



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

June 13, 2018

Ms. Cheryl A. Gayheart
Regulatory Affairs Director
Southern Nuclear Operating Co., Inc.
3535 Colonade Parkway
Birmingham, AL 35243

SUBJECT: EDWIN I. HATCH NUCLEAR PLANT, 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 (CAC NOS. MF7834 AND MF7835; EPID L-2016-JLD-0006)

Dear Ms. Gayheart:

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 28, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17240A391), letter submitted by Southern Nuclear Operating Company, Inc. (SNC, the licensee) for Edwin I. Hatch Nuclear Plant, Units 1 & 2 (Hatch). The NRC staff evaluated the Hatch mitigation strategies developed under Order EA-12-049 and described in SNC's Final Integrated Plan (FIP) for Hatch (ADAMS Accession No. ML17045A597). The staff's review of Hatch's mitigation strategies was documented in a safety evaluation dated August 4, 2017 (ADAMS Accession No. ML17179A286). 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 is scheduled for the week of August 20, 2018. The following NRC staff review confirms that the licensee has adequately addressed the reevaluated seismic hazard within Hatch'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 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, 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 Project Directorate (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), the Nuclear Energy Institute (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 *Federal Register* Notice 83 FR 18089.

MITIGATION STRATEGIES ASSESSMENT

By letter dated April 27, 2015 (ADAMS Accession No. ML15097A424), 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 Hatch in the 1 to 10 hertz (Hz) range, as well as above 10 Hz. As such, a low frequency confirmation, high frequency confirmation (HF) and spent fuel pool (SFP) evaluation were merited. Further, the NRC staff determined that the individual plant examination of external events (IPEEE) high confidence of low probability of failure (HCLPF) spectrum (IHS) for Hatch exceeded the SSE from 1 to 100Hz and may be acceptable for use contingent upon a relay chatter review. The NRC staff concluded that the GMRS determined by the licensee adequately characterizes the reevaluated hazard for the Hatch site and is suitable for use in subsequent evaluations and confirmations, as needed, for the response to the 50.54(f) letter.

By letter dated August 28, 2017 (ADAMS Accession No. ML17240A391), SNC submitted the seismic MSA report for Hatch. The licensee stated that the Hatch 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 Hatch 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 checklist reviews of the seismic hazard MSA and associated HF confirmation for Hatch. The checklists are provided as enclosures to this letter.

The NRC staff found that Hatch 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 Hatch 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,



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

Docket Nos. 50-321 and 50-366

Enclosures:

1. Technical Review Checklist
2. HF Checklist

cc w/encls: Distribution via Listserv

TECHNICAL REVIEW CHECKLIST
BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO PATH FOUR MITIGATION STRATEGY ASSESSMENT
EDWIN I. HATCH NUCLEAR PLANT, UNITS 1 & 2
DOCKET NOS. 50-321 AND 50-366

The NRC staff performed the following checklist review based on Enclosure 1 of the August 28, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17240A391), letter for Edwin I. Hatch Nuclear Plant, Units 1 & 2 (Hatch). 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 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 1.79 based on the Hatch 1 design-basis earthquake (DBE)/SSE and the GMRS. This meets the criteria of NEI 12-06, Appendix H.5. The staff noted that the expedited seismic evaluation process (ESEP) used both the GMRS and the individual plant examination of external events (IPEEE) review level earthquake (RLE) anchored at 0.3g during the ESEP. The IPEEE RLE at 0.3g exceeds the GMRS across the spectrum and was determined to be acceptable for use as part of the ESEP. The NRC staff determined the IPEEE RLE is acceptable for the MSA based on the staff's acceptance for the ESEP and because it exceeds the DBE for both units and the GMRS.</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 Equipment

