



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

May 7, 2013

Mr. Joseph E. Pollock, Executive Director  
Nuclear Energy Institute  
1776 I Street NW, Suite 400  
Washington, DC 20006-3708

SUBJECT: ELECTRIC POWER RESEARCH INSTITUTE FINAL DRAFT REPORT  
XXXXXX, "SEISMIC EVALUATION GUIDANCE: AUGMENTED APPROACH  
FOR THE RESOLUTION OF FUKUSHIMA NEAR-TERM TASK FORCE  
RECOMMENDATION 2.1: SEISMIC," AS AN ACCEPTABLE ALTERNATIVE TO  
THE MARCH 12, 2012, INFORMATION REQUEST FOR SEISMIC  
REEVALUATIONS

Dear Mr. Pollock:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to the Nuclear Energy Institute's (NEI's) letter<sup>1</sup> of April 9, 2013. Your letter included a discussion of the update to the central and eastern United States (CEUS) ground motion model (GMM); an attached final draft of Electric Power Research Institute (EPRI) Report, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic" (hereafter referred to as the EPRI Guidance); and attached proposed schedules accounting for the GMM update, implementation of the EPRI Guidance, and seismic resource limitations.

The NEI letter indicates that industry intends to supplement its use of the staff-endorsed "Seismic Evaluation Guidance: Screening Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic,"<sup>2</sup> with proposed interim actions, as detailed in the EPRI Guidance. The SPID guidance was the product of significant interaction between the NRC, NEI, EPRI, and other stakeholders at numerous public meetings to support licensee responses to Enclosure 1 of the March 12, 2012, information request<sup>3</sup> that was issued by the NRC pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.54(f) (the 50.54(f) letter). As with the SPID guidance, the NRC, NEI, EPRI, and other stakeholders have interacted in several public meetings since November 2012 to discuss the EPRI Guidance document.

The staff has determined that the EPRI Guidance will provide an important demonstration of seismic margin and expedite plant safety enhancements 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 has also determined that the schedule modifications provided in the NEI's April 9, 2013, letter are

<sup>1</sup> Agencywide Documents Access and Management System (ADAMS) Accession No. ML13101A379.

<sup>2</sup> The SPID guidance document is found in ADAMS under Accession No. ML12333A170. The staff endorsement letter for the SPID guidance is found in ADAMS under Accession No. ML12319A074.

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

acceptable since 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 modifications.

### Ground Motion Model

The 50.54(f) letter requested that those licensees whose plants are located in the CEUS use NUREG-2115, "Central and Eastern United States Seismic Source Characterization for Nuclear Facilities," and the appropriate EPRI (2004, 2006) GMM to characterize the seismic hazard for their sites.<sup>4</sup> Subsequent to the issuance of the 50.54(f) letter, industry informed the staff that it had undertaken a study and determined that the EPRI (2004, 2006) GMM should be updated.<sup>5</sup> In order to facilitate its eventual review of the updated EPRI GMM, the staff has interacted with NEI, EPRI, and other stakeholders in public meetings on industry's efforts to update the EPRI GMM.

By letter dated January 31, 2013,<sup>6</sup> 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,<sup>7</sup> the staff expressed concern with EPRI's treatment of uncertainty and the level of documentation in the updated GMM. The staff formally documented these concerns by letter dated March 20, 2013.<sup>8</sup>

Subsequently, in a public meeting on March 26, 2013,<sup>9</sup> industry presented a revision of its updated EPRI GMM, which demonstrated significant progress towards 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 seismic hazard curves, industry proposed a six 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. The NRC staff intends to complete its review of the industry's updated CEUS GMM by

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<sup>4</sup> Licensees whose sites are located in the western United States (WUS) were asked to develop a probabilistic seismic hazard analysis consistent with the process used for new reactor licensing under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

<sup>5</sup> By letter dated August 24, 2012, at ADAMS Accession No. ML12240A034, the industry notified staff of its intent to proceed with Phase 2 of the GMM update project.

<sup>6</sup> The letter can be found in ADAMS at Accession No. ML13059A090.

<sup>7</sup> The meeting summary and presentation materials can be found in the package in ADAMS at Accession No. ML13106A158.

<sup>8</sup> The letter can be found in ADAMS at Accession No. ML13078A029.

