



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

May 1, 2014

Vice President, Operations  
Entergy Operations, Inc.  
Grand Gulf Nuclear Station  
P.O. Box 756  
Port Gibson, MS 39150

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 - STAFF ASSESSMENT OF THE SEISMIC WALKDOWN REPORT SUPPORTING IMPLEMENTATION OF NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT (TAC NO. MF0128)

Dear Sir or Madam:

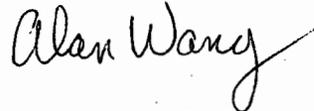
On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued a request for information letter per Title 10 of the *Code of Federal Regulations*, Subpart 50.54(f) (50.54(f) letter). The 50.54(f) letter was issued to power reactor licensees and holders of construction permits requesting addressees to provide further information to support the NRC staff's evaluation of regulatory actions to be taken in response to lessons learned from Japan's March 11, 2011, Great Tōhoku Earthquake and subsequent tsunami. The request addressed the methods and procedures for nuclear power plant licensees to conduct seismic and flooding hazard walkdowns to identify and address degraded, nonconforming, or unanalyzed conditions through the corrective action program, and to verify the adequacy of the monitoring and maintenance procedures.

By letter dated November 27, 2012, Entergy Operations, Inc. (Entergy), submitted its Seismic Walkdown Report as requested in Enclosure 3 of the 50.54(f) letter for the Grand Gulf Nuclear Station, Unit 1. By letter dated December 2, 2013, the licensee provided a response to the NRC request for additional information for the staff to complete its assessments.

The NRC staff reviewed the information provided and, as documented in the enclosed NRC staff assessment, determined that sufficient information was provided to be responsive to Enclosure 3 of the 50.54(f) letter.

If you have any questions, please contact me at 301-415-1445 or by e-mail at [Alan.Wang@nrc.gov](mailto:Alan.Wang@nrc.gov).

Sincerely,

A handwritten signature in black ink that reads "Alan Wang". The signature is written in a cursive style with a long, sweeping underline.

Alan B. Wang, Project Manager  
Plant Licensing IV-2 and Decommissioning  
Transition Branch  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosure:  
Staff Assessment of Seismic  
Walkdown Report

cc w/encl: Distribution via Listserv

STAFF ASSESSMENT OF SEISMIC WALKDOWN REPORT  
NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO  
THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT  
ENERGY OPERATIONS, INC.  
GRAND GULF NUCLEAR STATION, UNIT 1  
DOCKET NO. 050-416

1.0 INTRODUCTION

On March 12, 2012,<sup>1</sup> the U.S. Nuclear Regulatory Commission (NRC) issued a request for information per Title 10 of the *Code of Federal Regulations*, Subpart 50.54(f) (50.54(f) letter to all power reactor licensees and holders of construction permits in active or deferred status. The request was part of the implementation of lessons learned from the accident at the Fukushima Dai-ichi nuclear power plant. Enclosure 3, "Recommendation 2.3: Seismic,"<sup>2</sup> to the 50.54(f) letter requested licensees to conduct seismic walkdowns to identify and address degraded, nonconforming, or unanalyzed conditions using the corrective action program (CAP), verify the adequacy of monitoring and maintenance procedures, and report the results to the NRC.

Enclosure 3 of the 50.54(f) letter requested licensees to provide the following:

- a. Information concerning the plant-specific hazard licensing bases and a description of the protection and mitigation features considered in the licensing basis evaluation.
- b. Information related to the implementation of the walkdown process.
- c. A list of plant-specific vulnerabilities identified by the IPEEE [Individual Plant Examination of External Events] program and a description of the actions taken to eliminate or reduce them...
- d. Results of the walkdown including key findings and identified degraded, nonconforming, or unanalyzed conditions...
- e. Any planned or newly installed protection and mitigation features.
- f. Results and any subsequent actions taken in response to the peer review.

In accordance with the 50.54(f) letter, Enclosure 3, Required Response Item 2, licensees were required to submit a response within 180 days of the NRC's endorsement of the seismic

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<sup>1</sup> Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340.

<sup>2</sup> ADAMS Accession No. ML12056A049.

walkdown process. By letter dated May 29, 2012,<sup>3</sup> the Nuclear Energy Institute (NEI) staff submitted Electric Power Research Institute (EPRI) document 1025286, "Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic," (walkdown guidance) to the NRC staff to consider for endorsement. By letter dated May 31, 2012,<sup>4</sup> the NRC staff endorsed the walkdown guidance.

By letter dated November 26, 2012,<sup>5</sup> Entergy Operations, Inc. (Entergy, the licensee), provided a response to Enclosure 3 of the 50.54(f) letter Required Response Item 2, for Grand Gulf Nuclear Station, Unit 1 (GGNS).