<p>Equipment used in support of the flexible mitigation strategies (FLEX) 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>	
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<p>Did the licensee previously perform an ESEP?</p> <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</p> <p>Yes / No / NA</p> <p>Yes / No / NA</p>
<p>Notes from staff reviewer: The licensee stated that FLEX items not included in the ESEP were evaluated for the Hatch MSSHI. The licensee stated that some FLEX components not evaluated in the ESEP report were evaluated as part of IPEEE. The NRC staff found the IPEEE RLE spectrum exceeds the GMRS and those components are acceptable on that basis. Results of evaluations of components not on the expedited seismic evaluation process 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> <p>The licensee has evaluated the seismic adequacy of equipment used in support of FLEX mitigation strategies consistent with the NEI 12-06, Appendix H guidance.</p>	<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 style="padding-left: 40px;">Documented the inherently and sufficiently rugged SSCs consistent with the NEI 12-06 Appendix H guidance.</p>	<p>Yes / No</p>
<p>Notes from staff reviewer: The process to identify inherently rugged items is documented in Section 2.3 of the Hatch MSA report dated August 28, 2017.</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 • Non-seismic CAT I structures • Operator Pathways credited in FLEX strategy • Tie down of FLEX portable equipment • Seismic interactions <ul style="list-style-type: none"> ○ Masonry block wall ○ Piping attached to tanks ○ Flooding from non-seismically robust tanks 	<p style="text-align: center;">Yes / No</p> <p style="text-align: center;">Yes / No / NA</p> <p style="text-align: center;">Yes / No</p> <p style="text-align: center;">Yes / No</p> <p style="text-align: center;">Yes / No</p> <p style="text-align: center;">Yes / No</p> <p style="text-align: center;">Yes / No</p>
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<ul style="list-style-type: none"> ○ Distributed systems (Piping/conduit/raceways/cable trays) ○ Other potential areas of interaction ● FLEX equipment haul paths ● Other equipment (list in Staff Reviewer Notes) <p>Did the licensee provide adequate description/documentation of the evaluation?</p>	<p>Yes / No</p> <p>Yes / No</p> <p>Yes / No</p> <p>Yes / No / NA</p> <p>Yes / No</p>
<p>Notes from staff reviewer: The licensee described an evaluation of the potential for liquefaction along the haul path that may produce maximum settlement of up to 5 inches. The licensee stated that large-wheeled equipment could still traverse the haul paths for the anticipated settlement. The licensee also described walkdowns of the haul path to identify potential seismic interactions. The licensee stated, in part, that there were no locations along the primary haul path that could prevent FLEX equipment deployment as a result of GMRS-level ground motion. The staff found the licensee's evaluation of haul paths and other SSC's not covered by the ESEP to be consistent with the NEI 12-06 Appendix H 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 followed the NEI 12-06, Appendix H guidance in evaluating SSCs not deemed inherently rugged. 	<p>Yes / No</p>

V. Spent Fuel Pool (SFP) Cooling

<p>Per NEI 12-06, Appendix H, Section 4.4, licensees need to evaluate the adequacy of SFP cooling equipment to the GMRS. Most plants include the Order EA-12-051 SFP Level Instrument as part of the strategy.</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. 	<p>Yes / No</p> <p>Yes / No</p> <p>Yes / No</p>

<ul style="list-style-type: none"> • 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>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 Hatch. The licensee stated that SFP integrity evaluations for Plant Hatch demonstrated inherent margins of the SFP structure and interfacing plant equipment to a peak spectral acceleration of 0.8g, which bounds the Plant Hatch GMRS. The licensee also performed a calculation to demonstrate the SFP level instrumentation to have adequate seismic capacity to withstand the MSSHI. The NRC staff found that the Hatch SFP evaluation met the criteria of NEI 12-06, Appendix H 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 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. 	<p>Yes / No</p>
<ul style="list-style-type: none"> • Provided a HF evaluation as described in NEI 12-06, Section H.4.2. 	<p>Yes / No / NA</p>
<ul style="list-style-type: none"> • Appeared to follow the guidance for the HF evaluation. 	<p>Yes / No / NA</p>
<ul style="list-style-type: none"> • Provided results of demand vs. capacity with identification of resolutions as needed. 	<p>Yes / No / NA</p>

Notes from staff reviewer: The licensee referenced the relay chatter review performed as part of the ESEP in lieu of referencing the NTTF Recommendation 2.1 High Frequency Confirmation. The NRC staff performed a checklist review of the MSA HF to confirm Hatch met the criteria of NEI 12-06, Section H.4.2 and EPRI report 3002004396. The report stated that all evaluated components had seismic capacity greater than demand.

