



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

April 22, 2014

Mr. Louis P. Cortopassi
Site Vice President and Chief Nuclear Officer
Omaha Public Power District
Fort Calhoun Station
9610 Power Lane, Mail Stop FC-2-4
Omaha, NE 68008

SUBJECT: FORT CALHOUN 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. MF0126)

Dear Mr. Cortopassi:

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 June 28, 2013, Omaha Public Power District (OPPD) submitted the Seismic Walkdown Report, as requested in Enclosure 3 of the 50.54(f) letter for Fort Calhoun Station. By letters dated November 27, 2013, and March 27, 2014, OPPD provided its Fort Calhoun Station response to the NRC request for additional information for the NRC staff to complete its assessments.

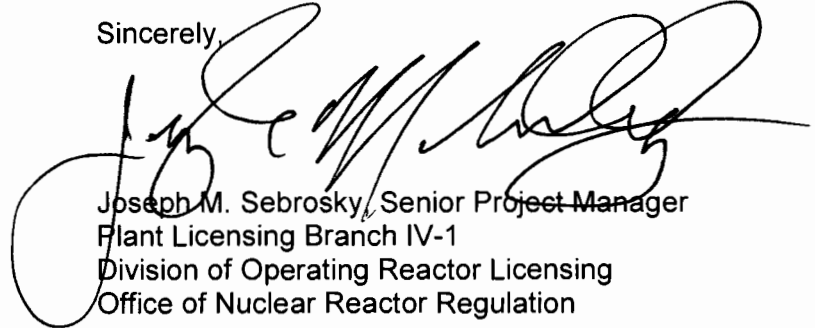
The NRC staff reviewed the information provided and, as documented in the enclosed staff assessment, determined that sufficient information was provided to be responsive to Enclosure 3 of the 50.54(f) letter.

L. Cortopassi

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If you have any questions, please contact me at 301-415-1132 or by e-mail at Joseph.Sebrosky@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph M. Sebrosky". The signature is fluid and cursive, with a large loop at the beginning and end.

Joseph M. Sebrosky, Senior Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosure:
Staff Assessment of Seismic
Walkdown Report

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STAFF ASSESSMENT OF SEISMIC WALKDOWN REPORT
NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO
THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT
OMAHA PUBLIC POWER DISTRICT
FORT CALHOUN STATION
DOCKET NO. 50-285

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 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.

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

² ADAMS Accession No. ML12056A049.

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 (NEI) staff submitted Electric Power Research Institute document 1025286, "Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force (NTTF) 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 Omaha Public Power District (the licensee) provided a response to Enclosure 3 of the 50.54(f) letter Required Response Item 2, for Fort Calhoun Station (FCS). In addition to the aforementioned letter, by letter dated June 28, 2013,⁶ the licensee provided an updated submittal to the initial 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. By letter dated November 1, 2013,⁷ and e-mail dated March 19, 2014,⁸ 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. By letters dated November 27, 2013,⁹ and March 27, 2014,¹⁰ the licensee responded to the NRC staff's requests for additional information (RAIs).

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,

³ ADAMS Package Accession No. ML121640872.

⁴ ADAMS Accession No. ML12145A529.

⁵ ADAMS Package Accession No. ML123400363.

⁶ ADAMS Package Accession No. ML13193A235.

⁷ ADAMS Accession No. ML13304B418.

⁸ ADAMS Accession No. ML14078A337.

⁹ ADAMS Accession No. ML13333A674.

¹⁰ ADAMS Accession No. ML14087A450.

and the specific values or ranges of values chosen for controlling parameters as reference bounds for the design.

GDC 2 states that the design bases for the SSCs shall reflect appropriate consideration of the most severe natural phenomena that have been historically reported for the site and surrounding area with sufficient margin 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 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 FCS 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 of the walkdown report, focusing on the summary of the SSE and the design codes used in the design.

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 05, 2012,¹¹ the licensee confirmed that it would utilize the walkdown guidance in the performance of the FCS seismic walkdowns.

The walkdown report dated November 27, 2012, and supplemented on June 28, 2013, did not identify deviations from the walkdown guidance.

¹¹ ADAMS Accession No. ML121910223.

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 4 and Attachment 11.7 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 FCS 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 11.2 and the descriptions provided in Section 6.0 of the walkdown report, FCS 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). The NRC staff noted that an explanation was provided for cases where specific classes of equipment were not included as part of the SWEL, and, therefore concludes that these exclusions are acceptable.

