NRR-PMDAPEm Resource

From: Jackson, Diane
Sent: Tuesday, July 07, 2015 12:52 PM
To: Shams, Mohamed
Cc: DiFrancesco, Nicholas; Wyman, Stephen; Spence, Jane; Devlin-Gill, Stephanie; Roche, Kevin; Yee, On; Heeszel, David; Rodriguez, Ricardo; Ng, Ching; Park, Sunwoo; 50.54f_Seismic Resource; RidsNroDsea Resource; Hsu, Kaihwa
Subject: EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2 - TECHNICAL REVIEW CHECKLIST RELATED TO INTERIM ESEP SUPPORTING IMPLEMENTATION OF NTTF R2.1, SEISMIC (TAC NO. MF5243 AND MF5244)
Attachments: Hatch R2.1 seismic ESEP NRC review.docx

July 7, 2015

MEMORANDUM TO: Mohamed K. Shams, Chief
Hazards Management Branch (JHMB)
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

FROM: Diane T. Jackson, Chief
Geosciences and Geotechnical Engineering Branch 2 (RGS2)
Division of Site Safety and Environmental Analysis
Office of New Reactors

SUBJECT: EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2 - TECHNICAL REVIEW CHECKLIST RELATED TO INTERIM EXPEDITED SEISMIC EVALUATION PROCESS SUPPORTING IMPLEMENTATION OF NTTF RECOMMENDATION 2.1, SEISMIC, RELATED TO THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT (TAC NO. MF5243 and MF5244)

The NRC technical staff working through the Geosciences and Geotechnical Engineering Branches 1 and 2 (RGS1 and RGS2) completed the Technical Review Checklist of the Edwin I. Hatch Nuclear Power Plant response to Enclosure 1, Item (6) of the March 12, 2012, request for information letter issued per Title 10 of the Code of Federal Regulations, Subpart 50.54(f), to power reactor licensees and holders of construction permits requesting addressees to provide further information to support the NRC staff's evaluation of regulatory actions to be taken in response to Fukushima Near-Term Task Force (NTTF) Recommendation 2.1: Seismic which implements lessons learned from Japan's March 11, 2011, Great Tōhoku Earthquake and subsequent tsunami. This addresses the staff review of the interim Expedited Seismic Evaluation Process (ESEP) report in response to Requested Item (6) of Enclosure 1, "Recommendation 2.1: Seismic," of the 50.54(f) letter. Attached is a file containing the technical review checklist to prepare a response letter to the licensee.

The NRC staff reviewed the information provided and, as documented in the enclosed staff checklist, determined that sufficient information was provided to be responsive to this portion of the Enclosure 1 of the 50.54(f) letter. The application of this staff review is limited to the interim ESEP as part of NTTF Recommendation 2.1: Seismic activities.

This electronic memo constitutes the DSEA concurrence provided that only editorial changes are made that would not affect the technical conclusions or technical context of the assessment.

This concludes the NRC's efforts associated with TAC NO. MF5243 AND MF5233 for the review of the interim ESEP report for the EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2.

Docket No: 50-321 and 50-366

CONTACT: Stephanie Devlin-Gill
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Hearing Identifier: NRR_PMDA
Email Number: 2207

Mail Envelope Properties (933495689F8EB5409FE4267845E41B8816D46733DF)

Subject: EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2 - TECHNICAL REVIEW CHECKLIST RELATED TO INTERIM ESEP SUPPORTING IMPLEMENTATION OF NTTF R2.1, SEISMIC (TAC NO. MF5243 AND MF5244)
Sent Date: 7/7/2015 12:52:26 PM
Received Date: 7/7/2015 12:52:30 PM
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Files	**Size**	**Date & Time**
MESSAGE	3021	7/7/2015 12:52:30 PM
Hatch R2.1 seismic ESEP NRC review.docx	51372	

Options
Priority: Standard
Return Notification: No
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Expiration Date:
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TECHNICAL REVIEW CHECKLIST

