



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

February 5, 2018

Mr. Joel P. Gebbie
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 FLOODING FOCUSED EVALUATION (CAC NOS. MG0032, MG0033, AND
EPID L-2017-JLD-0008)

Dear Mr. Gebbie:

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), "Conditions of Licenses" (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807). Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazards for their sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). By letter dated March 6, 2015 (ADAMS Accession No. ML15069A334), as supplemented by letter dated November 10, 2016 (ADAMS Accession No. ML16330A015), Indiana Michigan Power Company (the licensee) submitted its flood hazard reevaluation report (FHRR) for Donald C. Cook Nuclear Plant, Units 1 and 2 (D.C. Cook).

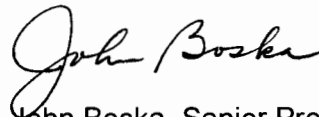
By letters dated December 4, 2015 (ADAMS Accession No. ML15334A413), and July 25, 2017 (ADAMS Accession No. ML17193A378), the NRC issued an interim staff response (ISR) and staff assessment for the FHRR, respectively, describing the reevaluated flood hazards that exceeded the current design basis (CDB) for D.C. Cook and were considered by the NRC staff to be suitable inputs for the mitigating strategies assessment (MSA). As stated in the letters, because the local intense precipitation (LIP) flood-causing mechanism at D.C. Cook was not bounded by the plant's CDB, additional assessments of the LIP event are necessary.

By letter dated May 11, 2017 (ADAMS Accession No. ML17136A348), the licensee submitted the focused evaluation (FE) for D.C. Cook. The FE is intended to confirm that the licensee has adequately demonstrated, for the unbounded LIP event identified in the ISR letter, that: 1) the LIP event is bounded based on further reevaluation of flood mechanism parameters; 2) effective flood protection is provided for the LIP event; or 3) a feasible response is provided for the LIP event. The purpose of this letter is to provide the NRC's assessment of the D.C. Cook FE.

As set forth in the attached staff assessment, the NRC staff has concluded that the D.C. Cook FE was performed consistent with the guidance described in Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178). Guidance document NEI 16-05, Revision 1, has been endorsed by Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation" (ADAMS Accession No. ML16162A301). The NRC staff has further concluded that the licensee has demonstrated that effective flood protection would exist for the LIP flood event during a beyond-design-basis external flooding event when the licensee completes its regulatory commitments to improve the plant's ability to cope with this event. No further information is needed from the licensee related to the reevaluated flooding hazard portion of the 50.54(f) letter and this closes out the NRC staff's efforts associated with CAC Nos. MG0032, MG0033, and EPID L-2017-JLD-0008.

If you have any questions, please contact me at 301-415-2901 or at John.Boska@nrc.gov.

Sincerely,



John Boska, Senior Project Manager
Beyond-Design-Basis Management Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Enclosure:
Staff Assessment Related to the
Flooding Focused Evaluation for D.C. Cook

Docket Nos. 50-315 and 50-316

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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO THE FOCUSED EVALUATION FOR
DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2,
AS A RESULT OF THE REEVALUATED FLOODING HAZARD
NEAR-TERM TASK FORCE RECOMMENDATION 2.1- FLOODING
(EPID L-2017-JLD-0008)

1.0 INTRODUCTION

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807).

Enclosure 2 of the 50.54(f) letter requested that licensees reevaluate flood hazards for their respective sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). If the reevaluated hazard for any flood-causing mechanism is not bounded by the plant's current design basis (CDB) flood hazard, an additional assessment of plant response would be necessary. Specifically, the 50.54(f) letter states that an integrated assessment should be submitted, and described the information that the integrated assessment should contain. By letter dated November 30, 2012 (ADAMS Accession No. ML12311A214), the NRC staff issued Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2012-05, "Guidance for Performing the Integrated Assessment for External Flooding."

On June 30, 2015 (ADAMS Accession No. ML15153A104), the NRC staff issued COMSECY-15-0019, describing the closure plan for the reevaluation of flooding hazards for operating nuclear power plants. The Commission approved the closure plan on July 28, 2015 (ADAMS Accession No. ML15209A682). COMSECY-15-0019 outlines a revised process for addressing cases in which the reevaluated flood hazard is not bounded by the plant's CDB. The revised process describes a graded approach in which licensees with hazards exceeding their CDB flood may not be required to complete an integrated assessment, but instead will perform a focused evaluation (FE). As part of the FE, licensees will assess the impact of the hazard(s) on their site and then evaluate and implement any necessary programmatic, procedural, or plant modifications to address the hazard exceedance.

Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178), has been endorsed by the NRC as an appropriate methodology for licensees to perform the FE in response to the 50.54(f) letter. The NRC's endorsement of NEI 16-05, including exceptions, clarifications, and additions, is described in NRC JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force

Recommendation 2.1, Flood Hazard Reevaluation” (ADAMS Accession No. ML16162A301). Therefore, NEI 16-05, Revision 1, as endorsed, describes acceptable methods for demonstrating that Donald C. Cook Nuclear Plant, Units 1 and 2 (D.C. Cook) has effective flood protection.

2.0 BACKGROUND

This provides the final NRC staff assessment associated with the information that the licensee provided in response to the reevaluated flooding hazard portion of the 50.54(f) letter. Therefore, this background section includes a summary description of the reevaluated flood information provided by the licensee and the associated assessments performed by the NRC staff. The reevaluated flood information includes: 1) the flood hazard reevaluation report (FHRR); 2) the mitigation strategies assessment (MSA); and 3) the focused evaluation (FE).

Flood Hazard Reevaluation Report

By letter dated March 6, 2015 (ADAMS Accession No. ML15069A334), as supplemented by letter dated November 10, 2016 (ADAMS Accession No. ML16330A015), Indiana Michigan Power Company (I&M, the licensee) submitted its FHRR for D.C. Cook. By letters dated December 4, 2015 (ADAMS Accession No. ML15334A413), and July 25, 2017 (ADAMS Accession No. ML17193A378), the NRC issued an interim staff response (ISR) and staff assessment for the FHRR, respectively, describing the reevaluated flood hazards that exceeded the current design basis (CDB) for D.C. Cook and were considered by the NRC staff to be suitable inputs for further assessments. As stated in those letters, because the local intense precipitation (LIP) flood-causing mechanism at D.C. Cook was not bounded by the plant's CDB, further assessments of the LIP event were necessary in order to evaluate the site's response to this flooding mechanism.

Mitigation Strategies Assessment

By letter dated December 15, 2016 (ADAMS Accession No. ML16355A017), the licensee submitted the MSA for D.C. Cook for review by the NRC staff. The MSAs are intended to confirm that licensees have adequately addressed the reevaluated flooding hazards within their mitigation strategies for beyond-design-basis external events. By letter dated June 14, 2017 (ADAMS Accession No. ML17151A967), the NRC issued its assessment of the D.C. Cook MSA. The NRC staff concluded that the D.C. Cook MSA was performed consistent with the guidance described in Appendix G of Nuclear Energy Institute (NEI) 12-06, Revision 2, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide” (ADAMS Accession No. ML16005A625). The NRC's endorsement of NEI 12-06, Revision 2, is described in JLD-ISG-2012-01, Revision 1, “Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events” (ADAMS Accession No. ML15357A163). The NRC staff further concluded that the licensee has identified specific actions that must be completed to ensure successful implementation of its FLEX mitigating strategies during the postulated LIP event. These actions are listed as regulatory commitments in the licensee's MSA submittal.

Focused Evaluation

By letter dated May 11, 2017 (ADAMS Accession No. ML17136A348), the licensee submitted its FE for D.C. Cook. The FE is intended to confirm that the licensee has adequately demonstrated, for the unbounded LIP event identified in the ISR letter, that: 1) the LIP event is

bounded based on further reevaluation of flood mechanism parameters; 2) effective flood protection is provided for the LIP event; or 3) a feasible response is provided for the LIP event. These 3 options associated with performing an FE are referred to as Path 1, 2, or 3, as described in NEI 16-05, Revision 1. The purpose of this staff assessment is to provide the results of the NRC's evaluation of the D.C. Cook FE.

3.0 TECHNICAL EVALUATION

The licensee stated that its FE followed Path 2 of NEI 16-05, Revision 1, and utilized Appendix B for guidance on evaluating the site strategy. Path 2 is designed to evaluate if there is effective flood protection for this event. The D.C. Cook FE addresses the LIP flooding mechanism, which had been found to exceed the plant's CDB as described in the FHRR and ISR letter. The licensee's modeling of the LIP event was previously reviewed and found acceptable by the NRC staff in the staff's assessment of the FHRR. That staff assessment agreed with the licensee's methods of calculating the LIP flood elevations given in Table 1 and Table 2 below. This technical evaluation will address the following topics: characterization of flood parameters; evaluation of flood impact assessments; evaluation of available physical margin, and reliability of flood protection features.

