



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

April 23, 2014

Mr. Christopher J. Wamser
Site Vice President
Entergy Nuclear Operations, Inc.
Vermont Yankee Nuclear Power Station
320 Governor Hunt Road
Vernon, VT 05354

SUBJECT: VERMONT YANKEE 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. MF0188)

Dear Mr. Wamser:

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.

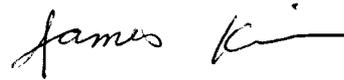
By letter dated November 27, 2012, as supplemented by letter dated July 3, 2013, Entergy Nuclear Operations, Inc. (Entergy) submitted its Seismic Walkdown Report as requested in Enclosure 3 of the 50.54(f) letter for the Vermont Yankee Nuclear Power Station (Vermont Yankee). By letter dated November 22, 2013, Entergy 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 staff assessment, determined that sufficient information was provided to be responsive to Enclosure 3 of the 50.54(f) letter.

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If you have any questions, please contact me at 301-415-4125 or by e-mail at James.Kim@nrc.gov

Sincerely,

A handwritten signature in cursive script that reads "James Kim". The signature is written in black ink and is positioned above the typed name and title.

James Kim, Project Manager
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-271

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
ENTERGY NUCLEAR OPERATIONS, INC.
VERMONT YANKEE NUCLEAR POWER STATION
DOCKET NO. 50-271

1.0 INTRODUCTION

On March 12, 2012,¹ 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,"² 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 that 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 Individual Plant Examination of External Events (IPEEE) 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 walkdown process. By letter dated May 29, 2012,³ the Nuclear Energy Institute staff submitted

¹ Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340

² ADAMS Accession No. ML12056A049

³ ADAMS Package Accession No. ML121640872

Electric Power Research Institute 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, 2012,⁴ the NRC staff endorsed the walkdown guidance.

By letter dated November 27, 2012,⁵ Entergy Nuclear Operations, Inc. (the licensee) provided a response to Enclosure 3 of the 50.54(f) letter Required Response Item 2, for Vermont Yankee Nuclear Power Station (Vermont Yankee). In addition to the aforementioned letter, the licensee, by letter dated July 3, 2013⁶, provided an updated seismic walkdown report. The purpose of the latter submittal was to update and provide information on inaccessible components not completed in the first submittal.

The NRC staff reviewed the walkdown report and determined that additional supplemental information would assist the staff in completing its review. In a letter dated November 1, 2013⁷, 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 22, 2013.⁸

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 systems, structures 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.

⁴ ADAMS Accession No. ML12145A529

⁵ ADAMS Accession No. ML12362A049

⁶ ADAMS Package Accession No. ML132000190

⁷ ADAMS Accession No. ML13304B418

⁸ ADAMS Accession No. ML ML13330A859

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 Vermont Yankee in Section 2.0 of the walkdown report. Consistent with the walkdown guidance, the staff noted that the report includes a summary of the Safe Shutdown Earthquake 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.

Based on the NRC staff's review, the 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, 2012,⁹ the licensee confirmed that it would utilize the walkdown guidance in the performance of the seismic walkdowns at Vermont Yankee.

The walkdown report dated November 27, 2012 and supplemented on July 3, 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
- Licensing Basis Evaluations and Results

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.

⁹ ADAMS Accession No. ML12198A008

The NRC staff reviewed the information provided in Section 4, and Tables 4-1 and 4-2 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 provides one representative for plant operations who was involved in the equipment selection and development of the SWEL. In addition, the the staff noted that the experience of the six SWEs varies from over 2 years to over 30 years in analysis and design of structural and mechanical systems, seismic qualification of equipment, and plant modifications at various nuclear facilities, including Vermont Yankee. The two IPEEE reviewers have a total of more than 55 years of experience in engineering design of nuclear facilities, including seismic design.

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 Vermont Yankee base list, SWEL 1 (sample list of designated safety functions equipment), and SWEL 2 (sample list of spent fuel pool 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, Tables 9.4.2, and 9.4.5 of the walkdown report, Vermont Yankee 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 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 as part of the SWEL, and concludes that these exclusions are acceptable.