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO EXPEDITED SEISMIC EVALUATION PROCESS INTERIM EVALUATION

IMPLEMENTING NTTF RECOMMENDATION 2.1 SEISMIC

EDWIN I. HATCH NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-321 AND 50-366

By letter dated March 12, 2012 (USNRC, 2012a), 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) "Conditions of License" (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, and identify actions to address or modify, as necessary, plant components affected with the reevaluated seismic hazards. Requested Information Item (6) in Enclosure 1 to the 50.54(f) letter requests addressees to provide an interim evaluation and actions taken or planned to address a higher seismic hazard relative to the design basis, as appropriate, prior to completion and submission of the seismic risk evaluation.

Additionally, by letter dated April 12, 2013[1], the Electric Power Research Institute (EPRI) staff submitted EPRI TR 3002000704 "Seismic Evaluation Guidance; Augmented Approach for the Resolution of Fukushima Near-Term Task Force (NTTF) Recommendation 2.1: Seismic" (hereafter referred to as the guidance). The Augmented Approach proposed that licensees would use an Expedited Seismic Evaluation Process (ESEP) to address the interim actions as requested by Information Item (6) in the 50.54(f) letter. The ESEP is a simplified seismic capacity evaluation with a focused scope of certain key installed Mitigating Strategies equipment that is used for core cooling and containment functions to cope with scenarios that involve a loss of all AC power and loss of access to the ultimate heat sink to withstand the Review Level Ground Motion, which is up to two times the safe shutdown earthquake (SSE). Due to the expedited and interim nature of the ESEP, the assessment does not include many considerations that are part of a normal risk evaluation. These deferred items, include but are not limited to, structures, piping, non-seismic failures, and operator actions, as well scenarios such as addressing loss of coolant accidents. By letter dated May 7, 2013[2], the NRC staff endorsed the guidance. Central and eastern United States licensees with a reevaluated seismic hazard exceeding the SSE submitted an ESEP interim evaluation in December 2014.

Consistent with the interim nature of this activity, the staff performed the review of the licensee's submittal to assess whether the intent of the guidance was implemented. A multi-disciplined team checked whether the identified methods were consistent with the guidance. A senior expert panel reviewed team questions and checklists for consistency and scope. New or updated parameters (e.g., In-Structure Response Spectra, High Confidence of Low Probability of Failure calculations) presented by the licensees were assessed for acceptability only for the Item (6) response. The application of this staff review is limited to the ESEP interim evaluation as part of NTTF Recommendation 2.1: Seismic activities.

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1 ADAMS Accession No. ML13102A142

2 ADAMS Accession No. ML13106A331

Technical Review Checklist for Edwin I. Hatch Nuclear Plant, Units 1 & 2

By letter dated December 30, 2014[3], Southern Nuclear Operating Company, Inc. (the licensee) provided an Expedited Seismic Evaluation Process (ESEP) report in a response to Enclosure 1, Requested Information Item (6) of the 50.54(f) letter, for the Edwin I. Hatch Nuclear Plant, Units 1 and 2 (Hatch).

I. Review Level Ground Motion

The licensee: • described the determination of the review level ground motion (RLGM) using one of the means acceptable by the guidance. • identified location of the control point and is consistent with March submittal • compared the site ground motion response spectra used to select the ESEP RLGM to the SSE.	No Yes Yes
HATCH used IPEEE Spectrum anchored at 0.3 g	
Notes from the Reviewer: • The licensee used the Individual Plant Examination of External Events (IPEEE) review level earthquake (RLE) anchored to the plant level capacity as the RLGM at the site. **Deviation(s) or Deficiency(ies), and Resolution:** • The licensee used the IPEEE RLE spectrum as the RLGM. Because the IPEEE RLGM is greater than both the GMRS and the ratio between the IPEEE RLGM and the SSE is greater than the ratio between the GMRS and the SSE between 1 and 10 Hz, this approach is acceptable for this interim evaluation.	
The NRC staff concludes: • the licensee's RLGM meets the intent of the guidance • the RLGM is reasonable for use in the interim evaluation.	 Yes Yes

