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## NUCLEAR REGULATORY COMMISSION

[NRC-2013-0038]

### Electric Power Research Institute; Seismic Evaluation Guidance

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Endorsement letter; issuance.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) is issuing an endorsement letter of Electric Power Research Institute (EPRI) Report, "Seismic Evaluation Guidance: EPRI Guidance for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," Draft Report, hereafter referred to as the EPRI Guidance.

**ADDRESSES:** You may access information related to this document, which the NRC possesses and is publicly available, by searching on <http://www.regulations.gov> under Docket ID **NRC-2013-0038**.

- **Federal Rulemaking Web site:** Go to <http://www.regulations.gov> and search for Docket ID **NRC-2013-0038**. Address questions about NRC dockets to Carol Gallagher; telephone: 301-492-3668; e-mail: [Carol.Gallagher@nrc.gov](mailto:Carol.Gallagher@nrc.gov).

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may access publicly-available documents online in the NRC Library at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "[ADAMS Public Documents](#)" and then select "[Begin Web-based ADAMS Search](#)." For problems with ADAMS,

please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to [PDR.Resources@nrc.gov](mailto:PDR.Resources@nrc.gov). The NRC staff's endorsement letter of the EPRI Guidance is available under ADAMS Accession No. ML13106A331. The NRC staff's request for information dated March 12, 2012, is available under ADAMS Accession No. ML12053A340.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

**FOR FURTHER INFORMATION CONTACT:** Ms. Lisa M. Regner, Japan Lessons-Learned Project Directorate, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-1906; e-mail: [Lisa.Regner@nrc.gov](mailto:Lisa.Regner@nrc.gov).

## **SUPPLEMENTARY INFORMATION:**

### **I. Background Information**

This EPRI Guidance provides additional information, to be used in combination with the staff-endorsed Screening Prioritization and Implementation Details (SPID) report<sup>1</sup>, on an acceptable strategy to implement interim actions in accordance with item (6) of the Requested Information in Enclosure 1 “Recommendation 2.1: Seismic,” of the NRC staff’s request for information (Section 50.54(f) of Title 10 of the *Code of Federal Regulations* (10 CFR), (the 50.54(f) letter)), “Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the

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<sup>1</sup> The SPID report is available in the NRC's Agencywide Documents Access and Management System (ADAMS) under Accession No. ML12333A170. The staff endorsement letter for the SPID report is available in ADAMS under Accession No. ML12319A074.

Fukushima Dai-ichi Accident," dated March 12, 2012. In addition, in its April 9, 2013 letter<sup>2</sup>, the Nuclear Energy Institute (NEI) requested modifications to the schedule established in the staff's 50.54(f) letter. The NRC staff has found the schedule modifications to be acceptable since they account for completion of the EPRI central and eastern United States (CEUS) ground motion model (GMM) update, completion of potential interim actions provided in the EPRI Guidance, and limited available seismic resources.

The NRC issued the 50.54(f) letter following letter dated March 12, 2012, regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force (NTTF) Review of Insights from the Fukushima Dai-ichi Accident.<sup>3</sup> The NRC issued the 50.54(f) letter following the staff's evaluation of the earthquake and tsunami, and resulting nuclear accident, at the Fukushima Dai-ichi nuclear power plant in March 2011. Enclosure 1 to the 50.54(f) letter requests licensees and holders of construction permits under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," to reevaluate the seismic hazards at their sites using present-day NRC requirements and guidance, and to identify actions taken or planned to address plant-specific vulnerabilities associated with the updated seismic hazards. Based on this information, the NRC staff will determine if additional regulatory actions are necessary to protect against the updated hazards.

By letter dated February 15, 2013, the NRC staff issued an endorsement letter, with clarifications, of EPRI-1025287, "Seismic Evaluation Guidance: Screening, Prioritization, and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," referred to as the SPID report. This SPID report describes strategies for the screening, prioritization, and implementation of seismic risk evaluations that

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<sup>2</sup> The NEI letter, with attachments, is available in ADAMS in a package with Accession No. ML13101A345.

<sup>3</sup> The NTTF Report is available under ADAMS Accession No. ML111861807. The 50.54(f) letter is available under ADAMS Accession No. ML12053A340.

are acceptable to the NRC staff, and will assist nuclear power reactor licensees when responding to Enclosure 1 of the 50.54(f) letter.

By letter dated April 9, 2013, the NEI submitted additional guidance to be used to supplement the SPID report for NRC endorsement. The letter also documented the industry's proposed plan to update the GMM for CEUS plants, and proposed modifications to the schedule for plant seismic reevaluations established in the 50.54(f) letter. The NEI letter, the EPRI Guidance, and additional attachments addressing proposed schedule changes are available in ADAMS under package Accession No. ML13101A345.

