



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

April 11, 2014

Mr. Randall K. Edington  
Executive Vice President Nuclear/  
Chief Nuclear Officer  
Mail Station 7602  
Arizona Public Service Company  
P.O. Box 52034  
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 –  
STAFF ASSESSMENT OF THE SEISMIC WALKDOWN REPORTS  
SUPPORTING IMPLEMENTATION OF NEAR-TERM TASK FORCE  
RECOMMENDATION 2.3 RELATED TO THE FUKUSHIMA DAI-ICHI NUCLEAR  
POWER PLANT (TAC NOS. MF0154, MF0155, AND MF0156)

Dear Mr. Edington:

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 three letters dated November 27, 2012, as supplemented by letters dated August 30, 2013 and January 14, 2014, Arizona Public Service Company (APS) submitted its Seismic Walkdown Report as requested in Enclosure 3 of the 50.54(f) letter for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3. By letter dated December 12, 2013, APS provided a response to the NRC request for additional information for the NRC staff to complete its assessments.

The NRC staff acknowledges that APS plans to submit a supplemental letter by April 30, 2014, addressing the remaining inaccessible items consistent with the regulatory commitment for PVNGS Unit 3.

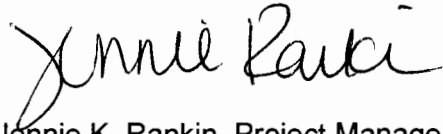
The NRC staff reviewed the information provided and, as documented in the enclosed staff assessments, Enclosure 1 for Unit 1, Enclosure 2 for Unit 2, and Enclosure 3 for Unit 3, determined that sufficient information was provided to be responsive to Enclosure 3 of the 50.54(f) letter.

R. Edington

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If you have any questions, please contact me at (301) 415-1530 or via e-mail at [jennivine.rankin@nrc.gov](mailto:jennivine.rankin@nrc.gov).

Sincerely,

A handwritten signature in black ink that reads "Jennie Rankin". The signature is written in a cursive style with a large initial "J".

Jennie K. Rankin, Project Manager  
Plant Licensing Branch IV-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-528, STN 50-529,  
and STN 50-530

Enclosures:

1. Unit 1 Staff Assessment of Seismic Walkdown Report
2. Unit 2 Staff Assessment of Seismic Walkdown Report
3. Unit 3 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  
ARIZONA PUBLIC SERVICE COMPANY  
PALO VERDE NUCLEAR GENERATING STATION, UNIT 1  
DOCKET NO. 50-528

1.0 INTRODUCTION

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

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

- a. Information on 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 (including any seismic anomalies, outliers, or other findings) identified by the IPEEE [Individual Plant Examination of External Events] program and a description of the actions taken to eliminate or reduce them (including their completion dates)
- d. Results of the walkdown including key findings and identified degraded, nonconforming, or unanalyzed conditions...
- e. Any planned or newly installed protection and mitigation features
- f. Results and any subsequent actions taken in response to the peer review

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

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

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

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

By letter dated November 27, 2012,<sup>5</sup> Arizona Public Service (the licensee) provided a response to Enclosure 3 of the 50.54(f) letter Required Response Item 2, for Palo Verde Nuclear Generating Station, Unit 1 (PVNGS-1). In addition to the aforementioned letter, the licensee, by letter dated January 14, 2014,<sup>6</sup> provided a supplement to the PVNGS-1 seismic walkdown report. The updated report provides the results for the supplemental seismic walkdowns of components which were inaccessible during the initial walkdowns. Also, this updated report provides the results of interior inspections to several electrical cabinets which were not opened during the initial walkdowns. The NRC staff reviewed the initial walkdown report and determined that additional supplemental information would assist the NRC staff in completing its review. By 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 for additional information (RAI) by letter dated December 12, 2013.<sup>8</sup>

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

## 2.0 REGULATORY EVALUATION

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

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

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

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

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

<sup>5</sup> ADAMS Accession No. ML12341A319.

<sup>6</sup> ADAMS Accession No. ML14022A054.

