



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

June 26, 2014

Mary G. Korsnick
Chief Nuclear Officer
Constellation Energy Nuclear Group, LLC
100 Constellation Way, Suite 500P
Baltimore, MD 21202

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2, AND R. E. GINNA NUCLEAR POWER PLANT- STAFF ASSESSMENT OF FLOODING WALKDOWN REPORTS SUPPORTING IMPLEMENTATION OF NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT (TAC NOS. MF0208, MF0209, AND MF0231)

Dear Ms. Korsnick:

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, Constellation Energy Nuclear Group, LLC, (CENG) submitted Flooding Walkdown Reports as requested in Enclosure 4 of the 50.54(f) letter for the Calvert Cliffs Nuclear Power Plant (Calvert Cliffs), Units 1 and 2, and R.E. Ginna Nuclear Power Plant (Ginna) sites. By letter dated January 31, 2014, CENG provided a response to the NRC's 50.54(f) request for additional information for the NRC staff to complete its assessment of the Flooding Walkdown reports.

Regarding Calvert Cliffs, the licensee provided an acceptable schedule to complete the delayed walkdown items no later than June 25, 2014. The NRC staff reviewed the information provided and, as documented in the staff assessment found in Enclosure 1, determined that sufficient information was provided to be responsive to Enclosure 4 of the 50.54(f) letter.

Regarding Ginna, the licensee provided an acceptable schedule to complete the delayed walkdown items no later than October 2013. The NRC staff reviewed the information provided and, as documented in the staff assessment found in Enclosure 2, determined that sufficient information was provided to be responsive to Enclosure 4 of the 50.54(f) letter.

Ms. Korsnick

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If there are any questions, please contact me at (301) 415-1476 or email at Mohan.Thadani@nrc.gov.

Sincerely,



Mohan C. Thadani, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos.: 50-317, 50-318, and 50-244,

Enclosures:

1. Staff Assessment of Flooding Walkdown Report for Calvert Cliffs Nuclear Power Plant, Units 1 and 2
2. Staff Assessment of Flooding Walkdown Report for R.E. Ginna Nuclear Power Plant

cc w/enclosures:

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UNITED STATES
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STAFF ASSESSMENT OF FLOODING WALKDOWN REPORT
NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO
THE FUKUSHIMA DAI-CHI NUCLEAR POWER PLANT ACCIDENT
CONSTELLATION ENERGY NUCLEAR GROUP, LLC
CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2
DOCKET NOS. 50-317 AND 50-318

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* (10 CFR), Subpart 50.54(f) (50.54(f) letter) to all power reactor licensees and holders of construction permits in active or deferred status. The request was part of the implementation of lessons learned from the accident at the Fukushima Dai-ichi nuclear power plant. Enclosure 4, "Recommendation 2.3: Flooding,"² to the 50.54(f) letter requested licensees to conduct flooding walkdowns to identify and address degraded, nonconforming, or unanalyzed conditions using the corrective action program (CAP), verify the adequacy of monitoring and maintenance procedures, and report the results to the NRC.

Enclosure 4 of the 50.54(f) letter requested licensees to include the following:

- a. Describe the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress.
- b. Describe protection and migration features that are considered in the licensing basis evaluation to protect against external ingress of water into structures, systems, and components (SSCs) important to safety.
- c. Describe any warning systems to detect the presence of water in rooms important to safety.
- d. Discuss the effectiveness of flood protection systems and exterior, incorporated, and temporary flood barriers. Discuss how these systems and barriers were evaluated using the acceptance criteria developed as part of Requested Information item 1.h.

¹ 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. Document the 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 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, the 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 27, 2012⁵, Constellation Energy Nuclear Group, LLC (CENG), provided a response to Enclosure 4 of the 50.54(f) letter Required Response Item 2, for the Calvert Cliffs, Units 1 and 2, Nuclear Power Plant (CCNPP). 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 31, 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. ML12335A029.

⁶ ADAMS Accession No. ML13325A891.

⁷ ADAMS Accession No. ML14038A122.

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 for Nuclear Power Plants," Criterion 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, tsunami, and seiches without loss of capability to perform their safety functions.