## **II. Ground Motion Model**

The 50.54(f) letter requested that the licensees whose plants are located in the CEUS use NUREG-2115, "Central and Eastern United States [CEUS] Seismic Source Characterization for Nuclear Facilities" and the appropriate EPRI (2004, 2006) GMM to characterize the seismic hazard for their sites. The industry is currently completing a study to update the EPRI (2004, 2006) GMM based on current data and new ground motion prediction equations developed by seismic experts.

The NRC staff has interacted with NEI, EPRI, and other stakeholders in public meetings since November 2012, for status updates on industry's efforts to update the CEUS GMM. By letter dated January 31, 2013, the NEI transmitted the EPRI draft document, "Draft – EPRI (2004, 2006) Ground Motion Model (GMM) Review Project" to the NRC, requesting review and approval by February 27, 2013. For the update of its earlier GMM, EPRI used a significant amount of additional data, conducted field investigations, and used more recent methods than were previously available. In performing the GMM update, EPRI has also addressed the concerns of an independent peer review panel, which is an important part of the Senior Seismic

Hazard Analysis Committee (SSHAC) guidelines (these guidelines are discussed in NRC's NUREG 2117, "Practical Implementation Guidelines for SSHAC Level 3 and 4 Hazard Studies"). Following a review of the NEI submittal, in a public meeting on February 28, 2013, the staff expressed concern with EPRI's treatment of uncertainty and the level of documentation in the proposed updated GMM. The staff formally documented these concerns by letter dated March 20, 2013.

Subsequently, in a public meeting on March 26, 2013, industry presented a revision of its updated EPRI GMM, which demonstrated significant progress toward addressing the staff's concerns with respect to the treatment of uncertainty. Industry also proposed a schedule, including further interactions with NRC staff, for completing the development and documentation of the updated EPRI GMM. In order to complete its update of the EPRI GMM and accompanying documentation, and to allow time for the development of site-specific seismic hazard curves, industry proposed a 6 month delay from the schedule outlined in the 50.54(f) letter for the submittal of the seismic hazard reevaluations for CEUS plants.

The staff agrees that updated models, methods, and data will provide licensees with the most current information in order to perform the seismic hazard evaluations requested by the 50.54(f) letter.

### **III. EPRI Guidance**

The EPRI Guidance document provides licensees with information on the performance of an Expedited Seismic Evaluation Process. The Expedited Seismic Evaluation Process is a screening, evaluation, and equipment modification process to be conducted by licensees to provide additional seismic margin and expedite plant safety enhancements while more detailed and comprehensive plant seismic risk evaluations are being performed.

The Expedited Seismic Evaluation Process evaluations would be conducted on plants with a new seismic hazard that exceeds their current seismic design basis, and necessary modifications would be made to certain core and containment cooling components used during the initial plant coping time following a severe external event. The letter states that CEUS licensees will complete non-outage-related Expedited Seismic Evaluation Process equipment modifications by December 2016. Western United States (WUS) licensees will complete non-outage-related Expedited Seismic Evaluation Process equipment modifications by June 2018.

After review of industry's proposed EPRI Guidance, the NRC staff believes that the evaluations and potential near-term equipment modifications associated with the Expedited Seismic Evaluation Process will provide an important demonstration of seismic margin and enhance plant safety while more detailed plant risk evaluations are being conducted by licensees. The staff further concludes that the seismic evaluation guidance for the EPRI Guidance provides an appropriate methodology for licensees to implement and complete the Expedited Seismic Evaluation Process according to the schedule provided in the letter.

#### **IV. Schedule Modifications**

The NEI has proposed two adjustments to the seismic hazard reevaluations at nuclear power plant sites: (1) to complete the update of the EPRI GMM for the CEUS, and (2) to implement the EPRI Guidance. These proposed changes affect the schedule outlined in the 50.54(f) letter.

First, the industry has requested additional time to complete the updated EPRI GMM project, including documentation and interactions with the NRC staff. The project documentation is scheduled to be submitted to the NRC on June 3, 2013. Pending approval by the staff, the CEUS licensees will use the updated model to complete the site-specific seismic

hazard reevaluations specified in Enclosure 1 to the SPID guidance. Currently, the hazard submittals are requested by September 2013; however, industry has requested to submit the hazard evaluations by March 31, 2014. The industry stated in its letter that it will not delay submittal of items 3.a. "Description of Subsurface Materials and Properties," and 3.b. "Development of Base Case Profiles and Nonlinear Material Properties" of Section 4 of Enclosure 1 to the SPID guidance. Licensees intend to submit these items in September 2013 for the staff's review. This will allow the staff to begin its review in accordance with the original schedule and complete a significant portion of the Section 4 review on time.