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

<sup>8</sup> ADAMS Accession No. ML13352A008.

surrounding area with 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 (CLB) is the set of NRC requirements applicable to a specific plant, including the licensee's docketed commitments for ensuring compliance with, and operation within, applicable NRC requirements and the plant-specific design basis, including all modifications and additions to such commitments over the life of the 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 PVNGS-1 in Section 1 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.

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, Submittal Report, of the walkdown guidance.

#### 3.2 Seismic Walkdown Methodology Implementation

Section 2, Personnel Qualifications; Section 3, Selection of SSCs; Section 4, Seismic Walkdowns and Area Walk-Bys; and Section 5, Seismic Licensing Basis Evaluations, of the walkdown guidance provide information to licensees regarding the implementation of an appropriate seismic walkdown methodology. By letter dated July 10, 2012,<sup>9</sup> the licensee confirmed that it would utilize the walkdown guidance in the performance of the seismic walkdowns at PVNGS-1.

The walkdown report dated November 27, 2012, and supplemented on January 14, 2014, did not identify deviations from the walkdown guidance.

The NRC staff reviewed the following areas of the walkdown methodology implementation provided in the walkdown report:

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

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<sup>9</sup> ADAMS Accession No. ML12199A060.

### 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 2 and Appendix E 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 the licensee did not include a summary of the background and experience of the operation staff in the walkdown report; however, the licensee reported that the PVNGS operation staff consisted of a shift manager and a senior auxiliary operator. The licensee indicated that PVNGS operation staff was involved in the development of the SWEL, walkdown program and provided verification of safety function selections. Since licensed plant operators are qualified by the NRC and continuously train to maintain their licenses, licensed plant operators have the appropriate operations knowledge and experience to support the seismic walkdown activities.

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 PVNGS-1 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. The licensee stated that it considered the transformer as a subcomponent of the switchgear or motor control center (MCC); as such, transformers were included in the SWEL-1 but were not individually listed as a separate component. Based on Appendix F, Attachments 1 and 2, of the walkdown report, PVNGS-1 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 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, therefore, concludes that these exclusions are acceptable.

The licensee discussed the approach to identifying all items that can lead to rapid drain-down in Section 3.3 of the walkdown report. The licensee reported that there were no rapid drain-down items for input into SWEL-2. The licensee referenced its updated final safety analysis report to indicate that all pipe penetrations through the pool wall are at or above the minimum required water levels for spent fuel shielding of 10 feet. The licensee stated that all the pipes extending down into the SFP have siphon breaker holes at or above the minimum required water level. The licensee also considered other SFP drain-down flow paths, and concluded that there are no components that could, upon failure, result in rapid drain-down of the SFP water level to below 3 m (10 ft.) above the top of the fuel. After reviewing the information provided in this section, the NRC staff concludes that the licensee provided adequate justification for not including rapid drain-down items as part of the SWEL 2.

In Section 3.4 of the supplemental walkdown report, dated January 14, 2014, the licensee stated that several SWEL component substitutions were made due to plant protected train restrictions during the refueling outage. Table 3-7 in Section 3.4 of the supplemental report identifies and describes the equipment that was used as substitutes. The NRC staff reviewed the licensee's justification provided for the equipment substitution, the description and equipment location and agrees that the substituted items are comparable to the previous ones and were located in similar environmental conditions. The licensee provided a description of the substitutions in its supplemental report and documented the supplemental inspections in the seismic walkdown checklists (SWCs) in Appendix A of the supplemental walkdown report. The NRC staff concludes that the SWEL diversity has been maintained and the overall SWEL with the substitutions continues to maintain the diversity of the equipment classes as the original SWEL.