The NRC staff reviewed the walkdown reports and determined that additional information would assist the staff in completing its review. By letter dated November 1, 2013,<sup>6</sup> the NRC staff requested additional information to gain a better understanding of the processes and procedures used by the licensee in conducting the walkdowns and walk-bys. The licensee responded to the NRC staff's request for additional information (RAI) by letter dated December 2, 2013.<sup>7</sup>

The NRC staff evaluated the licensee's submittals to determine if the information provided in the walkdown report met the intent of the walkdown guidance and if the licensee responded appropriately to Enclosure 3 of the 50.54(f) letter.

## 2.0 REGULATORY EVALUATION

The structures, systems, and components (SSCs) important to safety in operating nuclear power plants are designed either in accordance with, or meet the intent of Appendix A to 10 CFR Part 50, General Design Criteria (GDC) 2, "Design Bases for Protection Against Natural Phenomena," and Appendix A to 10 CFR Part 100, "Reactor Site Criteria." GDC 2 states that SSCs important to safety at nuclear power plants shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunamis, and seiches without loss of capability to perform their safety functions.

For initial licensing, each licensee was required to develop and maintain design bases that, as defined by 10 CFR 50.2, identify the specific functions that an SSC of a facility must perform, and the specific values or ranges of values chosen for controlling parameters as reference bounds for the design.

The design bases for the SSCs reflect appropriate consideration of the most severe natural phenomena that have been historically reported for the site and surrounding area. The design bases also reflect sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

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<sup>3</sup> ADAMS Package Accession No. ML121640872.

<sup>4</sup> ADAMS Accession No. ML12145A529.

<sup>5</sup> ADAMS Package Accession No. ML123520086.

<sup>6</sup> ADAMS Accession No. ML13304B418.

<sup>7</sup> ADAMS Accession No. ML13337A593.

The current licensing basis (CLB) is the set of NRC requirements applicable to a specific plant, including the licensee's docketed commitments for ensuring compliance with, and operation within, applicable NRC requirements and the plant-specific design basis, including all modifications and additions to such commitments over the life of the facility operating license.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Seismic Licensing Basis Information

The licensee provided information on the plant-specific licensing basis for the Seismic Category I SSCs for GGNS in Section 2 of the walkdown report. Consistent with the walkdown guidance, the NRC staff noted that the report includes a summary of the Safe Shutdown Earthquake (SSE), and a description of the codes, standards, and methods that were used in the design of the Seismic Category I SSCs for meeting the plant-specific seismic licensing basis requirements. The NRC staff reviewed Section 2 of the walkdown report, focusing on the summary of the SSE, methodology and the design codes used in the design of GGNS.

Based on its review, the NRC staff concludes that the licensee has provided information on the plant-specific seismic licensing basis and a description of the protection and mitigation features considered in the licensing bases evaluation consistent with Section 8, Submittal Report, of the walkdown guidance.

#### 3.2 Seismic Walkdown Methodology Implementation

Section 2, Personnel Qualifications; Section 3, Selection of SSCs; Section 4, Seismic Walkdowns and Area Walk-Bys; and Section 5, Seismic Licensing Basis Evaluations, of the walkdown guidance provide information to licensees regarding the implementation of an appropriate seismic walkdown methodology. By letter dated July 10, 2012,<sup>8</sup> the licensee confirmed that it would utilize the walkdown guidance in the performance of the seismic walkdowns at GGNS.

The walkdown report dated November 26, 2012 did not identify deviations from the walkdown guidance. The NRC staff reviewed the following sections of the walkdown methodology implementation provided in the walkdown report:

- Personnel Qualifications
- Development of the Seismic Walkdown Equipment Lists (SWELs)
- Implementation of the Walkdown Process
- Licensing Basis Evaluations and Results

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<sup>8</sup> ADAMS Accession No. ML12194A549.

### 3.2.1 Personnel Qualifications

Section 2, Personnel Qualifications, of the walkdown guidance provides licensees with qualification information for personnel involved in the conduct of the seismic walkdowns and area walk-bys.

The NRC staff reviewed the information provided in Section 4 of the walkdown report, which includes information on the walkdown personnel and their qualifications. Specifically, the staff reviewed the summary of the background, experience, and level of involvement for the following personnel involved in the seismic walkdown activities: equipment selection personnel, seismic walkdown engineers (SWEs), licensing basis reviewers, IPEEE reviewers, peer review team, and operations staff.