The staff finds that the schedule modifications discussed above for CEUS plants are acceptable because the updated GMM will provide the CEUS operating nuclear plant fleet with a model developed using the most recent data and methodologies available for their seismic hazard reevaluations. Additionally, the partial submittal in September 2013 will allow the staff to complete a portion of its CEUS review as originally scheduled by the 50.54(f) letter.

Second, the industry has requested modifications to the 50.54(f) letter schedule to allow for implementation of the EPRI Guidance interim actions for those nuclear power plants where the reevaluated seismic hazard exceeds the plant's design basis. These schedule modifications allow for completion of Expedited Seismic Evaluation Process for CEUS plants by December 2016, if the modifications do not require a plant shutdown to access equipment. For WUS plants, the Expedited Seismic Evaluation Process modifications will be completed by June 2018, if the modifications do not require a plant shutdown to access equipment.

For plants requiring a seismic risk analysis (i.e., those with a reevaluated seismic hazard that exceeds the current seismic design basis), the 50.54(f) letter states that the staff will perform a prioritization for both the CEUS and WUS plants into two priority groups, and possibly a third, if needed. Under industry's proposed schedule, the higher priority CEUS plants will complete their risk evaluations by June 2017 (originally scheduled for October 2016). This

delay is primarily due to the additional time needed to complete the EPRI GMM update project. The second group of CEUS plants will complete their risk evaluations by December 2019. This is about a two-year delay from the schedule specified in the 50.54(f) letter for the lower priority plants to complete their risk evaluations. Conversely, the letter proposes an earlier completion date of June 2017 for the risk evaluations for the higher priority WUS plants.

The staff finds that the schedule modifications discussed above for CEUS and WUS nuclear power plants are acceptable, since the Expedited Seismic Evaluation Process provides for near-term seismic evaluations and expedited equipment modifications at the plants that will offer additional assurance that plants will operate safely during a beyond design basis seismic event. Furthermore, the schedule modifications account for limited seismic resources available to both the NRC and the industry. The schedule modifications provide for completion of the higher priority CEUS plant risk evaluations by the end of June 2017, which is not a significant extension of the original 50.54(f) letter schedule of October 2016. In addition, the schedule proposes an earlier completion date for the higher priority risk evaluations for the WUS plants.

## **V. Basis for Endorsement**

The NRC staff interacted with the stakeholders on development of the EPRI Guidance report with a focus on guidance on potential interim actions to be implemented for plants where the reevaluated seismic hazard exceeds the current seismic design basis. The EPRI Guidance report is the product of considerable interaction between the NRC, NEI, EPRI, and other stakeholders at five public meetings<sup>4</sup> over a 5-month period. These interactions and the insights gained from the meetings allowed for the development of this document in a very short time

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<sup>4</sup> Public meetings were held on November 2 and 14 and December 13, 2012; and February 14 and March 26, 2013.

frame. The meetings helped develop the expectations for how licensees would perform potential interim actions after updating their seismic hazard information. At each meeting, the NRC staff provided its comments on the current version of the EPRI Guidance and discussed with stakeholders subsequent proposed revisions to the document. This iterative process, over several months, resulted in the final version of the document. The NRC staff's endorsement of the EPRI Guidance is based on this cumulative development process resulting from the interactions between stakeholders and the NRC staff. This is the same process employed successfully in the development of the SPID guidance.

The staff has determined that the EPRI Guidance will provide an important demonstration of seismic margin and enhanced plant safety through evaluations and potential near-term modifications of certain core and containment cooling equipment while more comprehensive plant seismic risk evaluations are being performed. The NRC staff also has determined that the schedule modifications provided in the NEI's April 9, 2013, letter are acceptable because the schedule accounts for seismic resource limitations, EPRI's completion of the update to the GMM for the CEUS, and implementation of the EPRI Guidance evaluations and actions.

## **VI. Backfitting and Issue Finality**

This endorsement letter does not constitute backfitting as defined in 10 CFR 50.109, "Backfitting" (the Backfit Rule). This endorsement letter provides additional guidance on an

acceptable method for implementing the interim actions described in item (6) of the Requested Information in Enclosure 1, "Recommendation 2.1: Seismic," of the 50.54(f) letter. Licensees and construction permit holders may voluntarily use the guidance in the EPRI Guidance to comply with the requested interim action portion of the 50.54(f) letter. Methods, analyses, or solutions that differ from those described in the EPRI Guidance report may be deemed acceptable if they provide sufficient basis and information for the NRC staff to verify that the proposed alternative is acceptable.

## **VII. Congressional Review Act**

This endorsement letter is a rule as designated in the Congressional Review Act (5 U.S.C. 801-808). The Office of Management and Budget has found that this is a major rule in accordance with the Congressional Review Act.

Dated at Rockville, Maryland, this 7<sup>th</sup> day of May 2013.

For the Nuclear Regulatory Commission

Eric J. Leeds, Director  
Office of Nuclear Reactor Regulation

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