



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

July 19, 2018

Mr. Keith J. Polson
Senior Vice President and
Chief Nuclear Officer
DTE Electric Company
Fermi 2 - 210 NOC
6400 North Dixie Highway
Newport, MI 48166

**SUBJECT: FERMI, UNIT 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 (CAC NO. MF7828; EPID L-2016-JLD-0006)**

Dear Mr. Polson:

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 August 31, 2017, letter (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17243A087), submitted by DTE Electric Company (DTE, the licensee) for Fermi, Unit 2 (Fermi). The NRC staff evaluated the mitigation strategies developed under Order EA-12-049 and described in DTE's Final Integrated Plan (FIP) for Fermi (ADAMS Accession No. ML16022A118). The staff's review of Fermi's mitigation strategies was documented in a safety evaluation dated September 29, 2016 (ADAMS Accession No. ML16258A040). The purpose of the safety evaluation is to ensure that the licensee has developed guidance and proposed designs which, if implemented appropriately, should adequately address the requirements of Order EA-12-049. An inspection to confirm compliance with the order was conducted during the week of January 27, 2017. The results of the inspection are documented in Inspection Report 05000341/2017008, dated February 23, 2017 (ADAMS Accession No. ML17058A086). The following NRC staff review confirms that the licensee has adequately addressed the reevaluated seismic hazard within Fermi'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 that 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 capabilities following a beyond-design-basis external event. In order to proceed with the implementation of Order EA-12-049, licensees used the current design basis seismic hazard or the most recent seismic hazard information, which may not have been based on present-day methodologies and guidance, in developing their mitigation strategies.

On December 10, 2015 (ADAMS Accession No. ML16005A621), the Nuclear Energy Institute (NEI) submitted Revision 2 to NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementaion Guidance," 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).

On December 12, 2016 (ADAMS Accession No. ML16354B416), NEI submitted Revision 4 to NEI 12-06, including guidance for conducting MSAs using the reevaluated hazard information. In a letter to the NEI dated February 8, 2017 (ADAMS Accession No. ML17034A286), the NRC staff stated that JLD-ISG-2012-01, Revision 2 (ADAMS Accession No. ML17005A182) had been issued and had been made publicly available. This ISG revision endorsed NEI 12-06, Revision 4, with exceptions, clarifications and additions. However, the NRC letter to the NEI also cautioned that JLD-ISG-2012-01, Revision 2, was not intended to be referenced by licensees in submittals to the NRC, and that the NRC staff would not make use of this ISG revision until all applicable Congressional Review Act (CRA) requirements had been met. The CRA requirements were met and JLD-ISG-2012-01, Revision 2, was officially issued on April 25, 2018, in the *Federal Register* (83 FR 18089).

MITIGATION STRATEGIES ASSESSMENT

By letter dated October 5, 2015 (ADAMS Accession No. ML15077A028), the NRC staff documented its review of the licensee's reevaluated seismic hazard, also referred to as the mitigation strategies seismic hazard information (MSSHI). The NRC staff confirmed that the licensee's ground motion response spectra (GMRS) exceeds the safe shutdown earthquake (SSE) for Fermi from 3 Hertz (Hz) to 100 Hz. As such, a seismic risk evaluation, high frequency confirmation (HF) and spent fuel pool (SFP) evaluation were merited. The NRC staff concluded that the GMRS determined by the licensee adequately characterizes the reevaluated hazard for the Fermi site and is suitable for use in subsequent evaluations and confirmations, as needed, for the response to the 50.54(f) letter. Fermi later screened out of the seismic risk evaluation based on additional information as documented in NRC letter dated October 27, 2015 (ADAMS Accession No. ML15194A015).