Deviation(s) or deficiency(ies) and Resolution: None. The staff notes that the HF guidance demand calculation methodology is a simplified but highly conservative method developed to expedite the large number of component evaluations anticipated. Plant Hatch component evaluations performed as part of the ESEP pre-dated the HF guidance and therefore used conventional and more accurate demand calculation methods. The HF guidance allows the use of more accurate calculation methodologies and is not a deviation from the guidance.

Consequence(s): None

The NRC staff concludes:

- The licensee's component capacity evaluation met the intent of the HF guidance.

Yes /No

VII. Conclusions:

The NRC staff assessed the licensee's implementation of the MSA guidance for Hatch. 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 mitigation strategy.

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

TECHNICAL REVIEW CHECKLIST
BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO HIGH FREQUENCY CONFIRMATION
RELATED TO THE MITIGATION STRATEGIES ASSESSMENT FOR
EDWIN I. HATCH NUCLEAR PLANT, UNITS 1 & 2
DOCKET NOS. 50-321 AND 50-366

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) (hereafter referred to as the 50.54(f) letter). Enclosure 1 of the 50.54(f) letter requests addressees to reevaluate the seismic hazard at their site using present-day methods and guidance for licensing new nuclear power plants. Item 4 in Enclosure 1 to the 50.54(f) letter requests addressees to provide information related to high frequency (HF) sensitive structures, systems, and components (SSCs) for plants whose ground motion response spectra (GMRS) exceeds the safe shutdown earthquake (SSE) only at higher frequencies.

Additionally, by letter dated July 30, 2015 (ADAMS Accession No. ML15223A095), the Nuclear Energy Institute (NEI) submitted Electric Power Research Institute (EPRI) report EPRI 3002004396, "High Frequency Program: Application Guidance for Functional Confirmation and Fragility Evaluation" (hereafter referred to as the HF guidance). The HF guidance proposes methods for applying HF seismic testing results to support plant-specific analyses of potential HF effects. Specific guidance is given for plants performing a limited-scope HF confirmation to address the information requested in Item 4 in Enclosure 1 of the 50.54(f) letter. The limited-scope HF confirmation is a simplified seismic capacity evaluation focusing on the potential impacts of HF motion on key plant functions following a seismic event. By letter dated September 17, 2015 (ADAMS Accession No. ML15218A569), the NRC staff endorsed the HF guidance. Licensees with a reevaluated seismic hazard exceeding the SSE above 10 Hertz (Hz) and not performing a seismic probabilistic risk assessment (SPRA) were to submit a HF confirmation report in accordance with the schedule in the NRC letter dated October 27, 2015 (ADAMS Accession No. ML15194A015).

The NRC staff performed the following checklist review based on the MSA High Frequency Report in Enclosure 2 of the August 28, 2017, letter (ADAMS Accession No. ML17240A391) for Edwin I. Hatch Nuclear Plant, Units 1 and 2 (Hatch). 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. Component Selection (EPRI 3002004396 Section 4.2)