The NRC staff noted that a rapid drain-down list was not included as part of the SWEL, as described in Section 3 of the walkdown guidance. The rapid drain-down discussion in Section 6.2 of the seismic walkdown report did not provide sufficient information to reach a conclusion that rapid drain-down was assessed in accordance with the walkdown guidance. Therefore, the staff issued an RAI dated March 19, 2014, for clarification on the licensee's process in assessing rapid drain-down. In its response, the licensee stated that there are only two items with elevations below 10 feet above the stored fuel. The licensee provided an explanation to exclude these items from the SWEL 2, following the walkdown guidance. The licensee concludes that there are no items that could cause rapid drain-down of FCS SFP. After reviewing the information provided in this section and in the RAI response, the NRC staff concludes that the licensee provided sufficient information to justify not including rapid drain-down items as part of the SWEL 2.

After reviewing combined SWEL, 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 qualification and experience of those who are identified in Section 4 of the seismic walkdown report as responsible for equipment selection and the peer review team members, who individually reviewed the lists, are consistent with the intent of the 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 the Seismic Walkdowns and Area Walk-Bys were conducted by SWE teams comprised of one experienced seismic engineer and one less experienced engineer. In its response to an RAI dated November 1, 2013 (described below), the licensee stated that it utilized an engineering contractor in conjunction with plant's operations personnel to perform the seismic walkdowns. These activities were conducted from August 13, 2012, through August 29, 2012. In addition, the remaining walkdowns of deferred items were concluded on March 29, 2013, as stated in the licensee's letter dated June 28, 2013. The purpose of the last activity was to complete a number of items that were inaccessible during the initial walkdowns.

The licensee documented cases of potentially adverse seismic conditions (PASCs) in the checklists for further evaluation. Attachments 11.2 and 11.3 of the initial and updated walkdown report provide the completed SWCs and AWCs, documenting the results for each item of equipment on the combined SWEL and each area containing SWEL equipment. The results of the Seismic Walkdowns of each item of equipment on the SWEL (SWEL 1 plus SWEL 2) were documented on the SWCs and provided in Attachment 11.4. The licensee used the checklists provided in Appendix C of the walkdown guidance report without modification.

PASCs that were identified in the walkdowns were either evaluated under a licensing basis evaluation or entered directly into the plant's CAP for further evaluation. A summary of the PASCs is provided in Attachment 11.4. The table included in Attachment 11.4 lists the SWC or AWC number, TAG ID of the item, summary statement of the identified condition, licensing basis summary evaluation, Condition Report #, and reference to the condition report for the resolution of those conditions entered into the CAP.

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 NRC staff issued two questions in an 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 dated November 1, 2013, 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 the RAI, the licensee indicated that several observations were made by SWEs and noted on the field copies of the walkdown and area walk-by checklists. The licensee stated that PASCs or other adverse seismic conditions were documented with a No (N) on the checklist for the appropriate question. Any item that was viewed to pose a PASC for the station was evaluated using the questions listed on the walkdown checklist in accordance with the SWE's seismic experience and training (Near-Term Task Force (NTTF) Recommendation 2.3 Training or Seismic Qualification Utility Group (SQUG) training). A PASC was listed as a No (N) on the walkdown checklist. None of the identified PASCs were considered to be an immediate operability concern by the SWE's or the accompanying member of operations department. In addition, conditions related to general housekeeping that were deemed not detrimental to plant operations, were identified on the PASC table and a condition report was written for resolution in the CAP.

The seismic walkdown report, including the seismic walkdown checklists, did not provide information to confirm that cabinets were opened. Therefore, the staff issued an RAI, dated March 19, 2014, requesting the licensee provide information confirming that cabinets were opened during the walkdowns. In the RAI response, the licensee confirmed that all electrical cabinets on the SWEL were opened and inspected to view internal anchorage as well any other potentially adverse seismic conditions in accordance with the guidance.

The method for verifying anchorage configuration is described in Section 7 of the walkdown report. In response to the RAI dated November 1, 2013, the licensee stated that when a component on a walkdown checklist required an anchorage configuration verification, and the correct licensing documentation relating to the anchorage of the component in question was not available in the field, the checklist was marked with a No (N) and documented as PASCs. The

SWEs then took photographs; recorded anchorage dimensions and sizes, and took down a detailed sketch of the configuration for later verification through the licensing basis evaluation process. 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.

