkdown list consisted of 186 flood protection features including exterior walls, penetration seals, roofs, topography and drainage pathways.

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. As discussed previously, the flood protection features at LSCS are incorporated passive barriers. The licensee stated that the great majority of features inspected conformed to the CLB and were determined to be acceptable.

The licensee stated that 186 features were included in the walkdown list. The licensee indicated in its submittals that a total of 138 features were immediately judged to be acceptable during the walkdown activities. Some of these features include concrete walls, floor slabs, penetrations and site drainage.

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 five deficiencies during the course of the flood walkdowns, which were all entered in to the CAP for tracking and resolution. Two deficiencies were related to lack of seal or significant rust in penetrations. Three deficiencies were related to exterior doors threshold elevations being lower than the calculated flood elevation.

Regarding the deficiencies related to exterior door elevations, the licensee noted that these were not part of the original walkdown list as they were only inspected for APM. The licensee stated that these three deficiencies are associated with four exterior doors, since two of the doors had the same issue. The licensee checked the elevation of the doors using the current calculated maximum flood elevation of 710.48 ft MSL for this part of the plant, which is based on Design Calculation S-66. The licensee indicated that the LSCS UFSAR was not updated since the last time Design Calculation S-66 was revised and this issue was also entered into the CAP.

NEI 12-07 specifies that licensees report deficiencies and items in the CAP awaiting disposition when the walkdown report is submitted. The licensee identified a total of 38 features that were initially entered into the CAP and later judged to be acceptable. All of these features were determined to be able to perform their intended safety function in their current state. Recommended actions for these features include grouting of visible openings, cleaning of calcium buildups, removing rust, and painting.

3.6.3 Flood Protection and Mitigation Enhancements

The licensee stated that it initiated a service request for a preventative maintenance plan to periodically inspect and maintain roof drains to assure their functionality during rain events.

3.6.4 Planned or Newly-Installed Features

The walkdown report did not identify any planned or newly-installed flood protection features.

3.6.5 Deficiencies Noted and Actions Taken or Planned to Address

As discussed in Section 3.6.2, the licensee noted five deficiencies which were entered into the CAP for resolution.

3.6.6 Staff Analysis of Walkdowns

The NRC staff reviewed the licensee walkdown report and supplemental information. The staff noted that the licensee followed the recommended walkdown guidance without exception. Deficiencies and other conditions were entered into the plant's CAP for dispositioning and resolution. Reasonable simulations were not included as the LSCS does not depend on flood mitigation procedures.

The NRC staff noted that the number of items in the walkdown list was updated from 185 to 186 in the June 19, 2013, letter as a result of one exclusion and two additions. The exclusion refers to one penetration seal that was not installed in the field, and the two additions refer to previously unidentified penetration seals encountered during the deferred walkdown.

The walkdown report, as supplemented, identified 138 features which were immediately determined to be acceptable, 38 features that were entered into the CAP and later judged to be acceptable, five deficiencies (two for items on the walkdown list and three for items identified during APM analysis), and eight features classified as inaccessible.

The licensee provided a description of the results of the flooding walkdown, including potential improvements, in response to Enclosure 4 of the 50.54(f) letter. Based on the NRC staff's review, this response appears to be consistent with the walkdown guidance.

3.6.7 Available Physical Margin

The APM for each applicable flood protection feature is the difference between the licensing basis flood height and the flood height at which water could affect an SSC important to safety. In its walkdown report and January 31, 2014, letter, the licensee provided a description of the APM, as it relates to cliff-edge effects, in response to Enclosure 4 of the 50.54(f) letter. Based on the NRC staff's review, this response appears to be consistent with the walkdown guidance.

3.8 Independent Verification

On June 27, 2012,⁸ 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 accompanied licensee personnel on a sample of walkdowns to independently verify that the licensee implemented the flooding walkdowns consistent with the walkdown guidance. Additionally, the inspectors independently performed walkdowns of a sample of flood protection

⁸ ADAMS Accession No. ML12129A108

features. The NRC inspection report dated January 28, 2013,⁹ documents the results of this inspection; no findings of significance were identified.

4.0 SSCS NOT WALKED DOWN

4.1 Restricted Access Areas

The licensee identified a total of 34 features located in restricted access areas which were not walked down by the time the walkdown report was submitted. Some of these features included penetration seals and walls located in high radiation areas. Subsequent to the walkdown report submittal, the licensee walked down all these features and documented the results in the supplemental responses. The NRC staff considered this information in its review.

4.2 Inaccessible Features

The licensee stated that eight areas were inaccessible to the walkdown teams. Accordingly, the licensee stated that seven features, including floor slabs and walls, are located in rooms that cannot reasonably be inspected due to high dose rates that do not decrease during outages; and one feature, a sump pit, requires extensive disassembly. The licensee determined that these inaccessible access features are available and will perform credited functions based on analysis of similar features and observations of adjacent areas or features.

Based on the above, the NRC staff determined that the licensee provided adequate justification for not inspecting the features it identified as inaccessible.

4.0 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 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 inspection, identified no immediate safety concerns. The NRC staff reviewed the information submitted and determined that sufficient information was provided to be responsive to Enclosure 4 of the 50.54(f) letter.

⁹ ADAMS Accession No. ML13028A536

M. Pacilio

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If you have any questions, please contact me at (301) 415-1380 or by e-mail at blake.purnell@nrc.gov.

Sincerely,

/RA/

Blake Purnell, Project Manager
Plant Licensing III-2 and
Planning and Analysis Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-373 and 50-374

Enclosure:
Staff Assessment of Flooding Walkdown Report

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