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 4 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 one seismic review team of at least two Seismic Walkdown Engineers (SWEs) conducted the seismic walkdowns and area walk-bys together during the weeks of July 30, 2012, through August 2, 2012. In addition, a subsequent set of walkdowns were performed from April 6 through April 7, 2013, and on April 30, 2013, to complete inspections on a number of components that were inaccessible during the initial walkdowns. The NRC staff reviewed the SWCs and area walk-by checklists (AWCs) and noted that they were all signed on November 26, 2012, for the initial walkdowns and on October 29, 2013 for the subsequent walkdowns. In the letter dated January 14, 2014, the licensee submitted a supplemental walkdown report describing the results of these subsequent seismic 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. Appendices A and B of the walkdown report provide the completed SWCs and AWCs documenting the results for each item of equipment on SWELs 1 and 2 and each area containing SWEL equipment. The licensee used the checklists provided in Appendix C of the walkdown guidance report without modification.

The licensee documented cases of potentially adverse seismic conditions (PASCs) in the SWCs and AWCs checklists for further evaluation. In Appendix D, Licensing Evaluation Summary, of the walkdown report, the licensee included a table describing the identified PASCs, how each condition was addressed (e.g., placement in the CAP), its resolution, and its current status. Based on the initial review of the checklists and report, the NRC staff was unable to confirm that all the PASCs identified during the walkdowns were included in this table.

By letter dated November 1, 2013, the NRC staff issued two questions in 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 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 a summary of the overall process used to evaluate observations identified in the field by the SWEs. The licensee indicated that the process applied during the walkdowns and walk-bys relied upon SWEs to identify PASCs using its engineering judgment based upon experience and training, and supplemented by existing CLB plant documentation and analyses. The licensee stated that the observations identified in the field requiring judgment to conclude whether the component or area met the CLB had the supporting technical basis clearly documented in the SWC or AWC, including the field determinations denoted by Yes ("Y"), No ("N"), or Unknown ("U"). The licensee indicated that components or areas determined in the field to meet CLB were denoted as "Y" on the checklists, and no further action was taken. For the components or areas determined to not meet CLB, the licensee denoted them as "N" on the checklists, and entered them into the CAP by generating a Palo Verde Action Request (PVAR).



The PVARs were documented in both, Section 4.3 and the respective checklist of the walkdown report. In addition, the licensee indicated that components or areas for which conditions could not be determined to meet the CLB were considered PASCs and denoted as "U" on the checklists. These items were then evaluated further under the licensing basis evaluation process and documented in Appendix D of the walkdown report. The electrical components whose interiors could not be inspected during the initial walkdowns were also denoted as "U" and deferred for additional inspection during the next outage. The licensee confirmed that all PASCs, including conditions for which a calculation, analysis (if more than a simple analysis), or evaluation was used for a determination, identified during the walkdowns and walk-bys, were addressed and included in the submitted reports.

After evaluating the licensee's response and Appendix D of the walkdown report, the NRC staff concludes that the licensee responded appropriately to RAI-1 and that PASCs were identified and documented properly.

While reviewing the walkdown checklists the NRC staff noted 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 3.4 of the supplemental walkdown report confirms that additional walkdowns were conducted on April 6, April 7, and April 30, 2013, to perform inspections on inaccessible equipment and internal cabinets that were not completely inspected or were not opened during the initial walkdowns. Table 3-6 in Section 3.4 of the walkdown report includes a list of the supplemental cabinet inspections. 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 and that all supplemental inspections for inaccessible equipment were also inspected.

Based on the above, 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 5 of the PVNGS-1 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. Those PASCs that could not readily be shown to meet their CLB were entered into the PVNGS-1 CAP. Appendix D of the walkdown report provides the licensing basis evaluation summary, including a description of the item, its conditions, current status, and action taken for each item judged as a PASC.

The NRC staff reviewed the licensing basis evaluation and CAP entries and the description of the actions taken or planned to address potential deficiencies. The NRC staff concluded 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 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 6 of the PVNGS-1 walkdown report which describes the conduct of the peer review. In addition, the NRC staff reviewed Appendix C, Peer Review Checklists, which contains all findings noted by the independent reviewers and the resolution. The licensee stated that the peer review process provided real-time feedback to the SWEs during performance of the walkdowns, and confirmed that the licensing basis evaluations carefully compared the actual as-found plant configurations to the CLB documentation. 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 the peer reviews for both the original and the subsequent supplemental seismic walkdowns inspections were performed in accordance with page 6-1 of the walkdown guidance. The licensee stated that an individual involved in performing any given walkdown activity was not a peer reviewer for that same activity. The NRC staff reviewed the licensee's summary of each of these activities, the peer review findings, and resolution of peer review comments.