II. Selection of the Success Path

The licensee: • described the success path • described normal and desired state of the equipment for the success path • ensured that the success path is consistent with the plant's overall mitigating strategies approach or provided a justification for an alternate path • stated that the selection process was in accordance with the guidance or meets the intent of the guidance • used installed FLEX **Phase 1** equipment as part of the success path • included FLEX **Phase 2 and/or 3**connections • considered installed FLEX **Phase 2 and/or 3**equipment	 Yes Yes Yes Yes Yes Yes Yes
Notes from the Reviewer: None **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified.	

3 ADAMS Accession No. ML15049A502

The NRC staff concludes that: • the selected success path is reasonable for use in the interim evaluation • the licensee considered installed Phase 2 and 3 connections or equipment in the interim evaluation.	Yes Yes

III. Selection of the Equipment List

The licensee: • developed and provided the ESEL by applying the ESEP • identified equipment considering the following functions: o Core cooling (with focus on Mode 1) function o Available, sustainable water source o Containment function and integrity	Yes Yes Yes Yes
For PWR Plants ONLY The licenseeincluded indicators / instrumentation for the following functions: level, pressure, temperature, that would be indicative of (but not explicitly identified to specific instruments): water level of the SG, pressure of SG, containment, and RCS; and temperature of the RCS.	N/A
For BWR Plants ONLY The licenseeconsidered indicators for the following functions: level, pressure, temperature that would be indicative of (but not explicitly identified to specific instruments): Temperature of suppression pool, RCS, containment); Pressure of suppression pool, RCS, and drywell; water level of the suppression pool.	Yes

Notes from the Reviewer:

- The staff requested the licensee to explain why certain components are not included in the ESEL for Units 1 & 2. The licensee explained that these components either can be excluded per discussion in EPRI Report 3002000704 as not part of the credited mitigating strategies. The staff finds that the licensee responses (ML15106A549) adequately addressed the concern for this interim evaluation and met the intent of the guidance.

- The staff requested the licensee to clarify whether plant procedures provide instructions for manual operation for certain interlocks that are excluded. The licensee explained that the questioned exclusion was not applied to any components in the ESEL. The staff finds that the licensee responses (ML15106A549) adequately addressed the concern for this interim evaluation and met the intent of the guidance.

Deviation(s) or Deficiency(ies), and Resolution:

- No deviations or deficiencies were identified.

Through a sampling of the ESEP key components, the NRC staff concludes that: • the licensee's process to develop the ESEL meets the intent of the guidance for the interim evaluation • the desired equipment state for the success path were identified • the licensee considered the support equipment for the ESEL • both front-line and support systems appeared to be included in the ESEL as evidenced by inclusion of SSCs on the success path and of support systems (e.g., batteries, motor control center (MCC), inverters).	Yes Yes Yes Yes

IV. Walkdown Approach

The licensee: • described the walkdown screening approach, including walkbys and walkdowns performed exclusively for the ESEP, in accordance with the guidance • credited previous walkdown results, including a description of current action(s) to verify the present equipment condition and/or configuration (e.g., walk-bys), in accordance with the guidance • stated that the walkdown was performed by seismically trained personnel	Yes Yes Yes
Notes from the Reviewer: None **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified.	
The licensee: • Described, if needed, adverse material condition of the equipment (e.g. material degradation) • credited previous walkdown results, included a description of current action(s) to verify the present equipment condition (e.g., walk-bys), meeting the intent of the guidance	Yes Yes

The licensee:
• described the conditions of structural items considered for the interim evaluation, including:
  o spatial interactions (i.e., interaction between block walls and other items/components)
  o anchorage
  o piping connected to tanks (i.e., differential movement between pipes and tanks at connections)
	Yes
	Yes
	Yes

Notes from the Reviewer: • The licensee identified some issues related to equipment anchorage, which were then resolved and re-evaluated to confirm that their HCLPF values exceed the RLGM. **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified.