<p>The objective of the HF confirmation is to determine if the HF ground motion resulting from a seismic event could impact key plant safety functions that are critical following a plant trip/scram. Section 2 of the guidance summarizes EPRI's research on the impact of HF seismic activity which concludes that bi-stables (relays) in seal-in or lock-out (SILO) circuits could impact plant response. Component selection should identify any SILO-related relays that could directly impact critical functions following a trip. Licensees should provide sufficient description to clarify the potential impact in each of five major areas that encompass plant response: reactor (Rx) trip/scram, Rx vessel inventory control, Rx vessel pressure control, core cooling and alternating current/direct current (ac/dc) power systems.</p> <p>The licensee provided adequate description of the function with reasonable justification to support component selection in each of the following five functional areas:</p> <p>Rx trip/scram</p> <p>Rx vessel inventory control</p> <p>Rx vessel pressure control</p> <p>core cooling</p> <p>ac/dc power systems</p> <p>The licensee identified-SILO related circuits within the equipment scope.</p> <p>The licensee identified the applicable contact configurations for SILO related circuits.</p> <p>The licensee identified the locations of components (i.e., buildings and cabinets).</p>	<p>Yes / No / NA</p> <p>Yes / No / NA</p> <p>Yes / No / NA</p> <p>Yes / No / NA</p> <p>Yes / No / NA</p> <p>Yes / No / NA</p> <p>Yes / No / NA</p> <p>Yes / No / NA</p> <p>Yes / No / NA</p>
<p>Notes from staff reviewer: The NRC staff reviewed the HF Report Summary in Attachment 1 of the Hatch MSA Report. The NRC staff also reviewed via eportal Enercon report, "NEI 12-06 Appendix H High Frequency Equipment Selection for Seismic Mitigation Strategies Assessment for Plant Hatch", Report No. SNCH00222-REPT-001, Rev 0, August 8, 2017.</p> <p>Deviation(s) or deficiency(ies) and Resolution: None</p>	

<p>The NRC staff concludes:</p> <ul style="list-style-type: none"> The licensee's definition of the equipment list meets the HF guidance. 	<p>Yes / No</p>
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II. Horizontal Seismic Demand (EPRI 3002004396 Sections 3.2 and 3.3)

<p>For each equipment location, the licensee:</p> <ul style="list-style-type: none"> used the GMRS from the Seismic Hazard and Screening Report (SHSR). developed a Foundation Input Response Spectra (FIRS). provided justification for not providing FIRS. 	<p>Yes / No</p> <p>Yes / No</p> <p>Yes / No / NA</p>
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Notes from staff reviewer: The licensee stated in the HF Report Summary in Attachment 1 of the Hatch Mitigation Strategy Assessment (MSA) Report that the expedited seismic evaluation process (ESEP) high frequency sensitive equipment evaluations remain applicable for this MSA since the ESEP seismic demand was based on the Plant Hatch Seismic Margin Earthquake (SME) ground motion which was at least twice the Plant Hatch, Units 1 and 2, Design Basis Earthquakes and bounds the GMRS. The NRC staff found that the Hatch SME is an acceptable input response because it exceeds the Hatch GMRS.

Deviation(s) or deficiency(ies) and Resolution: None. The staff notes that the HF guidance demand calculation methodology is a simplified but highly conservative method developed to expedite the large number of component evaluations anticipated. Plant Hatch component evaluations performed as part of the ESEP pre-dated the HF guidance and therefore used conventional and more accurate demand calculation methods. The HF guidance allows the use of more accurate calculation methodologies and is not a deviation from the guidance.

<p>The NRC staff concludes:</p> <ul style="list-style-type: none"> The licensee's definition of the horizontal seismic demand is acceptable for use in the HF confirmation. 	<p>Yes / No</p>
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III. Component Horizontal Seismic Demand (EPRI 3002004396 Sections 4.3, 4.4, and 4.5)

<p>For each component location, the licensee must apply amplification factors to the peak horizontal GMRS between 15 Hz and 40 Hz to determine the horizontal demand for each component. The structural amplification factor (AF) is given by Figure 4-3 in the guidance based</p>	
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<p>on height above foundation. The cabinet AF is based on cabinet construction per EPRI NP-7148.</p> <p>The licensee:</p> <ul style="list-style-type: none">• identified the peak horizontal acceleration.• used structural amplification factors based on height above foundation from Figure 4-3 in the HF guidance (Section 4.3.2).• provided justification for selection of low, medium or high cabinet amplification factor based on cabinet construction consistent with EPRI NP-7148.• estimated the conservative deterministic failure margin mounting point demand in accordance with Section 4.5.1.	<p>Yes/ No</p> <p>Yes/ No</p> <p>Yes/ No</p> <p>Yes/ No</p>
<p>Notes from staff reviewer: The licensee used the relay chatter review previously performed for the ESEP. The NRC staff confirmed the relay chatter review was acceptable in NRC staff's Hatch ESEP response letter dated July 22, 2015 (ADAMS Accession No. ML15201A474).</p> <p>Deviation(s) or deficiency(ies) and Resolution: None. The staff notes that the HF guidance demand calculation methodology is a simplified but highly conservative method developed to expedite the large number of component evaluations anticipated. Plant Hatch component evaluations performed as part of the ESEP pre-dated the HF guidance and therefore used conventional and more accurate demand calculation methods. The HF guidance allows the use of more accurate calculation methodologies and is not a deviation from the guidance.</p>	
<p>The NRC staff concludes:</p> <ul style="list-style-type: none">• The licensee's development of component horizontal demand for the items on the equipment list met the HF guidance.	<p>Yes / No</p>