<sup>9</sup> The meeting summary and presentation material can be found in the package in ADAMS at Accession No. ML13081A304.

August 30, 2013, if the industry submits the completed documentation of the updated model by June 30, 2013. If the staff is unable to approve the updated EPRI GMM by August 30, 2013, industry is expected to use the staff-approved EPRI (2004, 2006) GMM for the CEUS plant reevaluations.

### EPRI Guidance

The EPRI Guidance document provides licensees with additional guidance 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 for certain core and containment cooling components while more detailed and comprehensive plant seismic risk evaluations are being performed.

The Expedited Seismic Evaluation Process focuses on the equipment needed to maintain or restore reactor and containment cooling during the initial phase of a severe external event causing an extended loss of all alternating current power as identified in Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events."<sup>10</sup> In response to the Order, NEI developed NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide."<sup>11</sup> The Expedited Seismic Evaluation Process identifies a subset of FLEX Phase 1 equipment for evaluation and potential modification. This subset of FLEX equipment is installed core and containment cooling equipment and connection points needed during an extended station blackout event.

In particular, the guidance describes a methodology for the evaluation of the seismic capacity of the equipment identified in the Expedited Seismic Evaluation Process. If the seismic capacity of the equipment is inadequate relative to the reevaluated seismic demand, then the guidance provides equipment modification criteria. These modifications will provide additional assurance regarding maintenance of core and containment cooling during beyond-design-basis seismic events. In accordance with the guidance, licensees will submit the results of the evaluations, including required equipment modifications and their implementation schedule, in an Expedited Seismic Evaluation Process report for review by the NRC staff. The letter states that CEUS licensees will submit the reports resulting from the Expedited Seismic Evaluation Process by December 2014 and complete non-outage-related Expedited Seismic Evaluation Process equipment modifications by December 2016. Similarly, the letter states that the western United States (WUS) licensees will submit Expedited Seismic Evaluation Process reports by January 2016 and 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

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<sup>10</sup> The Order is available in ADAMS under Accession No. ML12054A736.

<sup>11</sup> The guidance is available in ADAMS under Accession No. ML12242A378.

staff further concludes that 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.

In accordance with the 50.54(f) letter, each licensee is to submit to the NRC its intention to follow the NRC-endorsed seismic reevaluation guidance (or SPID), or an alternative approach, 60 days after the issuance of the NRC-endorsed guidance. Licensees may use the EPRI Guidance, in addition to the SPID guidance, as an acceptable approach for responding to the information requested in Enclosure 1 of the 50.54(f) letter. Accordingly, the NRC staff's issuance of this letter endorsing the EPRI Guidance is not considered backfitting, as defined in 10 CFR 50.109(a)(1).

The NRC requests that EPRI publish a final version of the EPRI Guidance within one month of receipt of this letter. The final version of the EPRI Guidance should incorporate this letter between the title page and the first section, and EPRI should remove the draft markings from the document.

#### Schedule Modification

As discussed above, the nuclear power industry 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, CEUS licensees will use the updated model to complete the site-specific seismic hazard evaluations specified in Enclosure 1 to the SPID guidance. Currently, the hazard submittals are requested by September 2013; however, the 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 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 Expedited Seismic Evaluation Process for those nuclear power plants where the reevaluated seismic hazard exceeds the plant's design basis. These schedule modifications allow for completion of the Expedited Seismic Evaluation Process for CEUS plants

by December 2016, if the equipment modifications do not require a plant shutdown to access equipment.<sup>12</sup> 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, 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 plants are acceptable, because 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.

The industry noted in its letter that if a large number of plants need to perform the risk evaluations, additional time may be needed which may extend the completion of some risk evaluations for a third tier of lower priority plants until December 2020. The NRC staff finds that the additional time to complete these lower priority plant risk evaluations is acceptable because limited seismic resources will likely impact the number of risk evaluations that can be completed by 2019.

### Conclusion

In conclusion, the staff has determined that the proposed EPRI Guidance and the schedule modifications described in the NEI's April 9, 2013, letter are acceptable since they provide for implementation of the expedited interim actions and near-term plant safety enhancements, as well as EPRI's completion of the update to the GMM for the CEUS. The industry proposal also provides a reasonable approach and schedule which accounts for the considerable seismic resources needed to complete the seismic reevaluations.