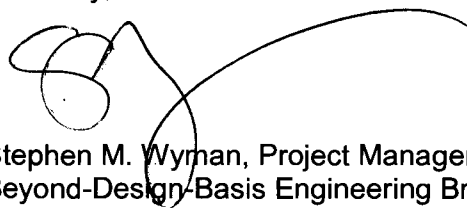
By letter dated August 31, 2017 (ADAMS Accession No. ML17243A087), DTE submitted the seismic MSA report for Fermi. The licensee stated that the Fermi MSA was performed consistent with Appendix H of NEI 12-06, Revision 4 (ADAMS Accession No. ML16354B421). Appendix H of NEI 12-06, Revision 4, describes acceptable methods for demonstrating that the reevaluated seismic hazard is addressed within the Fermi 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.4.4 of NEI 12-06, Revision 4, as endorsed, by JLD-ISG-2012-01, Revision 2. 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 performed a checklist review of the seismic hazard MSA for Fermi. The checklist is provided as an enclosure to this letter. The NRC staff found that Fermi met the intent of the guidance. The staff did not identify any deficiencies. All evaluated components demonstrated adequate seismic capacity and no component modifications were required.

The NRC staff completed its review of the seismic hazard MSA for Fermi and concluded 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, consisting of several loops and a long horizontal stroke extending to the right.

Stephen M. Wyman, Project Manager
Beyond-Design-Basis Engineering Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket No. 50-341

Enclosure:
Technical Review Checklist

cc w/encl: Distribution via Listserv

TECHNICAL REVIEW CHECKLIST
BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO PATH FOUR MITIGATION STRATEGY ASSESSMENT
FERMI, UNIT 2
DOCKET NO. 50-341

The NRC staff performed the following checklist review based on the Enclosure of the August 31, 2017, letter (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17243A087) for Fermi, Unit 2 (Fermi). Deviations, deficiencies, and conclusions are noted at the end of each section and an overall conclusion is provided at the end of the checklist.

I. Background and Assessment to Mitigation Strategies Seismic Hazard Information (MSSHI)

<p>This section establishes basic background and assessment to MSSHI criteria in Nuclear Energy Institute (NEI) 12-06, Appendix H.</p>	
<p>Licensee approach to mitigation strategies assessment (MSA):</p>	
<p>Was the MSA conducted in accordance with NEI 12-06, Revision 4 as endorsed by the staff?</p>	<p>Yes / No</p>
<p>Was the MSA conducted using an alternate method?</p>	<p>Yes / No</p>
<p>Status of Order EA-12-049 Flexible Mitigation Strategy (FLEX) at the time of this review:</p>	
<p>Has the licensee submitted a Final Integrated Plan?</p>	<p>Yes / No</p>
<p>Has the NRC staff completed a safety evaluation for the mitigation strategy?</p>	<p>Yes / No</p>
<p>Has the NRC staff confirmed compliance with Order EA-12-049 by successfully completing the temporary instruction (TI)-191 inspection?</p>	<p>Yes / No</p>
<p>Status of MSSHI</p>	
<p>Did the licensee use the Ground Motion Response Spectra (GMRS) and Uniform Hazard Response Spectra (UHRs) as submitted in response to the 50.54(f) request for information and reviewed by the NRC staff?</p>	<p>Yes / No</p>

<p>Has the plant equipment relied on for FLEX strategies previously been evaluated as seismically robust to the plant safe shutdown earthquake (SSE) levels?</p> <p>Is the maximum ratio of GMRS/SSE in the range of 1-10 Hertz (Hz) less than 2?</p> <p>Did the licensee meet the seismic evaluation criteria described in NEI 12-06, Section H.5?</p>	<p>Yes / No / NA</p> <p>Yes / No</p> <p>Yes / No</p>
<p>Notes from staff reviewer: The GMRS/SSE ratio is approximately 1.55. This meets the criteria of NEI 12-06, Appendix H.5. The licensee developed a foundation input response spectra (FIRS) that was used for the MSA. The NRC reviewed the FIRS as part of the Expedited Seismic Evaluation Process (ESEP) staff assessment (ADAMS Assessment No. ML15310A197) and found that it adequately characterizes the reevaluated seismic hazard for the Fermi 2 site. The NRC staff also found that the FIRS exceeds the GMRS and is therefore conservative and acceptable for use in this MSA for Fermi.</p> <p>Deviation(s) or deficiency(ies) and Resolution: None.</p> <p>Consequence(s): None</p>	
<p>The NRC staff concludes:</p> <ul style="list-style-type: none"> The licensee meets the background and assessment to MSSHI criteria in NEI 12-06, Appendix H. 	<p>Yes / No</p>

