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

January 11, 2017

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: LASALLE COUNTY STATION, UNITS 1 AND 2 – FLOOD HAZARD MITIGATION STRATEGIES ASSESSMENT (CAC NOS. MF7937 AND MF7938)

Dear Mr. Hanson:

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).

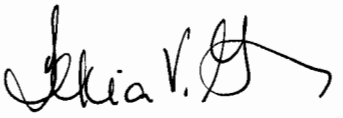
Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazards for their sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). Concurrent with the reevaluation of flood hazards, licensees were required to develop and implement mitigating strategies 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). 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.

By letter dated October 28, 2016 (ADAMS Accession No. ML16302A419), Exelon Generation Company, LLC (the licensee) submitted the mitigation strategies assessment (MSA) for LaSalle County Station, Units 1 and 2 (LaSalle). The MSAs are intended to confirm that licensees have adequately addressed the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events. The purpose of this letter is to provide the NRC's assessment of the LaSalle MSA.

The NRC staff has concluded that the LaSalle MSA was performed consistent with the guidance described in Appendix G of Nuclear Energy Institute 12-06, Revision 2, as endorsed by Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2012-01, Revision 1, and that the licensee has demonstrated that the mitigation strategies are reasonably protected from reevaluated flood hazards conditions for beyond-design-basis external events. This closes out the NRC's efforts associated with CAC Nos. MF7937 and MF7938.

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

Sincerely,



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

Enclosure:
Staff Assessment Related to the
Mitigating Strategies for LaSalle

Docket Nos. 50-373 and 50-374

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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO MITIGATION STRATEGIES FOR

LASALLE COUNTY STATION, UNITS 1 AND 2,

AS A RESULT OF THE REEVALUATED FLOODING HAZARD NEAR-TERM TASK FORCE

RECOMMENDATION 2.1- FLOODING CAC NOS. MF7937 AND MF7938

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), "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). Concurrent with the reevaluation of flood hazards, licensees were required to develop and implement mitigating strategies 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 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 NRC's endorsement of NEI 12-06, 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 LaSalle County Station, Units 1 and 2 (LaSalle) mitigating strategies for beyond-design-basis external events.

2.0 BACKGROUND

By letter dated September 3, 2015 (ADAMS Accession No. ML15211A482), the NRC issued an interim staff response (ISR) letter for LaSalle. The ISR letter provided the reevaluated flood hazard mechanisms that exceeded the current design basis (CDB) for LaSalle and parameters that are a suitable input for the mitigating strategies assessment (MSA). For LaSalle, the mechanisms listed as not bounded by the CDB in the ISR letter are the local intense precipitation (LIP) and probable maximum storm surge (PMSS). By letter dated October 29, 2016 (ADAMS Accession No. ML16302A419), Exelon Generation Company, LLC (Exelon, the licensee) submitted the LaSalle MSA for review by the NRC staff.

3.0 TECHNICAL EVALUATION

3.1 LaSalle's FLEX Strategies

A brief summary of LaSalle's FLEX strategies are listed below:

- The site has redundant FLEX diesel generators that can provide the power required for vital instrumentation and all FLEX equipment. The FLEX diesel fuel supply is provided by on-site fuel oil storage tanks, which are not affected by a flooding event.

- The control room indications of vital instruments are initially powered by the station batteries and eventually by the FLEX diesel generators.

- Core cooling is maintained by ensuring adequate reactor pressure vessel inventory for decay heat removal. Initially, the reactor core isolation cooling system will be used to provide reactor pressure vessel (RPV) makeup. Subsequently, a portable FLEX pump taking suction from the ultimate heat sink will makeup to the RPV.

- The primary strategy for maintaining containment integrity will be through venting the containment using the hardened containment vent system.