3.1 Characterization of Flood Parameters

Associated effects (AEs) and flood event duration (FED) parameters were assessed by the licensee in its MSA for flooding. These parameters have already been reviewed by the NRC, as summarized by the NRC assessment letter dated June 14, 2017. As stated in that letter, the AEs (hydrodynamic loading, debris loading, sediment loading, sediment deposition and erosion, concurrent conditions, groundwater ingress, and waterborne projectiles) were all judged to be minimal due to low water depths, slow water velocities, and site configuration. The licensee used the LIP flood height and FED parameters as input to the FE and concluded that the site's flood strategy would be effective in protecting structures, systems, and components (SSCs) that support key safety functions, after certain plant upgrades are completed. In its FE, the licensee stated that the site would not require manual actions by plant personnel to protect key SSCs; therefore, an evaluation of the overall site response was not necessary.

All elevations in this document use the National Geodetic Vertical Datum of 1929 (NGVD29), which is approximately the height above mean sea level. The elevations for the reevaluated flood mechanism (LIP) are in the following tables. The site grade level is about 594.6 feet (ft.), but the ground elevation varies due to the slope of the site. In its FHRR, the licensee stated that for most of the protected area the site is at an elevation of 609 ft. The site is located on the shore of Lake Michigan. The typical stillwater level in the lake has been about 579 ft. for the last 2 years. Section 2.6.2.3 of the D.C. Cook Updated Final Safety Analysis Report states that the highest (monthly mean) lake level observed was 583.6 ft. during the summer of 1886. The LIP event does not cause any measurable increase in lake level. For the LIP condition, the licensee relies on permanent passive flooding protection features and doors to demonstrate that adequate protection is available.

Table 1: Reevaluated LIP Flood Elevations at Critical Locations (NGVD29) (See Note 1)

	Location	Reevaluated LIP Flood Height (Stillwater)	Maximum Inundation Level	Approximate Duration (See Note 2)
CL1	1-DR-TUR201 (Turbine Building Unit 1 West Rollup Door)	594.8 ft.	0.0 ft.	N/A
CL2	2-DR-TUR220 (Turbine Building Unit 2 West Rollup Door)	596.0 ft.	0.8 ft.	7.5 hour (hr.)
CL3	2-DR-TUR260 (Turbine Building Unit 2 East Rollup Door)	609.2 ft.	0.2 ft.	2.5 hr.
CL4	Valve-Shed RWST, 1-TK-33	609.9 ft.	1.5 ft.	> 14 hr.
CL5	Valve-Shed PWST/CST 1	609.9 ft.	1.5 ft.	> 14 hr.
CL6	Valve-Shed RWST, 2-TK-33	609.5 ft.	0.6 ft.	11.5 hr.
CL7	Valve-Shed PWST/CST 2	609.6 ft.	1.2 ft.	> 14 hr.
CL8	Supplemental DGs (See Note 3)	609.6 ft.	0.6 ft.	7.5 hr.
CL9	1-DR-TUR253 (Turbine Building Unit 1 East Rollup Door)	609.8 ft.	0.8 ft.	7 hr.
CL10	12-DR-AUX381 (Auxiliary Building North Rollup Door)	609.9 ft.	1.0 ft.	> 14 hr.

Note 1: Data taken from the licensee's FE letter dated May 11, 2017.

Note 2: Time period that water level is above the critical threshold at the stated location.

Note 3: The Supplemental DGs at CL8 are not KEY SSCs. The data for that location is provided for information only.

Table 2: Reevaluated LIP Flood Elevations at Additional Locations (NGVD29) (See Note 1)

	Location	Reevaluated LIP Flood Height	Maximum Inundation Level	Approximate Duration (See Note 2)
ML11	Service Building Extension Northwest	606.4 ft.	0.4 ft.	7 hr.
ML12	Service Building Annex Northeast	609.0 ft.	1.1 ft.	14 hr.
ML13	Service Building Annex Southeast	609.7 ft.	0.9 ft.	7.5 hr.
ML14	Top of Ramp for CL2, 2-DR-TUR220 (Turbine Building Unit 2 West Rollup Door)	595.9 ft.	0.6 ft.	7 hr.
ML15	Bottom of Ramp for CL2, 2-DR-TUR220 (Turbine Building Unit 2 West Rollup Door)	596.0 ft.	4.0 ft.	15.5 hr.
ML16	Low Point in Primary Plant Access Road used for FLEX Deployment	610.8 ft.	3.1 ft.	19 hr.
ML17	Service Building Extension Northeast Corner	608.0 ft.	1.0 ft.	13 hr.
ML18	Auxiliary Building Track Bay East Wall	609.8 ft.	0.6 ft.	7 hr.