After reviewing the licensee's submittals, the NRC staff concludes that the licensee documented the results of the peer review activities sufficiently 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, "Individual Plant Examination of External Events for Severe Accident Vulnerabilities," dated November 23, 1988,<sup>10</sup> licensees previously had performed a systematic examination to identify any plant-specific vulnerabilities to severe accidents.

In Section 7 of the walkdown report, the licensee stated that no plant-specific seismic vulnerabilities were identified at PVNGS -1 by the IPEEE program and that no significant changes to plant design were required in order to demonstrate the ability to mitigate the Review Level Earthquake (RLE). The licensee indicated that all observations identified from the IPEEE walkdowns were resolved prior to issuing of the IPEEE report on June 1, 1995. The IPEEE report concluded that all components have capacities exceeding the 0.3g peak ground acceleration of the RLE. However, an action was taken to improve the seismic capacity of the bookcases located behind the control cabinets in the Unit 3 Control Room. While the condition was also noted for the same bookcases in Unit 1, the IPEEE report did not specify action to provide additional anchorage for these bookcases. As a result of this observation, the licensee, as part of walkdown activities, generated a PVNGS CAP entry and removed these bookcases from the zone of influence of the main control boards in all three units.

Based on the NRC staff's 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.

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<sup>10</sup> ADAMS Accession No. ML031150465.

### 3.6 NRC Oversight

#### 3.6.1 Independent Verification by Resident Inspectors

On July 6, 2012,<sup>11</sup> the NRC issued Temporary Instruction (TI) 2515/188, "Inspection of Near-Term Task Force Recommendation 2.3 Seismic Walkdowns." In accordance with the TI, NRC inspectors independently verified that the 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,<sup>12</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, through the implementation of the walkdown guidance activities and, in accordance with plant processes and procedures, the licensee verified the plant configuration with the current seismic licensing basis; addressed degraded, nonconforming, or unanalyzed seismic conditions; and verified the adequacy of monitoring and maintenance programs for protective features. Furthermore, the NRC staff notes that no immediate safety concerns were identified. The NRC staff reviewed the information provided and determined that sufficient information was provided to be responsive to Enclosure 3 of the 50.54(f) letter.

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<sup>11</sup> ADAMS Accession No. ML12156A052.

<sup>12</sup> ADAMS Accession No. ML13038A565.

STAFF ASSESSMENT OF SEISMIC WALKDOWN REPORT  
NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO  
THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT  
ARIZONA PUBLIC SERVICE COMPANY  
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## 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, tsunami, 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.

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

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

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

<sup>5</sup> ADAMS Accession No. ML12339A196.

<sup>6</sup> ADAMS Accession No. ML13252A109.

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

<sup>8</sup> ADAMS Accession No. ML13352A008.

surrounding area with 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 (CLB) is the set of NRC requirements applicable to a specific plant, including the licensee's docketed commitments for ensuring compliance with, and operation within, applicable NRC requirements and the plant-specific design basis, including all modifications and additions to such commitments over the life of the 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 PVNGS-2 in Section 1 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.

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, Submittal Report, of the walkdown guidance.

#### 3.2 Seismic Walkdown Methodology Implementation

Section 2, Personnel Qualifications; Section 3, Selection of SSCs; Section 4, Seismic Walkdowns and Area Walk-Bys; and Section 5, Seismic Licensing Basis Evaluations, of the walkdown guidance provide information to licensees regarding the implementation of an appropriate seismic walkdown methodology. By letter dated July 10, 2012,<sup>9</sup> the licensee confirmed that it would utilize the walkdown guidance in the performance of the seismic walkdowns at PVNGS-2.

The walkdown report dated November 27, 2012, and supplemented on August 30, 2013, did not identify deviations from the walkdown guidance.

