



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

May 30, 2014

Mr. Ernest J. Harkness
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SUBJECT: PERRY NUCLEAR POWER PLANT, 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. MF0159)

Dear Mr. Harkness:

On March 12, 2012 (Agencywide Document and Management System (ADAMS) Accession No. ML12053A340), 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 (ADAMS Accession No. ML13008A029), and supplemented by letter dated June 18, 2013 (ADAMS Accession No. ML13169A266), First Energy Nuclear Operating Company (FENOC) submitted its seismic walkdown report as requested in Enclosure 3 of the 50.54(f) letter for the Perry Nuclear Power Plant (PNPP). By letter dated November 26, 2013 (ADAMS Accession No. ML13340A277), FENOC provided a response to the NRC request for additional information (RAI) for the staff to complete its assessments. By this same letter, the licensee updated their seismic walkdown report to incorporate the response to the RAI, incorporate information provided in the June 18, 2013, addendum, and address similar issues identified at Beaver Valley Power Station by a self-assessment and NRC site audit.

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.

E. Harkness

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If you have any questions, please contact me at 301-415-2315 or by e-mail at
Eva.Brown@nrc.gov

Sincerely,

/RA/

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Office of Nuclear Reactor Regulation

Docket No. 50-440

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
FIRST ENERGY NUCLEAR OPERATING COMPANY (FENOC)
PERRY NUCLEAR POWER PLANT (PNPP)
DOCKET NO. 50-440

1.0 INTRODUCTION

On March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information per Title 10 of the *Code of Federal Regulations* (10 CFR), 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" (ADAMS Accession No. ML12056A049) 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.
- 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 (ADAMS Accession No. ML121640872), the Nuclear Energy Institute staff submitted Electric Power Research Institute document 1025286, "Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force

Enclosure

Recommendation 2.3: Seismic,” (walkdown guidance) to the NRC staff to consider for endorsement. By letter dated May 31, 2012 (ADAMS Accession No. ML12145A529), the NRC staff endorsed the walkdown guidance.

By letter dated November 27, 2012 (ADAMS Accession No. ML13008A029), First Energy Nuclear Operating Company (the licensee) provided a response to Enclosure 3 of the 50.54(f) letter Required Response Item 2, for Perry Nuclear Power Plant (PNPP). In addition to the aforementioned letter, the licensee, by letter dated June 18, 2013 (ADAMS Accession No. ML13169A266), provided an addendum to the initial seismic walkdown report. The purpose of the latter submittal was to 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, 2013 (ADAMS Accession No. ML13304B418), 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 (ADAMS Accession No. ML13340A277). Also, by this same letter, the licensee updated their seismic walkdown report to incorporate the responses to the staff's requests, incorporate information related to inaccessible items provided in the addendum, and to address similar issues identified at Beaver Valley Power Station (BVPS) by a self-assessment and NRC site audit. The BVPS is part of FENOC's fleet and seismic walkdowns were performed by the same group of contractor and plant personnel. The BVPS was audited by the NRC staff in July 2013.

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.

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 PNPP in Section 2 of the walkdown report. Consistent with the walkdown guidance, the 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.

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 (ADAMS Accession No. ML12192A615), the licensee confirmed that it would utilize the walkdown guidance in the performance of the seismic walkdowns at PNPP.

The walkdown reports dated November 27, 2012, June 18, 2013, and updated on November 26, 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.

The NRC staff reviewed the information provided in Section 3, and Appendix A 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. 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 PNPP 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 Tables 4-2 and 4-4 of the updated walkdown report, PNPP 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.

In Section 4.2 of the walkdown report, the licensee described the approach used to identify items that could lead to a rapid drain-down to the less than 10 feet above the top of the fuel in the SFP. Based on the discussions provided in this section, the licensee identified one path that could cause rapid drain-down of the PNPP SFP and leave less than 10 feet above the fuel. A manual isolation valve associated with a drain line in the cask pit section of the SFP was added to the SWEL 2. Walkdown results for this item were provided in the seismic walkdown checklist as part of the June 18, 2013, addendum. After reviewing this information, the staff concludes that the licensee provided sufficient information to describe and assess the rapid drain-down item identified for the PNPP SFP. No seismic adverse condition was identified as part of the walkdown performed for this item.

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 Sections 5 and 6 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 a two-person team of trained SWEs conducted the seismic walkdowns and area walk-bys together during the period of August 6 to August 10, 2012. The SWEs were assisted by plant operation personnel during the walkdown activities. The SWEs were also assisted by a senior structural engineer who served as a structural mentor and provided overall support to the walkdown team. In addition, a subsequent set of walkdowns were performed during March - April 2013. The purpose of the last activity was to complete walkdowns for a number of items that were inaccessible during the initial walkdowns. Results for these walkdown were provided in an addendum, as described in the June 18, 2013, letter from the applicant. This addendum was included in the updated report as described in a letter dated November 26, 2013.

The walkdown report 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. Appendices B and C 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 the SWELs 1 and 2, and each area containing the SWEL equipment. The licensee used the checklists provided in Appendix C of the walkdown guidance report without modification.