The licensee reported deviations for Hatch (related to walkdowns). If deviations were identified, there is a discussion of how the deficiencies were or will be addressed in the ESEP submittal report.	No N/A
The NRC staff concludes that: • the licensee described the performed walkdown approach, including any credited previous efforts (e.g. IPEEE) consistent with the guidance • the licensee addressed identified deviations consistent with the guidance, if any	 Yes Yes

V. Capacity Screening Approach and HCLPF Calculation Results

The licensee: • described the capacity screening process for the ESEL items, consistent with the guidance (e.g., use of EPRI NP-6041 screening table)[(1)]. • presented the results of the screened-out ESEL items in the ESEP report • described the development of ISRS based on scaling[(2)] • described the development of ISRS based on new analysis consistent with the guidance • described the method for estimating HCLPF capacity of screened-in ESEL items, including both structural and functional failure modes consistent with the guidance: o use of CDFM o use of FA o use of experience data or generic information • credited IPEEE spectral shape for HCLPF capacity estimates is similar to or envelopes the RLGM, and anchored at the same control point • presented the results of HCLPF capacities including associated failure modes for screened-in ESEL items • reviewed the ESEL items with the lowest HCLPF values to ensure that their capacities are equal or greater than the RLGM	 Yes Yes Yes N/A Yes Yes N/A Yes Yes Yes Yes

Notes from the Reviewer:

1. The staff asked questions to the licensee regarding failure modes and anchorage evaluations. In its response (ML15106A549), the licensee stated that it performed anchorage evaluations for each ESEL item anchored to structural elements and that all ESEL items were shown to have seismic capacity greater than or equal to the RLGM for all applicable failure modes, which is acceptable for this interim evaluation.
2. Because the submittal did not mention specific treatment of equipment above 40 feet, the staff also asked a question to the licensee regarding the method used for screening items located at elevations beyond 40 ft above grade. In its response (ML15106A549), the licensee stated that all the items located beyond 40 ft above grade were screened by following guidance put forth in EPRI 1019200, which is acceptable for this interim evaluation.

Deviation(s) or Deficiency(ies), and Resolution:

- No deviations or deficiencies were identified.

The NRC staff concludes that: • the licensee described the implementation of the capacity screening process consistent with the intent of the guidance • the licensee presented capacity screening and calculation results, as appropriate, in the ESEP report • the method used to develop the ISRS is consistent with guidance for use in the ESEP • for HCLPF calculations, the licensee used HCLPF calculation methods as endorsed in the guidance • no anomalies were noted in the reported HCLPF	Yes Yes Yes Yes Yes

VI. Inaccessible Items

The licensee: • provided a list of inaccessible items • provided a schedule of the planned walkdown and evaluation for all inaccessible items • provided Regulatory Commitment to complete walkdowns.	Yes Yes Yes
The licensee will provide results or complete walkdown by: • Hatch1: o December 2016 (2 years after ESEP report issuance) for items currently not installed and do not require an outage. o Spring outage 2018 (2 outages after December 2014) for items that were currently not installed and require outage. o Letter to NRC no later than 90 days after Spring 2018 outage. • Hatch 2: o December 2016 (2 years after ESEP report issuance) for items that were currently not installed and do not require outage. o Spring outage 2017 (2 outages after December 2014) for items that were currently not installed and require outage. o Letter to NRC no later than 90 days after Spring 2017 outage.	

Notes from the Reviewer:

- Hatch 1 & 2 ESEL contain about 70 items, in total, that are located in either drywells or locked high radiation areas. The licensee dispositioned of these items by sampling of other/similar equipment, referring to recent previous walkdowns performed and other applicable methods. The staff finds this approach reasonable for this interim evaluation.