The NRC staff reviewed the following areas of the walkdown methodology implementation provided in the walkdown report:

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

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<sup>9</sup> ADAMS Accession No. ML12199A060.

### 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 2 and Appendix E 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 the licensee did not include a summary of the background and experience of the operation staff in the walkdown report; however, the licensee reported that the PVNGS operation staff consisted of a shift manager and a senior auxiliary operator. The licensee indicated that PVNGS operation staff was involved in the development of the SWEL, walkdown program and provided verification of safety function selections. Since licensed plant operators are qualified by the NRC and continuously train to maintain their licenses, licensed plant operators have the appropriate operations knowledge and experience to support the seismic walkdown activities.

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 PVNGS-2 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. The licensee stated that it considered the transformer as a subcomponent of the switchgear or motor control center (MCC); as such, transformers were included in the SWEL-1 but were not individually listed as a separate component. Based on Appendix F, Attachments 1 and 2, of the walkdown report, PVNGS-2 SWEL 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 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, therefore, concludes that these exclusions are acceptable.

The licensee discussed the approach to identifying all items that can lead to rapid drain-down in Section 3.3 of the walkdown report. The licensee reported that there were no rapid drain-down items for input into SWEL 2. The licensee referenced its updated final safety analysis report to indicate that all pipe penetrations through the pool wall are at or above the minimum required water levels for spent fuel shielding of 10 feet. The licensee stated that all the pipes extending down into the SFP have siphon breaker holes at or above the minimum required water level the licensee also considered other SFP drain-down flow paths, and concluded that there are no components that could, upon failure, result in rapid drain-down of the SFP water level to below 3 m (10 ft) above the top of the fuel. After reviewing the information provided in this section, the NRC 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 4 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 one seismic review team of at least two Seismic Walkdown Engineers (SWEs) conducted the seismic walkdowns and area walk-bys together during the weeks of July 23, 2012, through July 30, 2012. In addition, a subsequent set of walkdowns were performed during its refueling outage from October 13 through October 15, 2012, and on a follow-on inspection on December 5, 2012, to complete inspections on a number of components that were inaccessible during the initial walkdowns. The NRC staff reviewed the SWCs and area walk-by checklists (AWCs) and noted that they were all signed on November 26, 2012, for the initial walkdowns and on December 12,

2012, for the subsequent walkdowns, with the exception of three checklists that were signed on May 29, 2013, and August 29, 2013. In a letter dated August 30, 2013, the licensee submitted a supplemental walkdown report describing the results of these subsequent seismic 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. Appendices A and B of the walkdown report provide the completed SWCs and AWCs, documenting the results for each item of equipment on SWELs 1 and 2 and each area containing SWEL equipment. The licensee used the checklists provided in Appendix C of the walkdown guidance report without modification.

The licensee documented cases of potentially adverse seismic conditions (PASCs) in the SWCs and AWCs checklists for further evaluation. In Appendix D, Licensing Evaluation Summary, of the walkdown report, the licensee included a table describing the identified PASCs, how each condition was addressed (e.g., placement in the CAP), its resolution, and its current status. Based on the initial review of the checklists and report, the NRC staff was unable to confirm that all the PASCs identified during the walkdowns were included in this table.

By letter dated November 1, 2013, the NRC 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 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 a summary of the overall process used to evaluate observations identified in the field by the SWEs. The licensee indicated that the process applied during the walkdowns and walk-bys relied upon SWEs to identify PASCs using its engineering judgment based upon experience and training, and supplemented by existing CLB plant documentation and analyses. The licensee stated that the observations identified in the field requiring judgment to conclude whether the component or area met the CLB had the supporting technical basis clearly documented in the SWC or AWC, including the field determinations denoted by Yes ("Y"), No ("N"), or Unknown ("U"). The licensee indicated that components or areas determined in the field to meet CLB were denoted as "Y" on the checklists, and no further action was taken. For the components or areas determined to not meet CLB, the licensee denoted them as "N" on the checklists, and entered them into the CAP by generating a Palo Verde Action Request (PVAR). The PVARs were documented in both, Section 4.3 and the respective checklist of the walkdown report. In addition, the licensee indicated that components or areas for which conditions that could not be determined to meet the CLB were considered PASCs and denoted as "U" on the checklists. These items were then evaluated further under the licensing basis evaluation process and documented in Appendix D of the walkdown report. The electrical components whose interiors could not be inspected during the initial walkdowns were also denoted as "U" and deferred for additional inspection during the next outage. The licensee confirmed that all PASCs, including conditions for which a calculation, analysis (if more than a simple analysis), or evaluation was used for a determination, identified during the walkdowns and walk-bys, were addressed and included in the submitted reports.