The NRC staff noted that Table 4-1 of the walkdown report does not identify names for licensing basis reviewers involved in the walkdown activities. The licensee stated in section 8.0 of the walkdown report that SWE teams performing the walkdowns conservatively entered conditions found in the field into the plant's CAP, therefore, no licensing basis evaluations or reviewers were needed.

Based on the review of the licensee's submittals, the NRC staff concludes that those involved in the seismic walkdown activities have the appropriate seismic background, knowledge and experience, as specified in Section 2 of the walkdown guidance.

### 3.2.2 Development of the SWELs

Section 3, Selection of SSCs, of the walkdown guidance provides information to licensees for selecting the SSCs that should be placed on the SWELs, so that they can be walked down by qualified personnel.

The NRC staff reviewed the overall process used by the licensee to develop the GGNS Base lists, and the SWEL 1 (sample list of designated safety functions equipment) and SWEL 2 (sample list of spent fuel pool (SFP)-related equipment). The licensee provided Base Lists 1 and 2; and SWELs 1 and 2 for GGNS in Tables B.1, B.2, B.3, and B.4, respectively, in Attachment B of the walkdown report.

This equipment selection process followed the screening process shown in Figures 1-1 and 1-2 of the walkdown guidance. Based on the walkdown report, GGNS SWELs 1 and 2 meet the inclusion requirements of the walkdown guidance. Specifically, the following attributes were considered in the sample selection:

- A variety of systems, equipment and environments
- IPEEE equipment
- Major new or replacement equipment
- Risk considerations

Due to individual plant configurations and the walkdown guidance screening process followed to select the final SWEL equipment, it is possible that some classes of equipment will not be represented on the SWELs. The walkdown guidance recognizes this is due to the equipment not being present in the plant (e.g., some plants generate direct current power using inverters and therefore do not have motor generators) or the equipment being screened out during the screening process (the screening process is described in Section 3 of the walkdown guidance). Based on the information provided, the NRC staff noted that a detailed explanation was provided justifying cases where specific classes of equipment were not included (e.g., Class 11 or 13) as part of the SWEL, and concludes that these exclusions are acceptable.

The NRC staff noted that items that could cause rapid drain-down to a level below 10 feet above the top of the fuel were not included as part of the SWEL 2, as described in Section 3 of the guidance. In Section 6.2 of the walkdown report, the licensee stated that there are no components that could, upon failure, result in rapid drain-down of the spent fuel pool water level to below 10 feet above the top of the fuel. After reviewing the information provided in this section, the NRC staff concludes that the licensee provided sufficient information to justify that there are no items that could lead to rapid drain-down of the GGNS spent fuel pool.

After reviewing SWELs 1 and 2, the NRC staff concludes that the sample of SSCs represents a diversity of component types and assures inclusion of components from critical systems and functions, thereby meeting the intent of the walkdown guidance. In addition, the NRC staff notes that the equipment selection personnel were appropriately supported by plant operations staff as described in the walkdown guidance.

### 3.2.3 Implementation of the Walkdown Process

Section 4, Seismic Walkdowns and Area Walk-Bys, of the walkdown guidance provides information to licensees regarding the conduct of the seismic walkdowns and area walk-bys for each site.

The NRC staff reviewed Section 7.0 of the walkdown report, which summarizes the results of the seismic walkdowns and area walk-bys, including an overview of the number of items walked down and the number of areas walked-by. The walkdown report states that at least two-person teams of trained Seismic Walkdown Engineers (SWEs) conducted the seismic walkdowns and area walk-bys. According to the signed seismic walkdown checklists (SWCs) and area walk-by checklists (AWCs), these activities were conducted over the course of 3 weeks during September and October 2012. The walkdown report also states that the SWEs discussed their observations and judgments with each other during the walkdowns. Additionally, the SWEs agreed on the results of their seismic walkdowns and area walk-bys before reporting the results of their review. Attachments C and D of the walkdown reports provides the completed SWCs and AWCs, documenting the results for each item of equipment on the SWELs 1 and 2 and each area containing SWEL equipment. The licensee used the checklists provided in Appendix C of the walkdown guidance report without modification.

The licensee documented cases of potentially adverse seismic conditions (PASCs) in the checklists for further evaluation. Attachment E of the walkdown report shows that 20 PASCs were identified during the seismic walkdowns and the area walk-bys. The licensee stated that each PASC was entered into the plant's CAP for resolution. Based on the initial review of the

checklists, the NRC staff was unable to confirm that all the PASCs identified during the walkdowns were included in this table. As such, by letter dated November 1, 2013, the staff issued two questions in an RAI in order to obtain additional clarification regarding the process followed by the licensee when evaluating conditions identified in the field during the walkdowns and walk-bys. Specifically, in RAI 1, the staff requested the licensee to provide further explanation regarding how a field observation was determined to be a PASC, and to ensure that the basis for determination was addressed using normal plant processes and documented in the walkdown report. In response to RAI 1, the licensee referenced the description of the walkdown process as described in Attachment E of the GGNS walkdown report, and stated that all PASCs were entered into the plant's CAP. Furthermore, the licensee confirmed that no new conditions were identified for all the PASCs identified during the walkdowns or walk-bys and that all items were addressed in the walkdown report.