II. Expedited Seismic Evaluation Process (ESEP) Equipment

<p>Equipment used in support of the FLEX strategies has been evaluated to demonstrate seismic adequacy following the guidance in Section 5 of NEI 12-06. As stated in Appendix H of NEI 12-06, previous seismic evaluations should be credited to the extent that they apply for the assessment of the MSSHI, including the ESEP evaluations performed in accordance with Electric Power Research Institute (EPRI) Report 3002000704. "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic." (ADAMS Accession No. ML13102A142).</p> <p>Licensees may reference a previous ESEP submittal, submit a new or updated ESEP report, or provide other adequate justification or evaluation.</p> <p>Did the licensee previously perform an ESEP?</p>	<p>Yes / No</p>
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<p>Did the licensee provide a new or updated ESEP report with the MSA?</p> <p>If the licensee did not perform ESEP, did they provide adequate justification that the expedited seismic equipment list structures, systems, and components (SSCs) are acceptable in accordance with the original guidance and in accordance with NEI 12-06 Section H.5 C_{10%} capacity criteria?</p> <p>If the licensee did not perform the ESEP, did they perform an evaluation consistent with the guidance in NEI 12-06, Section H.4.4, Steps 2 and 3, including the evaluation of FLEX components that were not previously evaluated to GMRS or two times the SSE?</p>	<p>Yes / No</p> <p>Yes / No / NA</p> <p>Yes / No / NA</p>
<p>Notes from staff reviewer: The licensee stated that FLEX SSCs not included in the ESEP were evaluated for the Fermi MSSHI. Results of evaluations of components not on the expedited seismic equipment list (ESEL) were presented in Section 2.4 of the MSA submittal.</p> <p>Deviation(s) or deficiency(ies) and Resolution: None</p> <p>Consequence(s): None</p>	
<p>The NRC staff concludes:</p> <ul style="list-style-type: none"> The licensee has evaluated the seismic adequacy of equipment used in support of FLEX strategy consistent with the NEI 12-06, Appendix H guidance. 	<p>Yes / No</p>

III. Inherently / Sufficiently Rugged Equipment

<p>Appendix H, Section 4.4 of NEI 12-06, Revision 2, documents the process and justification for inherently and sufficiently rugged SSCs.</p> <p>The licensee:</p> <p>Documented the inherently and sufficiently rugged SSCs consistent with the NEI 12-06, Appendix H, guidance.</p>	<p>Yes / No</p>
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<p>Notes from staff reviewer: The process to identify inherently rugged items is documented in Section 2.3 of the Fermi MSA report dated August 31, 2017. The NRC staff found the licensee's assessment of inherently rugged equipment is consistent with the NEI 12-06, Revision 4, guidance.</p> <p>Deviation(s) or deficiency(ies) and Resolution: None</p> <p>Consequence(s): None</p>	
<p>The NRC staff concludes:</p> <ul style="list-style-type: none"> • The licensee's assessment of inherently and sufficiently rugged SSCs met the intent of the NEI 12-06, Appendix H, guidance. 	<p>Yes / No</p>

IV. Evaluation of Components Not Covered by ESEP

<p>The ESEP specifically excluded the evaluation of certain components of the FLEX strategy in an effort to provide stakeholders with near-term confidence in a plant's seismic capacity. However, licensees will be required to complete those evaluations as part of the Path 4 MSA to demonstrate compliance with the impending rule. Were the following components, not evaluated in the ESEP, evaluated as part of the MSA? :</p>	
<ul style="list-style-type: none"> • FLEX Storage Building 	<p>Yes / No</p>
<ul style="list-style-type: none"> • Non-seismic CAT I structures 	<p>Yes / No / NA</p>
<ul style="list-style-type: none"> • Operator Pathways credited in FLEX strategy 	<p>Yes / No</p>
<ul style="list-style-type: none"> • Tie down of FLEX portable equipment 	<p>Yes / No</p>
<ul style="list-style-type: none"> • Seismic interactions <ul style="list-style-type: none"> ○ Masonry block wall ○ Piping attached to tanks ○ Flooding from non-seismically robust tanks ○ Distributed systems (Piping/conduit/raceways/cable trays) ○ Other potential areas of interaction 	<p>Yes / No</p> <p>Yes / No</p> <p>Yes / No</p> <p>Yes / No</p> <p>Yes / No</p>
<ul style="list-style-type: none"> • FLEX equipment haul paths 	<p>Yes / No</p>