Note 1: Data taken from the licensee's FE letter dated May 11, 2017.

Note 2: Time period that water level is above the long-term ponding elevation at the stated location.

3.2 Evaluation of Flood Impact Assessment for LIP

In the D.C. Cook FE, the licensee identified the potential impacts on key SSCs as a result of water ingress due to LIP. The key SSCs potentially impacted by flood waters from the postulated LIP are located in the auxiliary building and the turbine building. The licensee identified auxiliary building and turbine building vulnerabilities based on the potential inundation levels from the postulated LIP event, which could result in flood water entering the buildings. The licensee listed the pathways for water entry in Table 6-1 in its FE submittal and developed plans to limit flood water ingress to acceptable levels. The licensee stated it would install, replace, qualify, or augment passive flood protection features to preclude unacceptable flood water entry via these pathways, and provided a regulatory commitment to do this, as listed in enclosure 3 to its FE submittal. The licensee also identified three concrete block masonry walls, two in the turbine building and one in the adjacent service building that must stop water flow in order to limit water ingress to acceptable levels in the turbine building. The licensee stated it would evaluate these three walls and modify or supplement them as necessary to provide the necessary flood protection. The licensee provided a regulatory commitment to do this as listed in enclosure 3 to its FE submittal.

The NRC staff reviewed the information provided by the licensee in order to ensure that adequate flood parameters were used for the calculation of water ingress and water accumulation. The NRC staff verified that the assumed flood heights and the assumed duration of flooding above threshold elevation was consistent with previous information reviewed by the staff for the D.C. Cook FHRR and MSA.

3.3 Evaluation of Available Physical Margin and Reliability of Flood Protection Features

The licensee will rely on passive features and existing doors and hatches, and the completion of its regulatory commitments, to justify that there is available physical margin (APM). The licensee evaluated the key SSC elevations to determine if the SSCs were affected by water ingress accumulation through exterior doors and hatches, and evaluated the hydrostatic loads on exterior walls.

Leakage into the Auxiliary Building

The licensee stated in its FE submittal that assuming the regulatory commitments were completed, the total flood water potentially entering the auxiliary building for the LIP event would be 4,708 gallons. Water that entered the floor drains would be sent to the dirty waste holdup tank, which has a capacity of 24,700 gallons. Water could also flow through openings and eventually reach the lowest level of the auxiliary building. Although the lowest floor level in the auxiliary building is at 573 ft., there are areas below the floor elevation (e.g., the auxiliary building sump, the chemical and volume control system hold-up tank area, and the hold-up tank area sump). The licensee stated that these areas have a capacity of 192,674 gallons, and would prevent any elevated water levels on the 573 ft. elevation. The licensee stated that the limiting key SSCs in the auxiliary building with respect to flooding are the residual heat removal (RHR) pumps, which are located on the 573 ft. elevation. The licensee also stated that the RHR pumps can be operated even with water up to elevation 576.5 ft.

Leakage into the Turbine Building

In its FE submittal, the licensee examined three scenarios for leakage into the turbine building, assuming that the regulatory commitments discussed above are completed. The scenarios

assumed that certain floor drains become plugged, and water flows through openings to lower levels of the turbine building. The limiting scenario would result in 0.5 inches (in.) of water on the floor at elevation 591 ft. The licensee stated that the limiting key SSCs in the turbine building are the emergency diesel generators (EDGs) and the turbine-driven auxiliary feedwater (TDAFW) pumps. The EDGs have a curb protecting the EDG room corridor that overflows at 591 ft.-7 in. The curb would keep out the water, which is at 591 ft.-0.5 in. The TDAFW pumps are mounted on concrete pedestals which have a height of 591 ft.-4.5 in., and the base of the TDAFW pumps is 8 in. above that. This means the TDAFW pumps will be unaffected by the water at 591 ft.-0.5 in. The licensee stated that the calculated in-leakage from the postulated LIP event would be 10,458 gallons on the Unit 1 side of the turbine building, and 7,847 gallons on the Unit 2 side. The licensee also stated that the lower levels of the turbine building, below the 591 ft. level, have the capacity to hold over 1,297,000 gallons of water.