The NRC staff reviewed these checklists and noted that SWCs and AWCs were all signed on August 26, 2012, for the initial walkdowns and on April 2, 2013, for the subsequent walkdowns. The updated report provides additional details on the internal process followed by the SWEs which included team discussions and further evaluations at the daily meeting immediately after the walkdown. Observations identified during the walkdowns were evaluated with respect to their seismic licensing basis. If these observations could not be readily shown to meet its seismic licensing basis, the condition was immediately documented in a condition report (CR) to be further evaluated under the plant's CAP. The results of these assessments were then documented in their respective SWC or AWC. The SWCs and AWCs were not signed until all of the documentation, which included reviewer comments, was incorporated into the checklists. For this reason, according to the licensee, the SWCs and AWCs were signed when the final report was prepared and not when the in-field walkdowns were completed.

The licensee documented cases of potentially adverse seismic conditions (PASCs) in the checklists for further evaluation. Tables 6-5 and 6-6 of the updated walkdown report list each

PASC identified during the seismic walkdowns and area walk-bys. Field notes and finding resolutions are presented in their respective SWCs and AWCs included in Appendix B and C of the walkdown report. Tables 6-5 and 6-6 describes the PASCs and how the condition has been addressed (e.g., placement in the CAP). Based on the review of the initial checklists, the NRC staff was unable to confirm that all the PASCs identified during the walkdowns and area walk-bys were included in this summary table. As such, by letter dated November 1, 2013, the NRC staff requested clarification regarding the process followed by the licensee when evaluating conditions identified in the field during the walkdowns and walk-bys. Specifically, the NRC staff requested 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 a letter dated November 26, 2013, the licensee stated that the walkdown report has been updated to address the staff's concerns and included insights from observations and discussions from the BVPS seismic walkdown audit. The licensee confirmed that any PASCs identified in the seismic walkdowns or area walk-bys was evaluated with respect to the seismic licensing basis at the end of each day. Some conditions were resolved by additional calculations or by plant documents that substantiated the as-built condition. Reference to these calculations and plant documentation was provided in the SWCs and AWCs. If the PASC could not be readily shown to meet the licensing basis, then the condition was immediately documented in a condition report (CR) to be further evaluated using the plant's CAP. Furthermore, the licensee stated that each condition report entered into the CAP has either had corrective actions closed or has been closed to another action tracking process, such as a notification in the work order process.

After evaluating the licensee's response, reviewing Tables 6-5 and 6-6 and additional clarification provided in the updated report, the staff concludes that the PASCs were properly identified and documented and summary Tables 6-5 and 6-6 are 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.

The walkdown report does not clearly state whether the licensee opened cabinets as part of the walkdowns. The NRC staff reviewed the SWCs provided in the walkdown report and confirmed that accessible cabinets were opened to determine if any adverse conditions existed of 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 7.0 of the 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. Based on the information provided in the walkdown report, any PASC identified in the seismic walkdowns or area walk-bys was evaluated with respect to the seismic licensing basis at the end of each day. Some conditions were resolved by additional calculations or by plant documents that substantiated the as-built condition. Reference to these calculations and plant documentation was provided in the SWCs and AWCs. If the PASC could not be readily shown to meet the licensing basis, then the condition was immediately documented in a CR to be further evaluated using the plant's CAP. Table 6-5 and 6-6 in the walkdown report list each PASC identified during the seismic walkdown and area walk-bys, respectively. This table describe how each condition has been addressed (e.g., placement in the CAP).

The NRC staff reviewed the CAP entries and the description of the actions taken or planned to address deficiencies, and 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 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 the 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 PNPP walkdown report which describes the conduct of the peer review. In addition, the NRC staff reviewed the November 26, 2013, response which provided 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 in page 6-1 of the walkdown guidance were assessed and documented in the report. The NRC staff also requested confirmation whether any individual involved in performing any given walkdown activity was a peer reviewer for that same activity. In response, the licensee updated the walkdown report to address the NRC staff's question and included insights from observations and discussions of the BVPS seismic walkdown audit. 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. In addition, the licensee provided additional information in the updated report to better document the level of involvement of the peer review team and its leader 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 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 NRC staff reviewed Section 8.0 of the walkdown report which makes reference to Appendix F of the updated report. The licensee stated that four enhancements were identified as part of the IPEEE program to reduce the threat of spatial interactions. Appendix G of the updated walkdown report provides dates, calculation references and final resolution for these enhancements. The CRs were issued by the licensee to resolve two out of the four identified spatial interaction issues that had not been addressed by the time the NRC Recommendation 2.3 seismic walkdown started. Appendix G also documents the results on the relay chatter analysis performed as part of the IPEEE program. The licensee stated that a CR was issued to address the failure to modify operation procedures to alert the operator that post seismic event, certain relays may need to be reset.

Based on the review of Section 7 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 (ADAMS Accession No. ML12156A052), 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 PNPP 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 7, 2013 (ADAMS Accession No. ML13038A702), 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. Furthermore, the staff notes that no immediate safety concerns were identified. The NRC 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. 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.

Contributor: F. Vega, NRO

E. Harkness

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If you have any questions, please contact me at 301-415-2315 or by e-mail at Eva.Brown@nrc.gov

Sincerely,

/RA/

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Plant Licensing III-2 and
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Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosure:
Staff Assessment of Seismic Walkdown Report

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