



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

May 29, 2014

Mr. John A. Dent, Jr.  
Site Vice President  
Entergy Nuclear Operations, Inc.  
Pilgrim Nuclear Power Station  
600 Rocky Hill Road  
Plymouth, MA 02360-5508

SUBJECT: PILGRIM NUCLEAR POWER STATION - 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. MF0160)

Dear Mr. Dent:

On March 12, 2012, 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). The 50.54(f) letter was issued to power reactor licensees and holders of construction permits requesting addressees to provide 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, as supplemented by letter dated July 18, 2013, Entergy Nuclear Operations, Inc. (Entergy) submitted its Seismic Walkdown Report for the Pilgrim Nuclear Power Station, as requested in Enclosure 3 of the 50.54(f) letter. By letter dated November 26, 2013, Entergy provided a response to the NRC staff's request for additional information to complete its assessments.

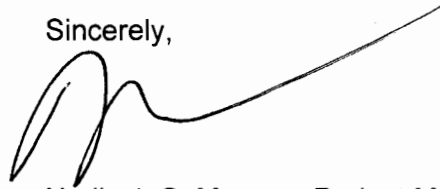
The NRC staff reviewed the information provided and determined that provided information was responsive to Enclosure 3 of the 50.54(f) letter, as documented in the enclosed NRC staff assessment.

J. Dent

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If you have any questions, please contact me at 301-415-1016 or by e-mail at Nadiyah.Morgan@nrc.gov

Sincerely,

A handwritten signature in black ink, consisting of a large, stylized initial 'N' followed by a long, sweeping horizontal line that extends to the right.

Nadiyah S. Morgan, Project Manager  
Plant Licensing Branch I-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-293

Enclosure:  
As stated

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  
ENTERGY NUCLEAR OPERATIONS, INC  
PILGRIM NUCLEAR POWER STATION  
DOCKET NO. 50-293

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* (CFR), Subpart 50.54(f) 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.

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 (LBE).
- 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 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 27, 2012,<sup>5</sup> Entergy Nuclear Operations, Inc., the licensee, provided a response to Required Response Item 2 of Enclosure 3 of the 50.54(f) letter, for Pilgrim Nuclear Power Station (Pilgrim). In addition, by letter dated July 18, 2013,<sup>6</sup> the licensee provided an update to the initial seismic walkdown report. The purpose of the letter was to update and provide information on inaccessible components.

The NRC staff reviewed the walkdown report and determined that additional supplemental information would assist the NRC staff in completing its review. In a letter dated November 1, 2013,<sup>7</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 request by letter dated November 26, 2013.<sup>8</sup>

The NRC staff evaluated the licensee's submissions 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." The 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 a 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

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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. ML12340A374

<sup>6</sup> ADAMS Package Accession No. ML13232A126

<sup>7</sup> ADAMS Accession No. ML13304B418

<sup>8</sup> ADAMS Accession No. ML ML13346A014

bases also reflect sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The current licensing basis 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 Pilgrim in Section 2.0 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 2.0 of the walkdown report, focusing on the summary of the SSE and the design codes used in the design.

Based on the NRC staff's 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 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 LBEs, of the walkdown guidance (EPRI document 1025286) provides information to licensees regarding the implementation of an appropriate seismic walkdown methodology.

By letter dated July 10, 2012,<sup>9</sup> the licensee confirmed that it would utilize the walkdown guidance in the performance of the seismic walkdowns at Pilgrim. The walkdown report dated November 27, 2012, and supplemented on July 18, 2013, 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
- LBEs and Results

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<sup>9</sup> ADAMS Accession No. ML12198A007

### 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 4.0 and Table 4-1 of the walkdown report, which includes information on the walkdown personnel and their qualifications. Specifically, the NRC 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 provides one representative from plant operations involved in the equipment selection and development of the SWEL. In addition, the NRC staff noted that the experience of the four SWEs (two of the four also served as licensing basis reviewers) varies from over 2 years to over 20 years in analysis and design of structural and mechanical systems, seismic qualification of equipment, and plant modifications at various nuclear facilities, including Pilgrim. The IPEEE reviewer, who also served as an SWE and licensing basis reviewer, has a total of more than 5 years of experience in engineering design of nuclear facilities, including seismic design. The two peer reviewers have more than 35 years experience each in the nuclear power industry.

Based on the review of the licensee's submissions, 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 Pilgrim base list, SWEL 1 (sample list of designated safety functions equipment) and SWEL 2 (sample list of spent fuel pool (SFP) related equipment). The overall equipment selection process followed the screening process shown in Figures 1-1 and 1-2 of the walkdown guidance. Based on Attachment B and Tables 9.4.2 and 9.4.5 of the walkdown report, Pilgrim 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 SWEL. The walkdown guidance recognizes that this is due to the equipment not being present in the plant (e.g., some plants generate DC 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 as part of the SWEL, and concludes that these exclusions are acceptable.

The NRC staff also noted that a rapid drain-down list was included as part of the SWEL 2, as described in Section 3 of the walkdown guidance. In Section 6.2.3 of the walkdown report, the licensee stated there are 16 components that could, upon failure, result in rapid drain-down of the SFP 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 followed the appropriate steps, as described in Screen 4 of the walkdown guidance, to define and assess items that could lead to rapid drain-down of the Pilgrim SFP, and provided sufficient information to justify the items included in the SWEL 2.

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 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 two teams consisting of two qualified SWEs conducted the seismic walkdowns and area walk-bys. These activities were conducted during three weeks in October of 2012. In addition, a subsequent set of walkdowns were performed during refueling outage 19 in April of 2013, as stated in Section 6.3 of the updated walkdown report. The purpose of the last activity was to complete a number of items that were inaccessible during the initial walkdowns.