After evaluating the licensee's response and reviewing the updated Attachment E of the submittal, the NRC staff concludes that the licensee responded appropriately to RAI 1 and PASCs were properly identified and documented and the summary table included in Attachment E is considered complete.

In addition to the information provided above, the NRC staff noted that the method for verifying anchorage configurations was summarized in Section 7.1 of the walkdown report and were verified to be consistent with existing plant documentation for at least 50 percent of the SWEL items, in accordance with Section 4 of the walkdown guidance.

Based on a review of the licensee's general walkdown methodology as described in Section 7.1 of the walkdown report and the SWCs and AWCs in Attachments C and D of the walkdown report, the NRC staff confirmed that cabinets were opened, where applicable, by the seismic walkdown team.

The equipment that was inaccessible during the 180-day period is listed in Table 6-1 the GGNS walkdown report. The licensee identified a total of 10 items that were inaccessible. Nine of them were SWEL items that were inaccessible while the plant is at power and the remaining one was a cabinet that could not be opened due to it being energized. The licensee stated that walkdowns of these items have been deferred until the next refueling outage scheduled for February 2014. The licensee committed to provide an updated submittal report in April 2014.

Based on the information provided in the licensee's submittals, the NRC staff concludes that the licensee's implementation of the walkdown process meets the intent of the walkdown guidance.

#### 3.2.4 Licensing Basis Evaluations and Results

Section 5, Seismic Licensing Basis Evaluations, of the walkdown guidance provides information to licensees regarding the conduct of licensing basis evaluations for items identified during the seismic walkdowns as degraded, nonconforming, or unanalyzed that might have potential seismic significance.

The NRC staff reviewed Section 8.0 of the GGNS Walkdown Report, which discusses the process used by the licensee to identify and resolve PASCs identified during the walkdowns. The licensee stated that SWE teams performing the walkdowns used conservative engineering

judgment in identifying conditions in the field, including housekeeping seismic issues and PASCs. The licensee stated that all conditions were conservatively dispositioned in the plant's CAP and, therefore, no licensing basis evaluations were needed. Attachment E of the walkdown report lists the key licensee findings, and provides a complete list of the potentially degraded, nonconforming, or unanalyzed conditions. Attachment E also describes the actions taken or planned to address these conditions, including the current status of each of the PASC items the licensee entered into the CAP.

The NRC staff reviewed the CAP entries and the description of the actions taken or planned to address potential deficiencies. The staff concludes that the licensee appropriately identified degraded, nonconforming, or unanalyzed conditions and entered them into the CAP, which meets the intent of the walkdown guidance.

### 3.2.5 Conclusion

Based on the above, the NRC staff concludes that the licensee's implementation of seismic walkdown methodology, meets the intent of the walkdown guidance for personnel qualifications, development of SWELs, implementation of the walkdown process, and seismic licensing basis evaluations.

### 3.3 Peer Review

Section 6, Peer Review, of the walkdown guidance provides licensees with information regarding the conduct of peer reviews for the activities performed during the seismic walkdowns. Page 6-1 of the walkdown guidance identifies the following activities to be conducted during the peer review process:

- Review the selection of the SSCs included on the SWELs
- Review a sample of the checklists prepared for the seismic walkdowns and area walk-bys
- Review the licensing basis evaluations
- Review the decisions for entering the potentially adverse conditions into the CAP
- Review the walkdown report
- Summarize the results of the peer review process in the walkdown report

The NRC staff reviewed the information provided in Section 9 and Attachment G of the GGNS Walkdown Report which describes the conduct of the peer review. In addition, the staff reviewed the response to RAI 2. In RAI 2, the staff requested the licensee to provide additional information on the overall peer review process that was followed as part of the walkdown activities. Specifically, the staff requested the licensee to confirm that the activities identified on page 6-1 of the walkdown guidance were assessed and documented in the report. The licensee was also requested to confirm that any individual involved in performing any given walkdown activity was not a peer reviewer for that same activity. In response to RAI 2, the licensee confirmed that all

peer review activities were performed in accordance with Section 6 of the walkdown guidance and referred to Section 9.0 and Attachment G of the GGNS walkdown report. In addition, the licensee stated that none of the peer review engineers were involved in the seismic walkdown inspection process in order to further demonstrate the independence of the peer review process.