Auxiliary Building, Turbine Building, and Service Building Walls

The licensee stated that the auxiliary building, turbine building, and service building have exterior concrete foundation walls and curbs that extend above grade. These concrete walls and curbs are credited as flood protection features that prevent unacceptable ingress of flood water from the postulated LIP into these buildings. With the exception of the south and the central segments of the turbine building west concrete wall, the license determined that the APM values for these concrete walls and curbs ranged from 1.2 ft. to over 14 ft., compared to the maximum postulated flood height at that location.

The licensee stated that the APM for the south and the central segments of the turbine building west concrete wall was determined to be 0 ft., although the analysis shows it reaching that level for only 30 minutes. Guidance document NEI 16-05, Appendix B, states that negligible or zero APM can be justified as acceptable if the use of conservative inputs, assumptions, and/or methods in the flood hazard reevaluation can be established. The licensee stated that the zero APM for the south segment of the turbine building west wall is acceptable based on conservatisms such as the assumption that the Jersey barriers between the turbine building and Lake Michigan would not pass water (although they are not water-tight barriers). This causes the computer model to predict that water would pond on the west side of the turbine building rather than flow down to Lake Michigan. The licensee stated that the zero APM for the center segment of the turbine building west wall is acceptable based on conservatisms such as the assumption that drains to the forebay of the intake structure were not working. These drains are 14 very large floor gratings in the screen house, some as large as 25 ft. by 3 ft., at elevation 591 ft. There is no mechanism identified that would cause significant blockage of these drains, and they would prevent the water level from reaching the top of the center segment of the turbine building west wall, which is at elevation 596 ft. The NRC staff finds that the licensee followed the guidance of NEI 16-05, Appendix B, and that this zero APM is acceptable considering these and other conservatisms identified by the licensee in the LIP flood hazard computer model.

The licensee evaluated the capability of the auxiliary building, turbine building, and service building exterior concrete walls and curbs to withstand the hydrostatic forces from the LIP flood water. As discussed earlier, the hydrodynamic forces have been judged to be minimal. The evaluation determined that the walls and curbs could withstand the forces. The NRC staff finds that this is sufficient to demonstrate the reliability of these flood barriers in accordance with NEI 16-05, Appendix B.

The licensee also evaluated potential flood water pathways such as doors and other penetrations in the auxiliary building and turbine building. These pathways are listed in

Table 6-1 in the licensee's FE submittal. The licensee committed to install, replace, qualify, or augment these passive flood protection features in order to prevent an unacceptable amount of flood water from entering these buildings.

Valve House Floor Seals

The licensee has four valve houses outside the main structures, which contain valves used to control flow in pipes that connect exterior tanks to pumps and other components in the auxiliary building. The pipes are in underground pipe tunnels that run from the valve houses to the auxiliary building. In order to prevent water leakage into the auxiliary building, the floor of each valve house is designed to prevent water leakage into the pipe tunnels. The piping that penetrates the floors of the valve houses has penetration sleeves with seals. Core bore holes in the floor of the valve houses are sealed with grout. Each valve house also has a manway for access into the pipe tunnels. The manways have seals to prevent water leakage. The licensee stated that the APM for the floor penetration sleeves with seals ranges from 1.4 ft. to 1.8 ft. based on the maximum postulated flood height at that location. The licensee did not quantify the APMs for the manway seals or the grout in the core bore holes, as they are a robust construction comparable to the strength of the 2 foot thick concrete slabs which form the floor itself.

The licensee stated that the reliability of the floor penetration sleeves with seals is assured by periodic inspections that are procedurally required. The licensee also evaluated the capability of the concrete floor slabs to withstand the hydrostatic force from the LIP flood water, and determined they could withstand that force. The licensee also stated that the manways are procedurally verified to be closed and resealed after each use, and are normally covered by concrete blocks. The NRC staff finds that this is sufficient to demonstrate the APM and reliability of these flood barriers in accordance with NEI 16-05, Appendix B.

Conclusion

The NRC staff concludes, based on the information provided by the licensee, that adequate margin exists for the reevaluated LIP mechanism. The NRC staff concurs with the licensee's statement that conservative methods were used to estimate the water accumulation in plant rooms. No credit was given to active components, such as sump pumps, that could alleviate the water accumulation if power is available. Therefore, the NRC staff concludes that the licensee has demonstrated that adequate passive features will exist to provide flood protection of key SSCs when the licensee's regulatory commitments are completed. The NRC staff also concludes that the flood protection features described above meet the definition of being reliable as discussed in Appendix B of NEI 16-05, Rev 1, due to appropriate inspection and maintenance programs.