IV. Vertical Ground Motion Response Spectrum (EPRI 3002004396 Section 3.2)

<p>The HF guidance Section 3.2 describes the method for developing the vertical GMRS (VGMRS) from the horizontal GMRS and site soil conditions.</p> <p>The licensee:</p> <ul style="list-style-type: none"> • used the horizontal GMRS and soil mean shear wave velocity vs. depth profile as given in the SHSR. • calculated the 30m shear wave velocity (Vs30) per the methodology in Section 3.5 of the HF guidance. • selected soil class from Table 3-1 in the HF guidance based on Peak Ground Acceleration and Vs30. • used correct V/H ratios from Table 3-2 in the HF guidance based on soil class. • provided a table and plot of the VGMRS. 	<p>Yes/ No</p> <p>Yes/ No</p> <p>Yes/ No</p> <p>Yes/ No</p> <p>Yes/ No</p>
<p>Notes from staff reviewer: The licensee used the relay chatter review previously performed for the ESEP. The NRC staff confirmed the relay chatter review was acceptable in NRC staff's Hatch ESEP response letter dated July 22, 2015 (ADAMS Accession No. ML15201A474).</p> <p>Deviation(s) or deficiency(ies) and Resolution: None. The staff notes that the HF guidance demand calculation methodology is a simplified but highly conservative method developed to expedite the large number of component evaluations anticipated. Plant Hatch component evaluations performed as part of the ESEP pre-dated the HF guidance and therefore used conventional and more accurate demand calculation methods. The HF guidance allows the use of more accurate calculation methodologies and is not a deviation from the guidance.</p>	
<p>The NRC staff concludes:</p> <ul style="list-style-type: none"> • The licensee followed the HF guidance in calculating VGMRS for use in HF confirmation. 	<p>Yes / Ne</p>

V. Component Vertical Seismic Demand (EPRI 3002004396 Sections 4.3 and 4.4)

<p>For each component location, the licensee must apply amplification factors to the peak vertical GMRS between 15 Hz and 40 Hz to determine the vertical demand for each component. The structural AF is given by Figure 4-4 in the guidance based on height above foundation. The cabinet AF is 4.7 for all cabinets based on the calculation in Appendix C of the HF guidance.</p> <p>The licensee:</p> <ul style="list-style-type: none"> • identified the peak vertical acceleration. • used Figure 4-4 from the guidance to determine the structural amplification factor. • used the cabinet amplification factor of 4.7 per Appendix C of the HF guidance. 	<p>Yes/ No</p> <p>Yes/ No</p> <p>Yes/ No</p>
<p>Notes from staff reviewer: The licensee used the relay chatter review previously performed for the ESEP. The NRC staff confirmed the relay chatter review was acceptable in NRC staff's Hatch ESEP response letter dated July 22, 2015 (ADAMS Accession No. ML15201A474).</p> <p>Deviation(s) or deficiency(ies) and Resolution: None. The staff notes that the HF guidance demand calculation methodology is a simplified but highly conservative method developed to expedite the large number of component evaluations anticipated. Plant Hatch component evaluations performed as part of the ESEP pre-dated the HF guidance and therefore used conventional and more accurate demand calculation methods. The HF guidance allows the use of more accurate calculation methodologies and is not a deviation from the guidance.</p>	
<p>The NRC staff concludes:</p> <ul style="list-style-type: none"> • The licensee's development of the vertical demand for the items on the equipment list met the HF guidance. 	<p>Yes / No</p>

