



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

October 21, 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: BYRON STATION, UNITS 1 AND 2– FLOOD HAZARD MITIGATION
STRATEGIES ASSESSMENT (CAC NOS. MF3893 AND MF3894)**

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 September 30, 2016, letter (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16274A132), submitted by Exelon Generation Company, LLC (Exelon, the licensee) for Byron Station, Units 1 and 2 (Byron). 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 implementing 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 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 Byron mitigating strategies for beyond-design-basis external events.

MITIGATION STRATEGIES ASSESSMENT

The licensee stated that the Byron 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 submitted to the NRC staff to review to ensure compliance with NRC Order EA-12-049. As discussed above, in developing these strategies, licensees stated that 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 September 3, 2015 (ADAMS Accession No. ML15243A462), the NRC staff concluded that the reevaluated flood hazard mechanisms for Byron 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. Subsequently, 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 September 3, 2015, letter to the licensee. Specifically, the revised model resulted in an increase in the maximum flood elevation due to LIP from 870.9 feet to 870.94 feet (a 0.04 feet increase), which exceeds the plant floor elevation at the east and southwest sides of the turbine building. According to the licensee, this minor increase in maximum LIP elevation is: 1) bounded by an internal flood; and 2) does not adversely impact mitigating strategies equipment. The equipment, deployment, and connection points used for compliance with Order EA-12-049 are described in Byron's final integrated plan (ADAMS Accession No. ML16197A390). Since this difference is minor and has no impact on implementation of the licensee's mitigating strategy, it is reasonable to conclude

B. Hanson

- 3 -

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 Byron. 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,

A handwritten signature in black ink, appearing to read 'Tekia S', with a long horizontal flourish extending to the right.

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

Docket Nos.: 50-454 and 50-455

cc: Distribution via Listserv

B. Hanson

- 3 -

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 Byron. 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,

/RA/

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

Docket Nos.: 50-454 and 50-455

cc: Distribution via Listserv

DISTRIBUTION:

PUBLIC	JLD R/F	RidsNRRJLD Resource
RidsNrrDorlPl3-2 Resource	RidsNrrDorl Resource	RidsNrrPMBByron Resource
RidsRgn3MailCenter Resource	RidsNrrLaSLent Resource	RidsOgcMailCenter Resource
RidsOpaMail Resource	RidsAcraAcnw_MailCtr Resource	RidsNroDsea Resource
TGovan, NRR	LQuinn-Willingham, NRO	JHughey, NRR
GBowman, NRR	CCook, NRO	ARivera-Varona, NRO
MWillingham, NRO	ACampbell, NRO	SBreithaupt, NRO

ADAMS Accession No.: ML16291A202

***via email**

OFFICE	NRR/JLD/JHMB/PM	NRR/JLD/LA	NRR/JLD/JHMB/BC	NRR/JLD/JHMB/PM
NAME	TGovan	SLent	GBowman	TGovan
DATE	10/20/16	10/18/16	10/20/16	10/21/16

OFFICIAL RECORD COPY