After evaluating the licensee's response and reviewing Attachment 11.5, the NRC staff concludes that the licensee responded appropriately to the first question in the RAI dated, November 1, 2013. PASCs were identified and documented properly and the summary table included in Attachment 11.4 is considered complete.

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 of the FCS 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.

In an RAI dated November 1, 2013, the NRC staff requested that the licensee provide a description of the overall process used to evaluate observations identified in the field by the SWEs.

For the PASCs pertaining to anchorage configuration verification, current licensing documentation was obtained and compared to the walkdown field sketches, photographs, and descriptions to determine if the anchorage configuration verification matched its licensing basis. A licensing basis evaluation was then performed and noted in the PASC table.

In the June 28, 2013, updated submittal to the initial seismic walkdown report, the licensee stated that licensing basis evaluations were performed for the identified PASCs. These licensing basis evaluations demonstrate how each individual PASC was dispositioned, the methodology used to disposition the PASCs, the result of each licensing basis evaluation, and the basis for each result. The table provided in Attachment 11.4 summarizes the PASCs and the results of the licensing basis evaluation conclusions, including the Condition Report number for each of the items the licensee entered into the CAP. Attachment 11.5 of the walkdown report includes the Licensing Basis Evaluation Forms, which list the documents reviewed, the results of the evaluations, and whether the condition meets the Licensing Basis.

The NRC staff reviewed the licensing basis evaluations 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 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 of the Fort Calhoun Station seismic walkdown report, which describes the conduct of the peer review. In addition, the staff reviewed the response to the RAI dated November 1, 2013, in which, the staff requested the licensee to provide additional information on the overall peer review process that was followed as part of the walkdown activities. Aside from the scope of the peer review as defined in the walkdown guidance, the lead peer reviewer was not involved with the SWEL preparation or disposition of any corrective actions. However, the NRC staff was unable to verify that any individual involved in performing a given walkdown activity was not a peer reviewer for that same activity based on information provided in the seismic walkdown report and the response to the RAI dated November 1, 2013. Therefore, the NRC staff issued an RAI dated March 19, 2014 requesting the licensee to confirm that any individual involved in performing a given activity was not a peer reviewer for the same activity or sufficiently explain how this did not contradict the objective of the peer review efforts. In its response to the RAI, the licensee stated that the individuals who performed seismic walkdowns and also peer reviewed walkdown activities did not peer review their own seismic walkdown activities and that the objective of the peer reviewed efforts described the guidance is maintained.

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 (GL) 88-20, "Individual Plant Examination of External Events for Severe Accident Vulnerabilities," dated November 23, 1988,¹² licensees previously had performed a systematic examination to identify any plant-specific vulnerability to severe accidents.

The licensee provided background information regarding its IPEEE program. The licensee stated that IPEEE reviewers reviewed the IPEEE report and supporting documentation to identify items determined to present a seismic vulnerability by the IPEEE program. IPEEE reviewers then reviewed additional plant documentation to identify the eventual resolutions to those seismic vulnerabilities not resolved by the completion of the IPEEE program. The licensee also stated that there are no IPEEE vulnerabilities to report, because all vulnerabilities have been resolved and incorporated into the plant design. Additionally, the licensee stated in the seismic walkdown report that a sample of equipment that had been modified or otherwise enhanced to reduce IPEEE vulnerabilities is included on the SWEL. Further, consistent with the intent of the walkdown guidance, the submittal report provides reference to the IPEEE and NRC Unresolved Safety Issue (USI) A-46 documents.

Based on its review of Section 5 of the walkdown report, the NRC staff concludes that the licensee's evaluation of plant-specific vulnerabilities identified by the IPEEE program 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, 2012,¹³ 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 FCS 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 November 13, 2012,¹⁴ documents the results of this inspection and states that no findings were identified.

¹² ADAMS Accession No. ML031150465.

¹³ ADAMS Accession No. ML12156A052.

¹⁴ ADAMS Accession No. ML12318A341.

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.

L. Cortopassi

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If you have any questions, please contact me at 301-415-1132 or by e-mail at Joseph.Sebrosky@nrc.gov.

Sincerely,

/RA/

Joseph M. Sebrosky, Senior Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosure:
Staff Assessment of Seismic
Walkdown Report

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