



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

June 18, 2014

Mr. Lawrence J. Weber
Senior Vice President and
Chief Nuclear Officer
Indiana Michigan Power Company
Nuclear Generation Group
One Cook Place
Bridgman, MI 49106

SUBJECT: DONALD C. COOK 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. MF0218 AND MF0219)

Dear Mr. Weber:

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 26, 2012, Indiana Michigan Power Company (I&M) submitted a Flooding Walkdown Report as requested in Enclosure 4 of the 50.54(f) letter for the Donald C. Cook Nuclear Plant, Units 1 and 2 site. By letter dated January 29, 2014, I&M 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.

Mr. L. Weber

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If you have any questions, please contact me at (301) 415-4037 or by e-mail at Thomas.Wengert@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "Thomas J. Wengert". The signature is written in a cursive style with a large, sweeping initial 'T'.

Thomas J. Wengert, Senior Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-315 and 50-316

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
INDIANA MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2
DOCKET NOS. 50-315 AND 50-316

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*, 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.

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

² ADAMS Accession No. ML12056A050

- 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, "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, 2012³, 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, 2012⁴, the NRC staff endorsed the walkdown guidance.

By letter dated November 26, 2012⁵, Indiana Michigan Power Company (I&M, the licensee), provided a response to Enclosure 4 of the 50.54(f) letter Required Response Item 2, for the Donald C. Cook Nuclear Plant, Units 1 and 2 (CNP). The NRC staff issued a request for additional information (RAI) to the licensee regarding the available physical margin (APM) dated December 23, 2013⁶. The licensee responded by letter dated January 29, 2014⁷. 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.

³ ADAMS Package Accession No. ML121440522

⁴ ADAMS Accession No. ML12144A142

⁵ ADAMS Accession No. ML12340A442

⁶ ADAMS Accession No. ML13325A891

⁷ ADAMS Accession No. ML14031A114

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. 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, 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 that are in effect.

3.0 TECHNICAL EVALUATION

3.1 Design Basis Flooding Hazard for CNP

The licensee reported that the design basis flood hazard for the site is weather-driven seiche on Lake Michigan of 11 feet during maximum monthly mean lake high water level of 583.6 feet mean sea level (or National Geodetic Vertical Datum of 1929, NGVD29). This elevation combination equates to a design basis flood elevation of 594.6 feet NGVD29. The licensee stated that concurrent weather conditions such as high winds and wave action are not considered part of the current design basis. The current design basis does not discuss a duration, however, the licensee evaluated an 11-minute duration. The licensee stated that this short duration does not have adverse impacts.

The licensee assumed that the impacts of flooding due to Probable Maximum Precipitation (PMP) have minimal impact on the site due to the rapid infiltration of rainwater into the natural soils which consist of highly permeable dune sands.

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

3.2 Flood Protection and Mitigation

3.2.1 Flood Protection and Mitigation Description

The licensee stated that the current licensing basis flood protection is up to an elevation of 594.6 feet NGVD29, with exceptions at the Screenhouse. The licensee reported that the site grade is 609 feet NGVD29, which is the primary flood protection. The Screenhouse directly connects to Lake Michigan, and therefore, is allowed to flood by the current licensing basis.

3.2.2 Incorporated and Exterior Barriers

The licensee reported that the site has incorporated exterior barriers that are permanently in-place, requiring no operator manual actions. The licensee described the following features:

- a. Stairway access from Screenhouse to Turbine building is built above elevation 594.6 feet NGVD29, therefore floodwaters cannot enter the Turbine Building from the Screenhouse.
- b. A check valve is installed in the Turbine Room Sump overflow line.
- c. Turbine Room Sump access hatch has a cover.
- d. All piping penetrations are sealed between the Screenhouse and Turbine Building.
- e. The concrete grade beam on the west side of the Turbine Building acts as a flood barrier.
- f. The Auxiliary Building, Containment Structures, and Diesel Fuel Oil Storage Tanks are constructed above elevation 594.6 feet NGVD29, and a sealed membrane protects the below grade portions of the structures.

Service Water Pumps and associated motor controls within the Screenhouse are situated above elevation 594.6 feet NGVD29.

