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

June 29, 2016

Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: CLINTON POWER STATION, UNIT NO. 1 – FLOOD HAZARD MITIGATION STRATEGIES ASSESSMENT (CAC NO. MF7547)

Dear Mr. Hanson:

The purpose of this letter is to provide the U.S. Nuclear Regulatory Commission's (NRC's) assessment of the flood hazard mitigation strategies assessment (MSA), as described in the March 24, 2016, letter (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16084A859), submitted by Exelon Generation Company, LLC (Exelon, the licensee) for Clinton Power Station, Unit No. 1 (Clinton). The MSA confirms that the licensee has adequately addressed the reevaluated flooding hazards within its mitigating strategies for beyond-design-basis external events.

BACKGROUND

By letter dated March 12, 2012 (ADAMS Accession No. ML12053A340), the NRC issued a request for information 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 50.54(f) letter was issued as part of the lessons learned from the accident at the Fukushima Dai-ichi nuclear power plant. Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood-causing mechanisms using present-day methodologies and guidance. Concurrent with the reevaluation of flood hazards, licensees were required to develop and implement mitigating strategies using the most recent external hazard information in accordance with NRC Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A735). That order requires holders of operating reactor licenses and construction permits issued under 10 CFR Part 50 to modify the plants to provide additional capabilities and defense-in-depth for responding to beyond-design-basis external events, and to submit to the NRC for review a final integrated plan that describes how compliance with the requirements of Attachment 2 of the order was achieved. In order to proceed with implementation of Order EA-12-049, licensees used the current licensing basis flood hazard or the most recent flood hazard information, which may not be based on present day-methodologies and guidance, in the development of their mitigating strategies.

The NRC staff and industry recognized the difficulty in developing and implementing mitigating strategies before completing the reevaluation of flood hazards. The NRC staff described this issue and provided recommendations to the Commission on integrating these related activities in COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flood Hazards," dated November 21, 2014 (ADAMS Accession No. ML14309A256). The Commission issued a staff requirements memorandum (SRM) on March 30, 2015 (ADAMS Accession No. ML15089A236), affirming that the Commission expects licensees for operating nuclear power plants to address the reevaluated flood hazards, which are considered beyond-design-basis external events, within their mitigating strategies.

Nuclear Energy Institute (NEI) 12-06, Revision 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" (ADAMS Accession No. ML16005A625), has been endorsed by the NRC as an appropriate methodology for licensees to perform assessments of the mitigating strategies against the reevaluated flood hazards developed in response to the March 12, 2012, 50.54(f) letter. The guidance in NEI 12-06, Revision 2, and Appendix G in particular, supports the proposed Mitigation of Beyond-Design-Basis Events rulemaking. The endorsement, including exceptions, clarifications, and additions, is described in NRC Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) 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). Therefore, Appendix G of NEI 12-06, Revision 2, describes acceptable methods for demonstrating that the reevaluated flooding hazard is addressed within the Clinton mitigating strategies for beyond-design-basis external events.

MITIGATION STRATEGIES ASSESSMENT

The licensee stated that the Clinton MSA was performed consistent with NEI 12-06, Revision 2, and that the mitigating strategies described in the MSA are consistent with the mitigation strategies that the NRC staff evaluated under NRC Order EA-12-049. As documented in a letter dated December 23, 2015 (ADAMS Accession No. ML15324A238), the NRC staff concluded that the licensee had developed guidance and proposed designs which, if implemented appropriately, will adequately address the requirements of Order EA-12-049. As discussed above, in developing these strategies, licensees ensured the strategies could be implemented under the conditions that would exist during a current licensing basis flood hazard, unless more recent flood hazard information was available.

By letter dated November 18, 2015 (ADAMS Accession No. ML15321A034), the staff concluded that the reevaluated flood hazard mechanisms for Clinton are bounded by the current design-basis. Therefore, the NRC staff concluded that it is appropriate to evaluate the mitigating strategies against the current design-basis flood hazard mechanisms. Subsequent to the NRC staff's review of Clinton's reevaluated flood hazards, the licensee revised the model used to develop the local intense precipitation (LIP) flood hazard parameters. The revision resulted in minor differences between the LIP parameters described in the MSA and the reevaluated LIP parameters described in the November 18, 2015, letter to the licensee. Specifically, the revised model resulted in an increase in the maximum flood elevation due to LIP from 736.8 feet to 737.1 feet (approximately a 4 inch increase), which exceeds the plant floor elevation at the northwest and west sides of the main building in the power block area by approximately 1 inch. According to the licensee, this minor increase in maximum LIP elevation does not adversely impact Clinton's safe shutdown equipment or mitigating strategies equipment. The equipment,

deployment, and connection points used for compliance with Order EA-12-049 are described in Clinton's final integrated plan (ADAMS Accession No. ML15349A911), which as discussed above, has been reviewed by the NRC staff. Since this difference is minor and has no impact on implementation of the licensee's mitigating strategy, it is reasonable to conclude that the flood hazards used in the MSA are equivalent to the design-basis of the facility and suitable for use in the MSA.

The NRC staff has reviewed the flood hazard MSA for Clinton. The NRC staff confirmed that the licensee's flood hazard MSA was performed consistent with the guidance in Appendix G of NEI 12-06, Revision 2, as endorsed, by JLD-ISG-2012-01, Revision 1. Based on the licensee's inclusion of an appropriate set of equipment and its use of an appropriate hazard and methodology in its MSA, the staff concludes that the licensee has demonstrated that the mitigation strategies are reasonably protected from reevaluated flood hazards conditions.

If you have any questions, please contact me at (301) 415-6197 or e-mail at Tekia.Govan@nrc.gov.

Sincerely,

Tekia Govan, Project Manager
Hazards Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

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Sincerely,

/RA/

Tekia Govan, Project Manager
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Japan Lessons-Learned Division
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