For initial licensing, each licensee was required to develop and maintain design bases that, as defined by 10 CFR 50.2, identify the specific functions 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 is the set of NRC requirements applicable to a specific plant, and the 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 Calvert Cliffs Nuclear Power Plant, Units 1 and 2.

The licensee reported that there are two design basis flooding hazards for the Calvert Cliffs, Units 1 and 2 site. The site is located on the western shore of the Chesapeake Bay. Plant structures are situated on three terraces rising from the bay at elevations of 10 feet (ft), 45 ft, and 70 ft above mean sea level (MSL) (all elevations herein refer to the U.S. Geological Survey 1929 datum). The reactor make-up water intake structure occupies the 10-ft terrace elevation; the worst hydrological flooding condition for that structure is hurricane storm surge originating in the Chesapeake Bay; the elevation attributed to this probable maximum hurricane (PMH) is 27.5 ft MSL. The grade elevation for the power block and other safety-related SSCs located in an auxiliary building are at the 45-ft terrace elevation. The licensee reported that the worst hydrological condition at that location is intense local precipitation in the form of probable maximum precipitation (PMP); the elevation associated with the PMP event is estimated to be 44.8 ft MSL (near the 1A Diesel Generator Building).

The licensee noted that the site is not considered to be susceptible to flooding by rivers, streams, or dam failures as none of these features are present on or near the site; thus, the probable maximum flood (PMF) event was also not considered. The site is also not considered to be susceptible to tsunami-induced flooding events.

The original ground-water surface elevation varied from 15 to 20 ft MSL; a passive subsurface drainage currently limits the ground water elevations to 16 ft MSL. Consequently, the licensee considered ground water ingress into structures containing safety-related SSCs not to be a likely flooding scenario.

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

The licensee stated that the current licensing basis (CLB) for flood protection at the Calvert Cliffs site is a PMH event at the Chesapeake Bay screen house location and a PMP event within the main power block yard.

The licensee stated that potential locations of external flooding associated with a PMP event are the Auxiliary Building and the 1A Diesel Generator Building. In the case of the Auxiliary Building, flooding attributed to the PMP would commence in one or more of the approximately 32 electrical conduits that enter this structure at the 37.2 ft elevation (connected to electrical manholes at 45 ft elevation). The licensee documented in Condition Reports previous signs of leakage noted in the Unit 1 Containment Purge Fan Room. No mitigation features intended to mitigate flooding of the electrical conduits were described by the licensee.

The licensee noted that the 1A Diesel Generator Building is reported to be well protected against flooding; it is approximately at the same elevation as the Power Block. The licensee also noted that the finished floor elevation of the 1A Diesel Generator Building is 45.5 ft MSL compared to the PMP flood elevation of 44.8 ft MSL. The licensee stated that the 1A Diesel Generator Building is also protected by a system of swales that would divert PMP-related flood waters away from the 1A Diesel Generator Building and to the bay. The licensee inspected conduits entering from the exterior and did not encounter open or unsealed conduits.

The licensee reported that the only safety-related equipment at the Calvert Cliffs site that could be affected by a flooding event would be the Reactor Intake Structure, which is situated at the 10 ft terrace elevation just above the Chesapeake Bay. The licensee noted that at this elevation, this structure is susceptible to a PMH. The cooling system pump motors contained within this structure are protected against the maximum hurricane tide and storm surges including wave action by the intake structure floor, walls, and roof. Although the PMH is estimated to be 27.5 ft MSL, the structure enclosing the intake pumps has been designed for flood levels of up to 30.6 ft.

3.2.2 Incorporated and Exterior Barriers

The licensee stated that it has incorporated exterior barriers that are permanently in-place, generally requiring no operator manual actions. These barriers are passive features that were incorporated into the original Calvert Cliffs design. For all major structures below finish grades, a heavy waterproofing membrane was installed at the exposed face of the exterior walls and below the base slab. Rubber waterstops have also been installed at all construction joints up to

grade elevation. Subsurface drains are provided to lower the elevation of ground water around the plant. All of these provisions are made to eliminate any possibility of flooding, by ground water infiltration, of equipment located below the elevation.

