



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

June 15, 2016

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

**SUBJECT: QUAD CITIES NUCLEAR POWER 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 May 26, 2016, letter (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16147A567), submitted by Exelon Generation Company, LLC (Exelon, the licensee) for Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities). The mitigation strategies assessment confirms that the licensee has adequately addressed the reevaluated seismic hazard within its 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, "Order Modifying 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. ML14090A526), the licensee provided its reevaluated seismic hazard for Quad Cities 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 MSAs regarding 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 February 10, 2016 (ADAMS Accession No. ML15309A493), 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 confirmed the licensee's conclusion that its reevaluated seismic hazard is bounded by the combination of design spectra defining the safe shutdown earthquake (SSE) over the 1 to 10 Hertz (Hz) frequency range, but exceeds the SSE over the frequency range of approximately 15 to 35 Hz, meriting a high frequency confirmation. In addition, the staff concluded that the Ground Motion Response Spectrum (GMRS) determined by the licensee adequately characterizes the reevaluated seismic hazard for the Quad Cities site.

By letter dated February 19, 2016 (ADAMS Accession No. ML16050A413), Exelon submitted a High Frequency Confirmation Report for Quad Cities. By letter dated March 14, 2016 (ADAMS Accession No. ML16060A043), the NRC staff confirmed the Quad Cities GMRS exceedance above the current design-basis is on the order of 10 percent or less of the area under the SSE curve over the frequency range of exceedance and met the criterion described in Section 3.1.2 "Limited High Frequency Exceedance Screening" in Electric Power Research Institute (EPRI) Report 3002004396. The EPRI report concluded, and the staff agreed, that these types of minor exceedances over limited frequency ranges do not represent a significant high frequency concern. Therefore, the methodology used by the licensee is appropriate to disposition the GMRS exceedance above the current design basis.

The licensee stated that the Quad Cities 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 Quad Cities 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 NRC staff has reviewed the seismic hazard MSA for Quad Cities. 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.

B. Hanson

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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 be 'S. Wyman', with a long horizontal flourish extending to the right.

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

Docket Nos. 50-254 and 50-265

cc: Distribution via Listserv

B. Hanson

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

Sincerely,

/RA/

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

Docket Nos. 50-254 and 50-265

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ADAMS Accession No. ML16154A093

*** via e-mail**

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