<p>The licensee:</p> <ul style="list-style-type: none"> Clearly identified the SSCs and locations of the equipment that is part of the final FLEX SFP cooling strategy. Clearly stated the seismic design basis (e.g. SSE) of the equipment used in the strategy. Provided adequate description or documentation of the SFP cooling equipment's evaluation to the GMRS. Portable equipment and flexible hoses do not need to be evaluated. 	<p>Yes / No</p> <p>Yes / No</p> <p>Yes / No</p>
<p>Notes from staff reviewer: The NRC staff confirmed that the SFP cooling equipment described in the licensee's FIP was previously evaluated to the SSE for Fermi. The licensee performed a SFP integrity evaluation which demonstrated inherent margins of the SFP structure and interfacing plant equipment to a peak spectral acceleration (PSA) of 0.8g. The SFP integrity evaluation was previously reviewed and found acceptable by the NRC staff (ADAMS Accession No. ML16350A195). FLEX equipment to maintain spent fuel pool is adequately protected in the Fermi Flex Storage Facility structures as previously evaluated in Section IV of this report.</p> <p>Deviation(s) or deficiency(ies) and Resolution: None</p> <p>Consequence(s): None</p>	
<p>The NRC staff concludes:</p> <ul style="list-style-type: none"> The licensee followed the NEI 12-06, Appendix H, guidance in evaluating SFP cooling. 	<p>Yes / No</p>

VI. High Frequency (HF)

<p>Per NEI 12-06, Appendix H, Section 4.4, licensees with GMRS exceedance of the SSE above 10 Hz need to evaluate bi-stable components such as relays using the methodology described in NEI 12-06, Section H.4.2. The HF evaluation may have been submitted under separate letter or may be sent as an attachment to the MSA Report. The staff review checklist is included as an attachment to this report.</p>	
<p>The licensee:</p> <ul style="list-style-type: none"> GMRS exceeds the SSE above 10 Hz. Provided a HF evaluation as described in NEI 12-06, Section H.4.2. 	<p>Yes / No</p> <p>Yes / No / NA</p>

<ul style="list-style-type: none"> • Appeared to follow the guidance for the HF evaluation. • Provided results of demand vs. capacity with identification of resolutions as needed. 	<p>Yes / No / NA</p> <p>Yes / No / NA</p>
<p>Notes from staff reviewer: The NRC staff performed a checklist review of the licensee's HF report (ADAMS Accession No. ML17242A213) to confirm Fermi met the criteria of NEI 12-06, Section H.4.2, and EPRI report 3002004396. The NRC staff review checklist is publicly available in NRC letter dated September 19, 2017 (ADAMS Accession No. ML17261B197). The report stated that all 277 evaluated components had seismic capacity greater than demand.</p> <p>Deviation(s) or deficiency(ies) and Resolution: None</p> <p>Consequence(s): None</p>	
<p>The NRC staff concludes:</p> <ul style="list-style-type: none"> • The licensee's component capacity evaluation met the intent of the HF guidance. 	<p>Yes / No</p>

VII. Conclusions:

The NRC staff assessed the licensee's implementation of the MSA guidance for Fermi. Based on its review, the NRC staff concludes that the licensee's implementation of the MSA meets the intent of the guidance. The staff concludes that through the implementation of the MSA guidance, the licensee identified and evaluated the seismic capacity of the mitigation strategies equipment to ensure functionality will be maintained following a seismic event up to the GMRS. As noted in the review checklist, the staff did not identify any deviations or exceptions taken from the guidance and the licensee did not identify any necessary equipment modifications or changes to the strategy.

In summary, the NRC staff has reviewed the seismic hazard MSA for Fermi. 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.

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LETTER DATED July 19, 2018

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