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<sup>12</sup> If outages are required, the plants are allowed two outages from the completion of the Expedited Seismic Evaluation Process report, which are to be submitted to the NRC staff for review by December 31, 2014.

J. Pollock

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If you or your staff have additional questions, please contact my office; alternatively, you can contact Mrs. Lisa Regner of my staff by phone at 301-415-1906, or by e-mail at [Lisa.Regner@nrc.gov](mailto:Lisa.Regner@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Eric J. Leeds". The signature is fluid and cursive, with a large initial "E" and "L".

Eric J. Leeds, Director  
Office of Nuclear Reactor Regulation

Enclosure:  
Federal Register Notice

cc: See enclosed list  
Listserv

POWER REACTOR LICENSEES AND HOLDERS OF  
CONSTRUCTION PERMITS IN ACTIVE OR DEFERRED STATUS

Arkansas Nuclear One

Entergy Operations, Inc.  
Docket Nos. 50-313 and 50-368  
License Nos. DPR-51 and NPF-6

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Beaver Valley Power Station

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Docket Nos. 50-334 and 50-412  
License Nos. DPR-66 and NPF-73

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Bellefonte Nuclear Power Station

Tennessee Valley Authority  
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Construction Permit Nos. CPPR-122 and  
CPPR-123

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Docket Nos. 50-317 and 50-318  
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License Nos. NPF-87 and NPF-89

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Crystal River Nuclear Generating Plant  
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License Nos. DPR-24 and DPR-27

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Prairie Island Nuclear Generating Plant  
1717 Wakonade Drive East  
Welch, MN 55089-9642

Quad Cities Nuclear Power Station  
Exelon Generation Co., LLC  
Docket Nos. 50-254 and 50-265  
License Nos. DPR-29 and DPR-30

Mr. Michael J. Pacillio  
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R.E. Ginna Nuclear Power Plant, LLC  
Docket No. 50-244  
License No. DPR-18

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R.E. Ginna Nuclear Power Plant  
1503 Lake Road  
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River Bend Station  
Entergy Operations, Inc.  
Docket No. 50-458  
License No. NPF-47

Vice President, Operations  
Entergy Operations, Inc.  
River Bend Station  
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St. Francisville, LA 70775

Salem Nuclear Generating Station  
PSEG Nuclear, LLC.  
Docket Nos. 50-272 & 50-311  
License Nos. DPR-70 and DPR-75

Mr. Thomas Joyce  
President and Chief Nuclear Officer  
PSEG Nuclear LLC - N09  
P.O. Box 236,  
Hancocks Bridge, NJ 08038

San Onofre Nuclear Generating Station  
Southern California Edison Company  
Docket Nos. 50-361 and 50-362  
License Nos. NFP-10 and NFP-15

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Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, CA 92674-0128

Seabrook Nuclear Plant  
NextEra Energy Seabrook, LLC  
Docket No 50-443  
License No. NFP-86

Mr. Kevin Walsh  
Vice President, Seabrook Nuclear Plant  
c/o Mr. Michael O'Keefe  
NextEra Energy Seabrook, LLC  
P.O. Box 300  
Seabrook, NH 03874

Sequoyah Nuclear Plant  
Tennessee Valley Authority  
Docket Nos. 50-327 and 50-328  
License Nos. DPR-77 and DPR-79

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Vice President, Nuclear Licensing  
Tennessee Valley Authority  
1101 Market Street, LP 3D-C  
Chattanooga, TN 37402-2801

Shearon Harris Nuclear Power Plant  
Carolina Power & Light Co.  
Docket No. 50-400  
License No. NPF-63

Mr. George T. Hamrick  
Vice President  
Carolina Power and Light Company  
Shearon Harris Nuclear Power Plant  
P.O. Box 165, Mail Zone 1  
New Hill, NC 27562-0165

South Texas Project  
STP Nuclear Operating Co.  
Docket Nos. 50-498 and 50-499  
License Nos. NPF-76 and NPF-80

Mr. Dennis L. Koehl  
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STP Nuclear Operating Company  
South Texas Project Electric Generating  
Station  
P.O. Box 289  
Wadsworth, TX 77483

St. Lucie Plant  
Florida Power & Light Co.  
Docket Nos. 50-335 and 50-389  
License Nos. DPR-67 and NPF-16