After evaluating the licensee's response and Appendix D of the walkdown report, the NRC staff concludes that the licensee responded appropriately to RAI-1 and that PASCs were identified and documented properly.

While reviewing the walkdown checklists the NRC staff noted 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 3.4 of the supplemental walkdown report confirms that additional walkdowns were conducted on October 13 through October 15, and December 5, 2012, to perform inspections on inaccessible equipment and internal cabinets that were not completely inspected or were not opened during the initial walkdowns. Table 3-6 in Section 3.4 of the walkdown report includes a list of the supplemental cabinet inspections. 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 of internal equipment and that all supplemental inspections for inaccessible equipment were also inspected.

Based on the above, 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 5 of the PVNGS-2 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. Those PASCs that could not readily be shown to meet their CLB were entered into the PVNGS-2 CAP. Appendix D of the walkdown report provides the licensing basis evaluation summary, including a description of the item, its conditions, current status, and action taken for each item judged as a PASC.

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

#### 3.2.5 Conclusion

Based on the 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 6 of the PVNGS-2 walkdown report which describes the conduct of the peer review. In addition, the NRC staff reviewed Appendix C, Peer Review Checklists, which contains all findings noted by the independent reviewers and the resolution. The licensee stated that the peer review process provided real-time feedback to the SWEs during performance of the walkdowns, and confirmed that the licensing basis evaluations carefully compared the actual as-found plant configurations to the CLB documentation. 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 the peer reviews for both the original and the subsequent supplemental seismic walkdowns inspections were performed in accordance with page 6-1 of the walkdown guidance. The licensee stated that an individual involved in performing any given walkdown activity was not a peer reviewer for that same activity. The NRC staff reviewed the licensee's summary of each of these activities, the peer review findings, and resolution of peer review comments.

After reviewing the licensee's submittals, the NRC staff concludes that the licensee documented the results of the peer review activities sufficiently 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, "Individual Plant Examination of External Events for Severe Accident Vulnerabilities," dated November 23, 1988,<sup>10</sup> licensees previously had performed a systematic examination to identify any plant-specific vulnerabilities to severe accidents.

In Section 7 of the walkdown report, the licensee stated that no plant-specific seismic vulnerabilities were identified at PVNGS-2 by the IPEEE program and that no significant changes to plant design were required in order to demonstrate the ability to mitigate the Review Level Earthquake (RLE). The licensee indicated that all observations identified from the IPEEE walkdowns were resolved prior to issuing of the IPEEE report on June 1, 1995. The IPEEE report concluded that all components have capacities exceeding the 0.3g peak ground acceleration of the RLE. However, an action was taken to improve the seismic capacity of the bookcases located behind the control cabinets in the Unit 3 Control Room. While the condition was also noted for the same bookcases in Unit 1, the IPEEE report did not specify action to provide additional anchorage for these bookcases. As a result of this observation, the licensee, as part of walkdown activities, generated a PVNGS CAP entry and removed these bookcases from the zone of influence of the main control boards in all three units.

Based on the NRC staff's 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,<sup>11</sup> the NRC issued Temporary Instruction (TI) 2515/188 "Inspection of Near-Term Task Force Recommendation 2.3 Seismic Walkdowns." In accordance with the TI, NRC inspectors independently verified that the 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,<sup>12</sup> documents the results of this inspection and states that no findings were identified.

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<sup>10</sup> ADAMS Accession No. ML031150465.