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, D, J and K of the updated walkdown report provide the completed seismic walkdown checklists (SWCs) and area walk-by checklists (AWCs), documenting the results for each item of equipment on SWEL 1 and 2 and each area containing SWEL equipment. The licensee used the checklists provided in Appendix C of the walkdown guidance without modification.

The NRC staff reviewed the original checklists in Attachment C and noted that the SWCs and AWCs were all signed between October 3 - 18, 2012. The NRC staff reviewed the overall

walkdown process described in the walkdown report and additional clarification provided as part of response to request for additional information (RAI) 1 (see RAI discussion below). The licensee stated that the checklists completed in the field as part of the walkdowns were finalized with input from Pilgrim design engineering management in order to document how issues were evaluated and their resolutions. These finalized checklists which were signed between October 3 - 18, 2012, were included as part of the walkdown report.

As stated above, the licensee documented cases of potentially adverse seismic conditions (PASCs) in the checklists for further evaluation. A table in Attachment E of the walkdown report lists the PASCs identified during the seismic walkdowns and the area walk-bys. The table describes how the condition was addressed (e.g., placement in the CAP), its resolution and current status.

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 the Attachment E table. As such, by letter dated November 1, 2013, the NRC staff issued two RAI questions in order to obtain 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 NRC staff requested the licensee to provide further explanation regarding how a field observation was determined to be 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 provided additional clarification and confirmed that observations that could not be readily judged to be acceptable with respect to its current licensing basis during the walkdown, were identified as PASCs on the SWCs and AWCs. These PASCs were further evaluated in the field and if the condition was determined to be unusual or uncertain, it was then either addressed via LBE or entered into the CAP for resolution. The licensee referred to Section 8.0 of the walkdown report which includes a description of all these items. Furthermore, the licensee stated that LBE items not readily concluded through the process to meet their current licensing basis were entered directly into the CAP.

After evaluating the licensee's response and reviewing Section 8.0 of the walkdown report, the NRC staff concludes that the licensee responded appropriately to RAI 1, PASCs were properly identified, and the summary list of condition reports, documented in Section 8.2 and Attachment E on CAP entries is considered complete.

In addition to the information provided above, the NRC staff notes that anchorage configurations 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.

Section 6.3 and Attachments J and K of the updated walkdown report confirm that additional walkdowns were conducted in April of 2013 to perform internal inspections of selected electrical equipment cabinets that were not completely inspected or were not opened during the initial walkdowns. The NRC staff reviewed the SWCs provided in the updated walkdown report and confirmed that cabinets were opened by the licensee to determine if any adverse conditions existed for internal equipment.



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

#### 3.2.4 LBEs and Results

Section 5, Seismic LBEs, of the walkdown guidance provides information to licensees regarding the conduct of LBEs 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 Pilgrim Walkdown Report, which discusses the process for conducting the seismic LBEs of the PASCs identified during the seismic walkdowns and area walk-bys. The licensee stated that conditions in the field were either addressed via LBE or entered into the CAP for resolution. The licensee stated it performed a total of four LBE items as documented in Attachment F of the walkdown report. The results are summarized in Attachment E which shows all were resolved and require no further action. Section 8.2 of the walkdown report lists the key licensee findings, and provides a complete list of the potentially degraded, nonconforming, or unanalyzed conditions. The summary list provided in Section 8.2 also describes the actions planned to address these conditions in the CAP.

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

#### 3.2.5 NRC Staff Findings

Based on the discussion 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 LBEs.

#### 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 LBEs
- 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 9.0 of the Pilgrim Walkdown Report which describes the conduct of the peer review. In addition, the NRC staff reviewed the response to RAI 2. In RAI 2, the NRC 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 NRC 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 the activities identified on page 6-1 of the walkdown guidance were included as part of the peer review process and referred to the summary of the peer review activities provided in Section 9.2 of the 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 the peer review team members' level of involvement, the peer review findings, and resolution of peer review comments. After reviewing the licensee's submissions, 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 discussion 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 (GL) 88-20, "Individual Plant Examination of External Events for Severe Accident Vulnerabilities," licensees previously had performed a systematic examination to identify any plant-specific vulnerabilities to severe accidents.

The licensee provided background information regarding their IPEEE program. The licensee stated that four issues were identified where installed configurations did not conform to seismic design configurations. A description of these conditions was provided in Attachment A of the walkdown report. In addition, the list of vulnerabilities provided in Attachment A was used to ensure that some equipment enhanced as a result of the IPEEE program were included in SWEL-1 in Section 6.1.2 of the walkdown report. The licensee stated that all the IPEEE identified issues were resolved by August 14, 2000.

Based on the NRC staff's review of Section 5.0 and Attachment A of the walkdown report, the NRC 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.

### 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 at Pilgrim independently verified that the 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 January 31, 2013,<sup>11</sup> documents the results of this inspection and states that no findings were identified.

### 4.0 CONCLUSION

The NRC staff concludes that the licensee's implementation of seismic walkdown methodology meets the intent of the walkdown guidance. The NRC staff concludes that the licensee, through the implementation of the walkdown guidance activities and, in accordance with plant processes and procedures, 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 NRC staff notes that no immediate safety concerns were identified. The NRC staff concludes that the licensee responded appropriately 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. ML13031A253

J. Dent

- 2 -

If you have any questions, please contact me at 301-415-1016 or by e-mail at Nadiyah.Morgan@nrc.gov.

Sincerely,

/RA/

Nadiyah S. Morgan, Project Manager  
Plant Licensing Branch I-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-293

Enclosure:  
As stated

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\* concurrence via e-mail

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