3.2.3 Temporary Barriers and Other Manual Actions

The licensee stated 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 since there are no manual actions required.

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 routine weather reports (i.e. rainfall and wind) are utilized to determine when the flood protection procedure is implemented, and that the CLB does not include any external warning systems.

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 stated that all flood features were walked down using acceptance criteria. Any features that did not meet the acceptance criteria were considered potential deficiencies that resulted in an Action Report. The licensee stated that all flood protection features are in conformance with the plant's CLB. The licensee listed several non-CLB features that provide defense-in-depth flood protection.

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 8, 2012,⁸ the licensee responded to the 50.54(f) letter that they 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 26, 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, 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.

⁸ ADAMS Accession No. ML12172A353

⁹ ADAMS Accession No. ML12173A215

3.6 Walkdown Results

3.6.1 Walkdown Scope

The licensee performed walkdowns of flood protection features including penetration seals, Screenhouse access, below grade portions of structures, and most of the items listed in Section 3.2.2 above. The items not walked down are listed in Section 4.2, Inaccessible Features. The licensee stated that flood protection features were evaluated using the configuration control documents. The licensee inspected additional features not in the CLB that could provide flood protection.

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.

NEI 12-07 defines a deficiency as follows: "a deficiency exists when a flood protection feature is unable to performed its intended function when subject to a design basis flooding hazard." The licensee identified potential deficiencies during the course of the flood walkdowns. The licensee addressed all of the potential deficiencies prior to the completion of the walkdowns. The licensee stated that no deficiencies exist.

NEI 12-07 specifies that licensees identify potential deficiencies in the CAP that were not yet dispositioned at the time the walkdown report was submitted. The licensee did not identify any observations awaiting disposition at the time of the submission of the walkdown report.

3.6.3 Flood Protection and Mitigation Enhancements

The licensee stated that no enhancements that improve or increase flood protection or mitigation are planned.

3.6.4 Planned or Newly-Installed Features

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

3.6.5 Deficiencies Noted and Actions Taken or Planned to Address

The licensee stated that observations that could have the potential to be a deficiency were entered into the CAP (Action Reports were generated), evaluated, and dispositioned. The licensee stated that no deficiencies exist. The NRC staff noted that all potential deficiencies were addressed prior to the completion of the walkdown. For example, the licensee stated that

a small diameter hole in the Turbine Building foundation grade beam was improperly plugged, and corrective action was taken to repair the plug.

3.6.6 NRC Staff Analysis of Walkdowns

The NRC staff reviewed the licensee walkdown report dated November 26, 2012. As part of the walkdown effort, the licensee evaluated the capability of flood protection features by direct examination and/or review of preventive maintenance work packages. The licensee stated that the features were confirmed to be capable of performing their intended flood protection or mitigation functions, with the exception of two features classified as inaccessible due to significant equipment disassembly. The licensee did not identify deficiencies or conditions that would impact the safety of the site.

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

By letter dated December 23, 2013¹⁰, 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, 2014¹¹. The licensee has reviewed its APM determination process and has entered any unknown APMs into its CAP. The 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 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 D.C. Cook 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

¹⁰ ADAMS Accession No. ML13325A891

¹¹ ADAMS Accession No. ML14031A114

report dated February 11, 2013¹², documents the results of this inspection. No findings of significance were identified.

4.0 SSCs NOT WALKED DOWN

The licensee identified inaccessible features as described below.

4.1 Restricted Access

The licensee did not identify any restricted access features.

4.2 Inaccessible Features

The licensee identified two features that are classified as inaccessible due to significant equipment disassembly – the Turbine Room Sump hatch and underlying check valve. The licensee provided a basis for reasonable assurance that the inaccessible access features are available and will perform credited functions. The licensee credits recent preventative maintenance (PM) performed in 2012 on the two features, which will continue to be inspected through the PM program.

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 also 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 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.

¹² ADAMS Accession No. ML13042A356

Mr. L. Weber

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If you have any questions, please contact me at (301) 415-4037 or by e-mail at Thomas.Wengert@nrc.gov.

Sincerely,

/RA/

Thomas J. Wengert, Senior Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-315 and 50-316

Enclosure:
Staff Assessment of Flooding Walkdown Report

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