Because increased focus has been placed on flood protection since the accident at Fukushima, licensees and NRC inspectors have identified deficiencies with equipment, procedures, and analyses relied on to either prevent or mitigate the effects of external flooding at a number of licensed facilities. Recent examples include those found in Information Notice 2015-01, "Degraded Ability to Mitigate Flooding Events" (ADAMS Accession No. ML14279A268). In addition, the NRC is cooperatively performing research with the Electric Power Research Institute to develop flood protection systems guidance that focuses on flood protection feature descriptions, design criteria, inspections, and available testing methods in accordance with a memorandum of understanding dated September 28, 2016 (ADAMS Accession No. ML16223A495). The NRC staff expects that licensees will continue to maintain flood protection

features in accordance with their current licensing basis. The staff also expects that licensees will use the site corrective action program to disposition flood-related maintenance, operations, and design issues, consistent with the provisions of NEI 16-05 and NEI 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features," as endorsed by the NRC, where appropriate. Continued research involving flood protection systems will be performed and shared with licensees in accordance with the guidance provided in Management Directive 8.7, "Reactor Operating Experience Program," (ADAMS Accession No. ML122750292) as appropriate.

3.4 Overall Site Response

The licensee does not rely on any personnel actions in order to respond to the beyond-design-basis LIP event. As described above, the licensee's evaluation relies on passive flood protection features to demonstrate adequate flood protection; therefore, there is no need to review overall site response.

3.5 Regulatory Commitments

The licensee identified actions that need to be taken in order to ensure a successful response to the LIP event using permanent plant equipment. Those actions are listed as regulatory commitments in the licensee's FE submittal as stated below:

Commitment	Date
The plant flood protection features that I&M has committed to install, replace, augment, or qualify as necessary to satisfactorily mitigate the ingress of flood water via the Auxiliary Building and Turbine Building pathways, identified in Table 6-1 of Enclosure 2 to this letter, will provide: <ul style="list-style-type: none">• Adequate Available Physical Margin in accordance with Appendix B to NEI 16-05, Revision 1.• Adequate reliability in accordance with Appendix B to NEI 16-05, Revision 1.	By the required compliance date of the forthcoming regulation 10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events."
The three concrete block masonry walls (two in the Turbine Building and one in the adjacent Service Building) that are to be credited for mitigation of postulated LIP flood water ingress into the Turbine Building will be evaluated, qualified, modified, or supplemented as necessary to provide adequate flood protection.	By the required compliance date of the forthcoming regulation 10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events."
The three concrete block masonry walls (two in the Turbine Building and one in the adjacent Service Building) that are to be credited for mitigation of postulated LIP flood water ingress into the Turbine Building will provide: <ul style="list-style-type: none">• Adequate Available Physical Margin in accordance with Appendix B to NEI 16-05, Revision 1.• Adequate reliability in accordance with Appendix B to NEI 16-05, Revision 1.	By the required compliance date of the forthcoming regulation 10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events."

4.0 AUDIT REPORT

The generic audit plan dated July 18, 2017 (ADAMS Accession No. ML17192A452), describes the NRC staff's intention to conduct audits related to focused evaluations and issue an audit report that summarizes and documents the NRC's regulatory audit of the licensee's FE. Staff activities have been limited to performing the reviews described above. Because this staff assessment appropriately summarizes the results of those reviews, the NRC staff concludes that an audit report is not necessary, and that this document serves as the final audit report described in the July 18, 2017, letter.

5.0 CONCLUSION

The NRC staff concludes that the licensee performed the D.C. Cook FE in accordance with the guidance described in NEI 16-05, Revision 1, as endorsed by JLD-ISG-2016-01, and that the licensee has demonstrated that effective flood protection from the reevaluated LIP flood hazard will exist when the licensee completes its regulatory commitments to improve the plant's ability to withstand the postulated LIP event. Furthermore, the NRC staff concludes that D.C. Cook screens out of performing an integrated assessment based on the guidance found in JLD-ISG-2016-01. As such, in accordance with Phase 2 of the process outlined in the 50.54(f) letter, additional regulatory actions associated with the reevaluated flood hazard following completion of the licensee's regulatory commitments are not warranted. The licensee has satisfactorily completed providing responses to the 50.54(f) activities associated with the reevaluated flood hazards.

SUBJECT: DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2– STAFF ASSESSMENT
OF FLOODING FOCUSED EVALUATION DATED February 5, 2018

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