Mr. Mano Nazar  
Executive Vice President and  
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NextEra Energy  
P.O. Box 14000  
700 Universe Boulevard  
Juno Beach, FL 33408-0420

Surry Power Station  
Virginia Electric & Power Co.  
Docket Nos. 50-280 and 50-281  
License Nos. DPR-32 and DPR-37

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President and Chief Nuclear Officer  
Dominion Nuclear  
Virginia Electric & Power Company  
Innsbrook Technical Center  
5000 Dominion Boulevard  
Glen Allen, VA 23060-6711

Susquehanna Steam Electric Station  
PPL Susquehanna, LLC  
Docket Nos. 50-387 and 50-388  
License Nos. NPF-14 and NPF-22

Mr. Timothy S. Rausch  
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Berwick, PA 18603-0467

Three Mile Island, Unit 1

Exelon Nuclear  
Docket No. 50-289  
License No. DPR-50

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Turkey Point

Florida Power & Light Co.  
Docket Nos. 50-250 and 50-251  
License Nos. DPR-31 and DPR-41

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Vermont Yankee Nuclear Power Station

Entergy Nuclear Operations, Inc.  
Docket No. 50-271  
License No. DPR-28

Site Vice President, Operations  
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Virgil C. Summer Nuclear Station

South Carolina Electric & Gas Co.  
Docket No. 50-395  
License No. NPF-12

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Vogtle Electric Generating Plant  
Southern Nuclear Operating Co.  
Docket Nos. 50-424 and 50-425  
License Nos. NPF-68 and NPF-81

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Waterford Steam Electric Station

Entergy Operations, Inc.  
Docket No. 50-382  
License No. NPF-38

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Waterford Steam Electric Station, Unit 3  
17265 River Road  
Killona, LA 70057-0751

Watts Bar Nuclear Plant, Units 1 and 2

Watts Bar Nuclear Plant, Unit 1  
Tennessee Valley Authority  
Docket No. 50-390  
License No. NPF-90

Watts Bar Nuclear Plant, Unit 2  
Tennessee Valley Authority  
Docket No. 50-391  
Construction Permit No. CPPR No. 092

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William B. McGuire Nuclear Station  
Duke Energy Carolinas, LLC  
Docket Nos. 50-369 and 50-370  
License Nos. NPF-9 and NPF-17

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Duke Energy Carolinas, LLC  
McGuire Nuclear Station  
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Huntersville, NC 28078-8985

Wolf Creek Generating Station  
Wolf Creek Nuclear Operating Corp.  
Docket No. 50-482  
License No. NPF-42

Mr. Matthew W. Sunseri  
President and Chief Executive Officer  
Wolf Creek Nuclear Operating Corporation  
P.O. Box 411  
Burlington, KS 66839



NUCLEAR REGULATORY COMMISSION

[NRC-2013-0038]

**Electric Power Research Institute; Seismic Evaluation Guidance**

**AGENCY:** U.S. 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. 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 (50.54(f) letter), "Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the 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

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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.

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

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.

**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**

Pursuant to 10 CFR Part 50.54(f), the NRC issued a 50.54(f) 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

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<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.

strategies for the screening, prioritization, and implementation of seismic risk evaluations that 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 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

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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.

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

J. Pollock

- 6 -

If you or your staff have additional questions, please contact my office; alternatively, you can contact Mrs. Lisa Regner of my staff by phone at 301-415-1906, or by e-mail at [Lisa.Regner@nrc.gov](mailto:Lisa.Regner@nrc.gov).

Sincerely,

*/ra/*

Eric J. Leeds, Director  
Office of Nuclear Reactor Regulation

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Letter to Joseph E. Pollock from Eric J. Leeds dated May 7, 2013

SUBJECT: ELECTRIC POWER RESEARCH INSTITUTE FINAL DRAFT REPORT  
XXXXXX, "SEISMIC EVALUATION GUIDANCE: AUGMENTED APPROACH  
FOR THE RESOLUTION OF FUKUSHIMA NEAR-TERM TASK FORCE  
RECOMMENDATION 2.1: SEISMIC" AS ACCEPTABLE ALTERNATIVE TO  
THE MARCH 12, 2012, INFORMATION REQUEST FOR SEISMIC  
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