The NRC staff reviewed the licensee's summary of each of these activities, which included a discussion of the peer review team members' qualifications and level of involvement, the peer review findings, and resolution of peer review comments. After reviewing the licensee's submittals, the NRC staff concludes that the licensee sufficiently documented the results of the peer review activities and how these reviews affected the work described in the walkdown report.

Based on the above, the NRC staff concludes that the licensee's results of the peer review and subsequent actions taken in response to the peer review meets the intent of Section 6 of the walkdown guidance.

### 3.4 IPEEE Information

Section 7, IPEEE Vulnerabilities, of the walkdown guidance provides information to licensees regarding the reporting of the evaluations conducted and actions taken in response to seismic vulnerabilities identified during the IPEEE program. Through the IPEEE program and Generic Letter 88-20, "Individual Plant Examination of External Events for Severe Accident Vulnerabilities," dated November 23, 1988,<sup>9</sup> licensees previously had performed a systematic examination to identify any plant-specific vulnerabilities to severe accidents.

The licensee provided background information regarding its IPEEE program and referenced several submittals to the NRC. The licensee identified 42 GGNS seismic vulnerabilities in Attachment A of the walkdown report. Attachment A provides pertinent information regarding each vulnerability, namely: a description of the action taken to reduce or eliminate the vulnerability, status of the IPEEE action in the configuration management program of the vulnerability, and the date of resolution actions for each vulnerability.

Based on the NRC staff's review of Section 5.0 of the walkdown report, the staff concludes that the licensee's identification of plant-specific vulnerabilities (including anomalies, outliers and other findings) identified by the IPEEE program, as well as actions taken to eliminate or reduce them, meets the intent of Section 7 of the walkdown guidance.

### 3.5 Planned Upgrades

The licensee did not identify any planned or newly installed protection and mitigation features in the walkdown report.

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<sup>9</sup> ADAMS Accession No. ML031150465.

### 3.6 NRC Oversight

#### 3.6.1 Independent Verification by Resident Inspectors

On July 6, 2012,<sup>10</sup> the NRC issued Temporary Instruction (TI) 2515/188, "Inspection of Near-Term Task Force Recommendation 2.3 Seismic Walkdowns." In accordance with the TI, NRC inspectors independently verified that the GGNS licensee implemented the seismic walkdowns in accordance with the walkdown guidance. Additionally, the inspectors independently performed walkdowns of a sample of seismic protection features. The inspection report dated February 11, 2013,<sup>11</sup> documents the results of this inspection and states that no findings were identified.

### 4.0 INACCESSIBLE ITEMS

The status of the limited number of inaccessible items and deferred cabinets is listed in Table 6-1 of the walkdown report. The walkdowns for all of the remaining inaccessible items and cabinets were committed to be completed during the next scheduled GGNS refueling outage in the spring of 2014. The licensee committed to provide a final walkdown report with the results of these walkdown items by April 30, 2014.

The NRC staff concludes that the inaccessible equipment list was developed consistent with the walkdown guidance. The schedule for completion is consistent with the time to the next scheduled outage.

### 5.0 CONCLUSION

The NRC staff concludes that the licensee's implementation of seismic walkdown methodology meets the intent of the walkdown guidance. The staff concludes that, through the implementation of the walkdown guidance activities and, in accordance with plant processes and procedures, the licensee verified the plant configuration with the current seismic licensing basis; addressed degraded, nonconforming, or unanalyzed seismic conditions; and verified the adequacy of monitoring and maintenance programs for protective features. Furthermore, the staff notes that no immediate safety concerns were identified. The staff acknowledges that a supplemental letter will be provided by April 30, 2014, addressing the remaining inaccessible items consistent with the regulatory commitment. The NRC staff reviewed the information provided and determined that sufficient information was provided to be responsive to Enclosure 3 of the 50.54(f) letter.

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<sup>10</sup> ADAMS Accession No. ML12156A052.

<sup>11</sup> ADAMS Accession No. ML13042A373.

If you have any questions, please contact me at 301-415-1445 or by e-mail at [Alan.Wang@nrc.gov](mailto:Alan.Wang@nrc.gov).

Sincerely,

**/RA/**

Alan B. Wang, Project Manager  
Plant Licensing IV-2 and Decommissioning  
Transition Branch  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosure:  
Staff Assessment of Seismic  
Walkdown Report

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**ADAMS Accession No. ML14098A175**

**\* concurrence by e-mail**

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