- The licensee stated that items that have not been installed or for which FLEX modifications have not been completed, as of the time of the ESEP report, will be evaluated after installation or modification per the SMA methodology. The staff finds the licensee Regulatory Commitment described above to be a reasonable approach for the interim evaluation.

Deviation(s) or Deficiency(ies), and Resolution:

- No deviations or deficiencies were identified.

The NRC staff concludes that the licensee: • listed inaccessible items • committed to provide the results (e.g. walkdowns, walkbys, etc) of the remaining inaccessible items consistent with the guidance • substitutions, if needed, were appropriately justified	 Yes Yes N/A

VII. Modifications to Plant Equipment

The licensee: • identified modifications for ESEL items necessary to achieve HCLPF values that bound the RLGM (excluding mitigative strategies equipment (FLEX)), as specified in the guidance • provided a schedule to implement such modifications (if any), consistent with the intent of the guidance • provided Regulatory Commitment to complete modifications • provided Regulatory Commitment to report completion of modifications	 No Yes Yes Yes
The licenseewill provide a report for each unit based on the results of items yet to be installed which may or may not require modifications as follows: • Hatch 1: o December 2016 (2 years after ESEP report issuance) for items currently not installed and do not require an outage. o Spring outage 2018 (2 outages after December 2014) for items that were currently not installed and require outage. o Letter to NRC no later than 90 days after Spring 2018 outage • Hatch 2: o December 2016 (2 years after ESEP report issuance) for items that were currently not installed and do not require outage. o Spring outage 2017 (2 outages after December 2014) for items that were currently not installed and require outage. o Letter to NRC no later than 90 days after Spring 2017 outage	
Notes from the Reviewer: • The licensee stated that items that have not been installed or for which FLEX modifications have not been completed, as of the time of the ESEP report, will be evaluated after installation or modification per the SMA methodology. The staff finds the licensee Regulatory Commitment described above to be a reasonable approach for this interim evaluation. **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified.	
The NRC staff concludes that the licensee: • identified plant modifications necessary to achieve the target seismic capacity • provided a schedule to implement the modifications (if any) consistent with the guidance	 N/A Yes

VIII. General Conclusions:

The NRC staff assessed the licensee's implementation of the ESEP guidance. Due to the interim applicability of the ESEP evaluations, use of the information for another application would require a separate NRC review and approval. Based on its review, the NRC staff concludes that the licensee's implementation of the interim evaluation meets the intent of the guidance. The staff concludes that, through the implementation of the ESEP guidance, the licensee identified and evaluated the seismic capacity of certain key installed Mitigating Strategies equipment that is used for core cooling and containment functions to cope with scenarios that involve a loss of all AC power and loss of access to the ultimate heat sink to withstand a seismic event up to the Review Level Ground Motion. Hatch used their IPEEE RLE spectrum anchored at 0.3g as the RLGM for the ESEP. This approach deviates from guidance, but is acceptable for the interim evaluation, as noted in the checklist. The application of this NRC staff review is limited to the ESEP interim evaluation as part of NTTF Recommendation 2.1: Seismic activities. The licensee is performing safety enhancing modifications of the FLEX equipment and committed to complete actions not requiring an outage by December 2016, modifications requiring an outage no later than the Spring 2018 outage for Unit 1 and Spring 2017 outage for Unit 2, and provide a letter to NRC no later than 90 days after each unit's outage.

In summary, the licensee, by implementing the ESEP interim evaluation, has demonstrated additional assurance which supports continued plant safety while the longer-term seismic evaluation is completed to support regulatory decision making. The NRC staff concludes that the licensee responded appropriately to Enclosure 1, Item (6) of the 50.54(f) letter, dated March 12, 2012, for Edwin I Hatch Nuclear Plant, Units 1 and 2.

Technical Reviewers: David Heezel, On Yee, Ching Ng, Robert Hsu, Sunwoo Park, Ricardo Rodriguez, Joseph Braverman(NRC Consultant)