To prevent damage to the Reactor Cooling Water Intake Structure pumps, the structure enclosing the intake pumps has been designed for both PMH-induced water intrusion as well as excessive hydrodynamic loads.

3.2.3 Temporary Barriers and Other Manual Actions

The licensee did not identify any temporary barriers and other manual actions that require operator action in the event of a flood threat in the walkdown report.

3.2.4 Reasonable Simulation and Results

The purpose of performing reasonable simulations is to verify that the required flood protection procedures or activities can be executed as specified /as written. The licensee noted that flood protection features at the CCNPP site do not include any temporary or active features that would require the implementation of a procedure for the performance of those manual operator actions necessary for the flood protection feature in question to perform its intended flood protection function. Hence, no 'Reasonable Simulation' of manual actions was reported to have been performed.

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 reported that there are no credited external flooding warning systems installed at the CCNPP site.

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 the licensing basis flood events at the Calvert Cliffs site are either (a) a PMP event, in the case of both the Auxiliary Building and the 1A Diesel Generator Building locations, or (b) a PMH event (specifically a combined effects flood), in the case of the Reactor Intake Structure location.

The licensee reported that all flood protection features at the Calvert Cliffs site are intended to protect safety-related equipment are passive design features, such as surface grading, below-grade waterproofing, and a below-grade drainage system.

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 6, 2012,⁸ 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." The licensee's walkdown submittal dated November 27, 2012, indicated that the licensee implemented the walkdowns consistent with the intent of the guidance provided in NEI 12-07. The licensee did not identify any exceptions from NEI 12-07.

Based on 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 currently-credited flood protection features at the Calvert Cliffs site; however, the exact number of as-built features visually-inspected, as well as the types of features inspected, was not reported. The walkdown scope was developed to confirm that flood protection features credited in the CLB were acceptable and capable of performing their credited flood protection functions.

The licensee noted that flood protection features at the Calvert Cliffs site do not include any temporary or active features that would require the implementation of a procedure for the performance of those manual operator actions; hence, no 'Reasonable Simulation' of manual actions was reported to have been performed. 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 Calvert Cliffs flood protection features. By virtue of its walkdown inspections, the licensee verified that permanent safety-related SSCs at the Calvert Cliffs site were acceptable, not degraded, and capable of performing their intended design function as credited in the CLB. No Calvert Cliffs operator actions are credited for external flood protection.

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 stated that all potential issues identified during the walkdown were discussed with a site engineering representative at the time of discovery and Condition Reports were generated

⁸ ADAMS Accession No. ML12160A084.

as necessary. The licensee stated that all Condition Reports related to the flooding walkdown were evaluated, and no deficiencies exist that would prevent the flood protection feature(s) from performing their intended CLB function(s). NEI 12-07 requires licensees to identify observations/potential deficiencies in the CAP that were not yet dispositioned at the time the walkdown report was submitted. The licensee stated that observations that may be potential deficiencies were entered to the CAP (Condition Reports were generated) and have been evaluated in accordance with the station processes.

3.6.3 Flood Protection and Mitigation Enhancements

The licensee did not identify any recently-implemented or planned enhancements to the Calvert Cliffs site that are intended to improve or increase flood protection and/or mitigation in the walkdown report.

3.6.4 Planned or Newly-Installed Features

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

3.6.5 Deficiencies Noted and Actions Taken or Planned to Address

No deficiencies were noted by the licensee that call for actions to be taken or planned to further enhance flooding protection at the Calvert Cliffs site.

3.6.6 Staff analysis of Walkdowns

The NRC staff reviewed the licensee walkdown report dated November 27, 2012. As part of the walkdown effort, the licensee evaluated the capability of flood protection features by conducting a series of visual inspections. Those inspections confirmed that credited design features were in-place, available, and capable of performing their intended flood protection or mitigation functions. The site has no temporary barriers and other manual actions that require operator action in the event of a flood threat; thus, the licensee did not perform a "Reasonable Simulation." No deficiencies were identified. No changes or enhancements to flood protection or mitigation features were identified as a result of the walkdowns. During the walkdowns, no corrective actions were identified.