While the ISR flood levels for the reevaluated LIP hazard are not completely bounded by the FLEX design-basis LIP event, the licensee concluded that the increased flood water elevations do not result in impacts to the FLEX strategy. In assessing the impact of the ISR flood levels for the LIP event, the licensee conservatively assumed that the extended loss of alternating current power occurred 1 hour after the beginning of the event, which corresponds with the peak water level. Although the LIP flood levels are higher than the FLEX design-basis LIP flood levels, the levels are below the FLEX equipment storage level so the equipment would remain functional in spite of the higher LIP flood elevation. Additionally, FLEX equipment does not need to be externally deployed until well after the 1 hour duration of the LIP event, thus the LIP flood waters should recede and not impede deployment of the FLEX equipment or use of offsite resources. Additionally, external connections do not need to be made until LIP flood waters have receded. Lastly, because the licensee's FLEX strategy does not involve the installation of temporary flood protection measures during a LIP event, they did not need to make any procedural changes. Based on the above assessment, the licensees stated that the ISR flood levels for LIP do not adversely impact the licensee's FLEX strategies.

The ISR flood levels for a PMSS event also exceeded the FLEX design-basis water levels. However, the licensee stated that the FLEX strategies are not adversely impacted by the new PMSS levels. Although the maximum flood elevation at the lake screen house (east side of the plant), 710.6 ft mean sea level (MSL), is above the plant elevation of 710 ft MSL, which includes wind-wave runup, the licensee stated that the ground elevation around the lake and intake structure is approximately 713.8 ft MSL, which gives the licensee 3.2 ft of margin. On the west side of the plant, the maximum water elevation is 707.3 ft MSL, which is below plant grade of 710 ft MSL giving the licensee 2.8 ft of margin. Also, both FLEX buildings are located well above the PMSS water level, with FLEX Building 22 located at 720 ft MSL and FLEX Building 23 located at 712 ft MSL. The licensee stated that the PMSS water level will not affect deployment of FLEX equipment because of the lowest FLEX building, Building 23, is still located 1.4 ft above the maximum flood height. Additionally, the licensee has an alternate connection point located at the FLEX Building 23 elevation that will be available during a flooding if normal access to the ultimate heat sink is not available. Lastly, because the licensee's FLEX strategy does not involve the installation of temporary flood protection measures for a PMSS event, they did not need to make any procedural changes. Because of the above assessment, the licensee stated that the ISR flood levels for PMSS do not adversely impact the licensee's FLEX strategies.

3.2. Evaluation of Associated Effects

Flood-related associated effects for LaSalle were assessed during the NRC staff's review of the LaSalle flood hazard reevaluation report (FHRR) (ADAMS Accession No. ML16350A219). In its staff assessment, the NRC staff reviewed the input and output of the model and determined that the associated effects parameters for LIP and PMSS were reasonable. The NRC staff agrees with the licensee's determination that associated effects have no impact on FLEX strategies.

3.3 Evaluation of Flood Event Duration

Flood event duration (FED) parameters (including warning time and period of inundation) were assessed during the NRC staff's review of the LaSalle FHRR (ADAMS Accession No. ML16350A219). In its staff assessment, the NRC staff agreed with the licensee's conclusion

that the inundation recession time for LIP is less than 1-hr and thus minimal and that the FED parameters are not applicable to the reevaluated storm surge flood-causing mechanism (i.e., PMSS). The NRC staff determined that FED has no impact on FLEX strategies.

4.0 CONCLUSION

The NRC staff has reviewed the information provided in the LaSalle MSA related to the original FLEX strategies, as evaluated against the reevaluated hazard(s) described in Section 2 of this staff assessment, and found that:

- The FLEX strategies are not affected by the impacts of the ISR flood levels (including impacts due to the environmental conditions created by the ISR flood levels).

- The deployment of the FLEX strategies is not affected by the impacts of the ISR flood levels.

- Associated effects and FED are reasonable and acceptable for use in the MSA, and have been appropriately considered in the MSA.

Therefore, the NRC staff concludes that the licensee has followed the guidance in NEI 12-06, Revision 2, and demonstrated the capability to deploy the original FLEX strategies, as designed, against a postulated beyond-design-basis event for the LIP and PMSS flood-causing mechanisms, including associated effects and flood event duration.

LASALLE COUNTY STATION, UNITS 1 AND 2 – FLOOD HAZARD MITIGATION STRATEGIES ASSESSMENT DATED January 11, 2017

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