The NRC staff also noted that no rapid drain-down items were included as part of the SWEL 2, as described in Section 3 of the guidance. In Section 6.3.2 of the walkdown report, the licensee stated there are no components that could, upon failure, result in rapid drain-down of the spent fuel pool (SFP) water level to below ten feet above the top of the fuel. After reviewing the information provided in this section, the staff concludes that the licensee provided adequate justification for not including rapid drain-down items as part of 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 three teams consisting of two qualified SWEs conducted the seismic walkdowns and area walk-bys. These activities were conducted during three weeks in October, 2012. In addition, a subsequent set of walkdowns were performed during refueling outage, RFO 30, in March 2013, as stated in the July 3, 2013 letter from the licensee. 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 performed preliminary walkdowns to gain a better understanding of the plant layout and also reviewed documentation packages prior to completing the walkdowns. Attachments C and D of the walkdown report provide the completed seismic walkdown checklists (SWCs) and area walk-by checklists (AWCs) for the initial walkdowns, while Attachments K and L provide the SWCs and AWCs for the subsequent walkdowns, 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 report without modification.

The NRC staff reviewed the original checklists in Attachment C and noted that SWCs and AWCs were all signed on October 18, 2012. The staff reviewed the overall walkdown process described in the walkdown report and additional clarification was provided as part of the response to the request for additional (RAI) 1 (see RAI discussion below). The licensee stated that the checklist was completed in the field as part of the walkdowns and were modified in order to document how issues were evaluated and included the licensee's resolutions. These modified checklists which were signed on October 18, 2012, were included as part of the walkdown report. The staff concludes that the process followed to update these checklists was acceptable since all the issues and their resolutions were identified in the field and were properly documented in the checklists.

As stated in Section 8.2, all unusual conditions were entered directly into the CAP system immediately and dispositioned for operability, with no operability issues identified. As a result, no items were entered in Attachment E- Potentially Adverse Seismic Conditions (PASCs) Form and Attachment F- Licensing Basis Evaluation Forms.

Based on the initial review of the checklists, the 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 staff issued two questions in a request for additional information (RAI) 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 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 seismic licensing basis during the walkdown, were identified as PASCs on the SWC and AWC. The licensee stated that conditions judged by the SWEs to be potentially significant to seismic response were reported to site personnel and entered into the CAP. The licensee noted that most of these conditions were related to spatial interactions or housekeeping issues or non-conforming anchorages. The licensee concluded that no issues entered into the CAP were PASCs and further stated that the corrective actions listed in Section 8.2 of the walkdown report were complete. Finally, the licensee reviewed both the initial and updated walkdown reports and noted that no new conditions were identified.

After evaluating the licensee's response and reviewing Section 8.0 of the walkdown report, the 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 of the initial and updated walkdown report 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 7.1.1, Attachments K and L of the updated walkdown report confirm that additional walkdowns were conducted on March 21, 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 seismic walkdown checklists provided in the supplemental report and confirmed that cabinets were opened to determine if any adverse conditions existed on internal equipment.

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 Vermont Yankee Walkdown Report, which discusses the process for conducting the seismic licensing basis evaluations of the PASCs identified during the seismic walkdowns and area walk-bys. The licensee stated that it did not perform licensing basis evaluations for the identified PASCs. Instead, for those items not readily concluded through the process, as discussed above, were entered directly into the CAP to meet their Current Licensing Basis. 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. At the time of reporting all items that had been submitted to the CAP had been closed out by evaluating them for operability and found to be operable. The updated walkdown report did not identify any additional CAP entries from the subsequent walkdowns.

The staff reviewed the CAP entries and the description of the actions planned to address the deficiencies in the CAP. The 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 Conclusion

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 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 of the Vermont Yankee 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 in 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 stated that the peer review was conducted in accordance with Section 6 of the walkdown guidance and referred to the summary of the peer review activities provided in Section 9.0 and attachment G of the initial and updated walkdown report. In addition, the licensee stated that peer review team was supplied by its contractor, Enercon Engineering, and was not part of the walkdown teams to further demonstrate the independence of the peer review process.

The 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 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 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 88-20, 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 five 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. The licensee stated that all the IPEEE identified issues were resolved by March 22, 2001.

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

3.6 NRC Oversight

3.6.1 Independent Verification by Resident Inspectors

On July 6, 2012,¹⁰ 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 Vermont Yankee 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 30, 2013,¹¹ 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 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 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.

¹⁰ ADAMS Accession No. ML12156A052

¹¹ ADAMS Accession No. ML13030A147

C. J. Wamser

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If you have any questions, please contact me at 301-415-4125 or by e-mail at James.Kim@nrc.gov

Sincerely,

/RA/

James Kim, Project Manager
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-271

Enclosure:
Staff Assessment of Seismic Walkdown Report

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