



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

March 29, 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: BRAIDWOOD STATION, UNITS 1 AND 2 – STAFF REVIEW OF MITIGATION STRATEGIES ASSESSMENT REPORT OF THE IMPACT OF THE REEVALUATED SEISMIC HAZARD DEVELOPED IN RESPONSE TO THE MARCH 12, 2012, 50.54(f) LETTER

Dear Mr. Hanson:

The purpose of this letter is to provide the U.S. Nuclear Regulatory Commission's (NRC) assessment of the seismic hazard mitigation strategies assessment (MSA), as described in the November 2, 2016, letter (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16307A294), submitted by Exelon Generation Company, LLC (Exelon, the licensee) for Braidwood Station, Units 1 and 2 (Braidwood). The NRC staff evaluated the Braidwood strategies as developed and implemented under Order EA-12-049, and as described in the Braidwood Final Integrated Plan (FIP) (ADAMS Accession No. ML16348A053). The staff's review of Braidwood's mitigation strategies will be documented in a forthcoming safety evaluation. The purpose of the safety evaluation is to ensure the licensee has developed guidance and proposed designs which, if implemented appropriately, will adequately address the requirements of Order EA-12-049. An inspection will confirm compliance with the order. The following NRC staff review confirms that the licensee has adequately addressed the reevaluated seismic hazard within Braidwood's mitigation 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 1 to the 50.54(f) letter requested licensees reevaluate the seismic hazard using present-day methodologies and guidance. Concurrent with the reevaluation of seismic hazards, the NRC issued Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A736). The order requires holders of operating power reactor licenses and construction permits issued under 10 CFR Part 50 to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling following a beyond-design-basis external event.

By letter dated March 31, 2014 (ADAMS Accession No. ML14091A005), the licensee, provided its reevaluated seismic hazard for Braidwood in response to the 50.54(f) letter.

On December 10, 2015 (ADAMS Accession No. ML16005A621), the Nuclear Energy Institute (NEI) submitted Revision 2 to NEI 12-06, including guidance for conducting MSAs using the reevaluated hazard information. The NRC subsequently endorsed NEI 12-06, Revision 2, with exceptions, clarifications, and additions, in 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).

MITIGATION STRATEGIES ASSESSMENT

By letter dated January 22, 2016 (ADAMS Accession No. ML16014A188), the NRC staff documented its review of the licensee's reevaluated seismic hazard, also referred to as the mitigation strategies seismic hazard information. The staff found that the Braidwood Ground Motion Response Spectrum (GMRS) is bounded by the safe shutdown earthquake (SSE) in the 1 to 11 Hertz (Hz) range, and exceeds the SSE above approximately 11 Hz, meriting a high frequency (HF) confirmation. In addition, the staff concluded that the GMRS determined by the licensee adequately characterizes the reevaluated seismic hazard for the Braidwood site.

By letter dated November 3, 2016 (ADAMS Accession No. ML16308A295), Exelon submitted a HF Confirmation Report for Braidwood. By letter dated January 30, 2017 (ADAMS Accession No. ML17023A179), the NRC staff concluded, based on its review, that the licensee correctly implemented the HF guidance in conducting the HF confirmation for Braidwood. All evaluated components demonstrated adequate seismic capacity and no component modifications were required.

By letter dated November 2, 2016 (ADAMS Accession No. ML16307A294), Exelon submitted a MSA Report for Braidwood. The licensee stated that the Braidwood MSA was performed consistent with NEI 12-06, Revision 2. Appendix H of NEI 12-06, Revision 2, describes acceptable methods for demonstrating that the reevaluated seismic hazard is addressed within the Braidwood mitigation strategies for beyond-design-basis external events. The NRC staff confirmed that the licensee's seismic hazard MSA is consistent with the guidance in Appendix H.4.2 of NEI 12-06, Revision 2, as endorsed by JLD-ISG-2012-01, Revision 1. Therefore, the methodology used by the licensee is appropriate to perform an assessment of the mitigation strategies that addresses the reevaluated seismic hazard.

The staff reviewed the licensee's description of the component selection process for the MSA. The staff found the licensee provided sufficient detail in describing the selection process and provided a clear list of references used to support the selection process. The staff also confirmed that the selected components support at least a single shutdown path that is consistent with the Braidwood FIP (ADAMS Accession No. ML15163A097) submitted in response to Order EA-12-049.

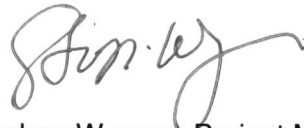
The licensee provided the seismic equipment list for the MSA in Table A-1. The licensee identified 16 components for which a HF confirmation evaluation was required. The licensee stated that the components were reviewed as part of the Braidwood HF confirmation. The staff confirmed that all 16 components were part of the Braidwood HF confirmation report. The staff review of these 16 components is documented in NRC letter dated January 30, 2017 (ADAMS Accession No. ML17023A179). The staff previously found that all 16 components had seismic

capacity greater than demand as part of the HF confirmation evaluation submitted in response to the 50.54(f) letter.

The NRC staff completed its review of the seismic hazard MSA for Braidwood. The NRC staff concludes that sufficient information has been provided to demonstrate that the licensee's plans for the development and implementation of guidance and strategies under Order EA-12-049 appropriately address the reevaluated seismic hazard information stemming from the 50.54(f) letter.

If you have any questions, please contact me at (301) 415-3041 or via e-mail at Stephen.Wyman@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen Wyman". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

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

Docket Nos. 50-456 and 50-457

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BRAIDWOOD STATION, UNITS 1 AND 2 – STAFF REVIEW OF MITIGATION STRATEGIES
ASSESSMENT REPORT OF THE IMPACT OF THE REEVALUATED SEISMIC HAZARD
DEVELOPED IN RESPONSE TO THE MARCH 12, 2012, 50.54(f) LETTER
DATED MARCH 29, 2017

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