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 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. The licensee responded with a letter dated January 31, 2014. The licensee has reviewed their APM determination process, and entered any unknown APMs into their 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 Calvert Cliffs 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 February 7, 2013⁹ documents the results of this inspection. No findings of significance were identified.

4.0 SSCS NOT WALKED DOWN

The licensee identified both restricted access and inaccessible features.

4.1 Restricted Access

The licensee identified two areas that were determined to be restricted access as defined by NEI 12-07. CCNPP27-Foot West Piping Penetration Rooms were not inspected as they are in locked high radiation areas. The licensee generated a condition report for each of these items and provided an acceptable schedule for completion, which the staff acknowledges that the licensee will complete no later than June 25, 2014.

4.2 Inaccessible Features

The licensee reported that certain features of the Calvert Cliffs physical plant were not inspected. They included waterproof membranes, waterstops, and waterproof expansion joints. These features were not inspected as they are buried or embedded in concrete. However, the licensee stated there were no indications of in-leakage of water at the locations described. Therefore, the licensee stated that it had reasonable assurance that the features are available and will perform their credited functions.

5.0 CONCLUSION

Based on the above assessment, 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, 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

⁹ ADAMS Accession No. ML13038A323.

protective features. Furthermore, the licensee's walkdown results, which were verified by the staff's inspection, identified no immediate safety concerns. The staff acknowledges that the licensee provided an acceptable schedule, by letter dated November 27, 2012, that the licensee will complete the delayed walkdown items no later than June 25, 2014. 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.



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STAFF ASSESSMENT OF FLOODING WALKDOWN REPORT
NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO
THE FUKUSHIMA DAI-CHI NUCLEAR POWER PLANT ACCIDENT
CONSTELLATION ENERGY NUCLEAR GROUP, LLC
R. E. GINNA NUCLEAR POWER PLANT
DOCKET NO. 50-244

1.0 INTRODUCTION

On March 12, 2012,¹⁰ the U.S. Nuclear Regulatory Commission (NRC) issued a request for information per 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,"¹¹ to the 50.54(f) letter requested licensees to conduct flooding walkdowns to identify and address degraded, nonconforming, or unanalyzed conditions using the corrective action program (CAP), verify the adequacy of monitoring and maintenance procedures, and report the results to the NRC.

Enclosure 4 of the 50.54(f) letter requested licensees to include the following:

- a. Describe the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress.
- b. Describe protection and migration features that are considered in the licensing basis evaluation to protect against external ingress of water into systems, structures, 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.

¹⁰ ADAMS Accession No. ML12053A340

¹¹ 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. Document the 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 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, the 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, 2012¹², 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, 2012¹³, the NRC staff endorsed the walkdown guidance.

By letter dated November 27, 2012¹⁴, Constellation Energy Nuclear Group, LLC (CENG, the licensee), provided a response to Enclosure 4 of the 50.54(f) letter Required Response Item 2, for the R.E. Ginna Nuclear Power Plant (Ginna) site. The NRC staff issued a request for additional information (RAI) to the licensee regarding the available physical margin (APM) dated December 23, 2013¹⁵. The licensee responded by letter dated January 31, 2014¹⁶.

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 for Nuclear Power Plants," Criterion 2, "Design Bases for protection against natural

¹² ADAMS Package Accession No. ML121440522

¹³ ADAMS Accession No. ML12144A142

¹⁴ ADAMS Accession No. ML12335A029

¹⁵ ADAMS Accession No. ML13325A891

¹⁶ ADAMS Accession No. ML14034A122.

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, tsunami, and seiches without loss of capability to perform their safety functions.