VI. Component Capacity Evaluation and Comparison with Demand (EPRI 3002004396 Sections 4.5 and 4.6)

<p>The licensee:</p> <ul style="list-style-type: none"> • used the maximum of the pair of demand values for the mounting point demand as described in Section 4.5.1 of the HF guidance. • selected the correct knockdown factor per Section 4.5.2 of the guidance and Table 4-2. 	<p>Yes/ No</p> <p>Yes/ No</p>
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<ul style="list-style-type: none"> • selected/justified the correct single axis correction factor. • clearly indicated component capacity demand ratio for each component (in the sample evaluations). • results of demand vs. capacity are provided with identification of potential resolutions as needed. 	<p style="text-align: right;">Yes/ No</p> <p style="text-align: right;">Yes/ No</p> <p style="text-align: right;">Yes/ No</p>
<p>Notes from staff reviewer: The licensee used the relay chatter review previously performed for the ESEP. The NRC staff confirmed the relay chatter review was acceptable in NRC staff's Hatch ESEP response letter dated July 22, 2015 (ADAMS Accession No. ML15201A474).</p> <p>Deviation(s) or deficiency(ies) and Resolution: None. The staff notes that the HF guidance demand calculation methodology is a simplified but highly conservative method developed to expedite the large number of component evaluations anticipated. Plant Hatch component evaluations performed as part of the ESEP pre-dated the HF guidance and therefore used conventional and more accurate demand calculation methods. The HF guidance allows the use of more accurate calculation methodologies and is not a deviation from the guidance.</p>	
<p>The NRC staff concludes:</p> <ul style="list-style-type: none"> • The licensee's component capacity evaluation met the HF guidance. 	<p style="text-align: right;">Yes /No</p>

VII. Resolution Options and High Frequency Report Requirements (EPRI 3002004396 Sections 4.6 and 4.7)

<p>To resolve any relays not meeting the component capacity screening criteria, the licensee:</p> <ul style="list-style-type: none"> • proposed an adequate resolution for each item on the component list that has a capacity vs. demand ratio less than one (outliers). 	<p style="text-align: right;">Yes/No/ NA</p>
<p>For plants that identified relays not meeting the component capacity screening criteria, the licensee used one or more of the following resolutions outlined in the guidance:</p>	
<ul style="list-style-type: none"> • identified additional component testing as a resolution. 	<p style="text-align: right;">Yes/No/ NA</p>
<ul style="list-style-type: none"> • identified refined mounting point seismic demand estimates as a resolution. 	<p style="text-align: right;">Yes/No/ NA</p>
<ul style="list-style-type: none"> • identified operator actions as a resolution. 	<p style="text-align: right;">Yes/No/ NA</p>

<ul style="list-style-type: none">• identified plant modifications as a resolution. <p>The HF confirmation report included these required elements not previously identified in this checklist:</p> <ul style="list-style-type: none">• provided a component resolutions schedule.• provided representative calculations.	Yes / No / NA Yes / No / NA Yes / No / NA
<p>Notes from staff reviewer: All components evaluated had capacity greater than demand.</p> <p>Deviation(s) or deficiency(ies) and Resolution: None</p>	
<p>The NRC staff concludes:</p> <ul style="list-style-type: none">• The licensee's proposed component resolution and report content met the HF guidance.	Yes / No

VIII. Conclusions:

The NRC staff concludes that through the implementation of the HF guidance, the licensee identified and evaluated the HF seismic capacity of certain key installed plant equipment to ensure critical functions will be maintained following a seismic event up to the GMRS. As noted in the review checklist, the staff did not identify deviations or exceptions taken from the guidance and the licensee did not identify any necessary equipment modifications. The application of this staff review is limited to the HF confirmation as part of the MSA.

SUBJECT: EDWIN I. HATCH NUCLEAR PLANT UNITS 1 & 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 June 13, 2018

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