For initial licensing, each licensee was required to develop and maintain design bases that, as defined by 10 CFR 50.2, identify the specific functions 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 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 Ginna

The licensee reported that the bounding design basis flood (DBF) hazard for Ginna is based on Constellation Energy Nuclear Group, LLC (CENG) estimated flood of 26,000 cubic feet per second (cfs) on Deer Creek. This discharge flow rate on Deer Creek corresponds to an elevation of 273.8 ft mean sea level (MSL) on the south wall of the Auxiliary Building, 272.0 ft MSL in the main plant area between the Auxiliary Building and Turbine Building, and an elevation of 256.6 ft MSL in the north yard area between the Screen House and the Turbine Building.

The licensee also reported design basis flood hazards for groundwater (265.0 ft relative to MSL), Lake Ontario storm surge (253.28 ft MSL), and Lake Ontario wave runoff (260.94 ft MSL). A brief description of the methodologies used to estimate these elevation values was provided in the flooding walkdown report by the licensee.

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

The current licensing basis (CLB) calls for flood protection to varying elevations depending on location. The licensee reports water surface elevations associated with the DBF for three separate areas: the south wall of the Auxiliary Building (273.8 ft MSL); the main plant area between the Auxiliary Building and Turbine Building (272.0 ft MSL); and the north yard between

the Screen House and the Turbine Building (256.6 ft MSL). The flood-protection and mitigation features were designed using the following assumptions and inputs: (1) amount of time elapsed between flood event and water recession does not adversely affect protection methodology; (2) minimum overtopping will occur on the shoreline wall in the vicinity of the Screen House; and (3) 45 minutes are available from the time Deer Creek reaches the handrails of the access road over Deer Creek to the time manually- installed flood-protection features must be installed.

3.2.2 Incorporated and Exterior Barriers

The licensee reported that it has incorporated and/or exterior barriers that are permanently in place, requiring no operator manual actions. These barriers include shoreline armoring, roof scuppers, flapper valves, and exterior walls.

The licensee stated that a two section revetment structure on the east and west side of the discharge canal protects the site from wave action to an elevation of 261 ft. The Auxiliary Building, Control Building, and Diesel Generator Building have been equipped with scuppers designed to divert rainwater, resulting from design-basis storm event, from roofs to prevent accumulation of water that could cause damage. The scuppers are placed in locations such that the outflow will not cause damage to other plant structures and equipment required for safe shutdown. Flapper valves are gagged to prevent flooding. The Auxiliary Building walls are capable of resisting the hydrostatic load of the design basis flood.

3.2.3 Temporary Barriers and Other Manual Actions

The licensee reported that the site has temporary barriers and other manual actions that require operator action. The actions/barriers include: installing a temporary curb in front of two Auxiliary Building access doors and installing a dam section in front of the Auxiliary Building rollup door.

3.2.4 Reasonable Simulation and Results

The licensee conducted reasonable simulations as part of its flooding walkdown and stated that all operator actions to install flood-mitigation features could be completed in 45 minutes. Plant mode of operation and potential maintenance activities were considered concurrent with flood and associated 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 stated there are no credited room water-surface elevation warning system features used to detect external flooding events.

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 the evaluation considerations for assessing the effectiveness of flood-mitigation features were consistent with NEI 12-07 guidance related to performing verification walkdowns of plant flood-protection features. The licensee explicitly mentioned walkdowns of the Standby Auxiliary Feedwater Building, Auxiliary Building, Turbine Building, Diesel Generator Building, and Control Building. The Standby Auxiliary Feedwater Building is subject to flooding but the walkdown identified all critical components as being at a height within the building to protect them from flooding. The Auxiliary Building is protected from water entering the building by temporary flood barriers and from hydrostatic loads on walls by the strength of the walls. The doors of the Turbine Building, Diesel Generator Building, and Control Building were inspected and determined to be sufficient to protect against flooding. Subgrade penetrations were not mentioned in the flooding walkdown report.

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, 2012¹⁷, 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." The licensee's walkdown submittal dated November 27, 2012,⁵ 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 provided the 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 flood-protection features including certain features of the Standby Auxiliary Feedwater Building, Auxiliary Building, Turbine Building, Diesel Generator Building, and Control Building. In addition, the licensee performed reasonable simulation of manual actions and stated that all operator actions to install flood-mitigation features could be completed in 45 minutes. Different modes of operation and maintenance activities that could affect flood barriers were considered during the walkdowns.

¹⁷ ADAMS Accession No. ML12164A369

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. Condition reports were generated for issues identified during the walkdown and discussed with site engineering representatives. The licensee stated that no deficiencies exist that could adversely impact the design basis function(s) of external flood-protection features as credited in the CLB.

3.6.3 Flood Protection and Mitigation Enhancements

The licensee indicated that Ginna is in the design phase of protecting the Standby Auxiliary Feedwater System from flooding beyond design basis flooding.

3.6.4 Planned or newly installed features

The licensee did determine that changes were necessary by the flood walkdowns. The licensee is planning to add a Condensate Storage Tank for additional condensate inventory and an air-cooled diesel generator.

3.6.5 Deficiencies Noted and Actions Taken or Planned to Address

The licensee stated that no deficiencies were noted.

3.6.6 Staff Analysis of Walkdowns

The NRC staff reviewed the licensee walkdown report dated November 27, 2012⁵. The licensee provided an evaluation of flood-protection procedures in the walkdown report. The staff found that the reasonable simulations conducted for these procedures met the intent of the walkdown guidance. The licensee found that the flood-protection and mitigation features referred to in the CLB were available, functional, and properly maintained. The licensee identified no deficiencies.

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 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 RAI to the licensee regarding the APM dated December 23, 2013. The licensee responded with a letter dated January 31, 2014. The licensee has reviewed their APM determination process, and entered any unknown APMs into their CAP. The NRC staff reviewed the response, and concluded that the licensee met the intent of the APM determination per NEI 12-07.

Based on 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 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 Ginna 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 February 11, 2013¹⁸, documents the results of this inspection. No findings of significance were identified.

4.0 SSCS NOT WALKED DOWN

The licensee identified four restricted access areas and three inaccessible areas in their walkdown report. The NRC staff verified that all restricted flood protection features have been walked down.

4.1 Restricted Access

The licensee stated that restricted access areas included the Diesel Generator 1A Room Vault, Diesel Generator 1B Room Vault, transformer yard, and relay room sump. The diesel generator room vaults and the transformer yard walkdown were delayed because of confined space and energized equipment issues. The relay room sump requires equipment disassembly for inspection. Restricted access features identified by the licensee were scheduled to be walked down by October 2013.

4.2 Inaccessible Features

The licensee identified the following inaccessible features: (1) air-handling room walls; (2) spent-resin tank room walls; and (3) demineralizer vault walls. These structures are either below grade or in areas of high radiation. The licensee provided a basis for reasonable assurance that inaccessible access features are available and will prevent flooding. The

¹⁸ ADAMS Accession No. ML13042A298

licensee evaluated the aggregate effect of potential loss of these systems and determined that there are no flood protection features that have a common mode of failure mechanisms that would impact flooding of the buildings as a result of a design basis flood.

5.0 CONCLUSION

Based on the above assessment, the NRC staff concludes that the licensee's implementation of flooding walkdown methodology meets the intent of the walkdown guidance. The NRC staff concludes that the licensee, through the implementation of the walkdown guidance activities and, in accordance with plant processes and procedures, verified the plant configuration with the current flooding licensing basis; addressed degraded, nonconforming, or unanalyzed flooding conditions; and verified the adequacy of monitoring and maintenance programs for protective features. Furthermore, the licensee's walkdown results, which were verified by the staff's inspection, identified no immediate safety concerns. The licensee provided an acceptable schedule to complete the delayed walkdown items by October 2013. The staff reviewed the information provided and determined that sufficient information was provided to be responsive to Enclosure 4 of the 50.54(f) letter.

If there are any questions, please contact me at (301) 415-1476 or email at Mohan.Thadani@nrc.gov.

Sincerely,
/RA/

Mohan C. Thadani, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos.: 50-317, 50-318, and 50-244,

Enclosures:

1. Staff Assessment of Flooding Walkdown Report for Calvert Cliffs Nuclear Power Plant, Units 1 and 2
2. Staff Assessment of Flooding Walkdown Report for R.E. Ginna Nuclear Power Plant
cc w/enclosures:

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