<sup>11</sup> ADAMS Accession No. ML12156A052.

<sup>12</sup> ADAMS Accession No. ML13038A565.

#### 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, through the implementation of the walkdown guidance activities and, in accordance with plant processes and procedures, the licensee verified the plant configuration with the current seismic licensing basis; addressed degraded, nonconforming, or unanalyzed seismic conditions; and verified the adequacy of monitoring and maintenance programs for protective features. Furthermore, the NRC staff notes that no immediate safety concerns were identified. 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.

STAFF ASSESSMENT OF SEISMIC WALKDOWN REPORT  
NEAR-TERM TASK FORCE RECOMMENDATION 2.3 RELATED TO  
THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT  
ARIZONA PUBLIC SERVICE COMPANY  
PALO VERDE NUCLEAR GENERATING STATION, UNIT 3  
DOCKET NO. 50-530

1.0 INTRODUCTION

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

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

- a. Information on 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 (including any seismic anomalies, outliers, or other findings) identified by the IPEEE [Individual Plant Examination of External Events] program and a description of the actions taken to eliminate or reduce them (including their completion dates)
- d. Results of the walkdown including key findings and identified degraded, nonconforming, or unanalyzed conditions...
- e. Any planned or newly installed protection and mitigation features
- f. Results and any subsequent actions taken in response to the peer review

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

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

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

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

By letter dated November 27, 2012,<sup>5</sup> Arizona Public Service (the licensee) provided a response to Enclosure 3 of the 50.54(f) letter Required Response Item 2, for Palo Verde Nuclear Generating Station, Unit 3 (PVNGS-3). The NRC staff reviewed the walkdown report and determined that additional supplemental information would assist the NRC staff in completing its review. In letter dated November 1, 2013<sup>6</sup>, the NRC staff requested additional information to gain a better understanding of the processes and procedures used by the licensee in conducting the walkdowns and walk-bys. The licensee responded to the NRC staff request by letter dated December 12, 2013<sup>7</sup>.

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

## 2.0 REGULATORY EVALUATION

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

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

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

The current licensing basis (CLB) is the set of NRC requirements applicable to a specific plant, including the licensee's docketed commitments for ensuring compliance with, and operation

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

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

<sup>5</sup> ADAMS Accession No. ML12340A475

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

<sup>7</sup> ADAMS Accession No. ML13352A008.



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 PVNGS-3 in Section 1 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.

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, Submittal Report, of the walkdown guidance.

#### 3.2 Seismic Walkdown Methodology Implementation

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

The walkdown report dated November 27, 2012, identified deviations from the walkdown guidance.

The NRC staff reviewed the following areas of the walkdown methodology implementation provided in the walkdown report:

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

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<sup>8</sup> ADAMS Accession No. ML12199A060.

### 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 2 and Appendix E 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 the licensee did not include a summary of the background and experience of the operation staff in the walkdown report; however, the licensee reported that the PVNGS operation staff consisted of a shift manager and a senior auxiliary operator. The licensee indicated that PVNGS operation staff was involved in the development of the SWEL, walkdown program and provided verification of safety function selections. Since licensed plant operators are qualified by the NRC and continuously train to maintain their licenses, all licensed plant operators have the appropriate operations knowledge and experience to support the seismic walkdown activities.

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 PVNGS-3 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. The licensee stated that it considered the transformer as a subcomponent of the switchgear or motor control center (MCC); as such, transformers were included in the SWEL-1 but were not individually listed as a separate component. Based on Appendix F, Attachments 1 and 2, of the walkdown report, PVNGS-3 SWEL 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 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, therefore, concludes that these exclusions are acceptable.

The licensee discussed the approach to identifying all items that can lead to rapid drain-down in Section 3.3 of the walkdown report. The licensee reported that there were no rapid drain-down items for input into SWEL-2. The licensee referenced its updated final safety analysis report, to indicate that all pipe penetrations through the pool wall are at or above the minimum required water levels for spent fuel shielding of 10 feet. The licensee stated that all the pipes extending down into the SFP have siphon breaker holes at or above the minimum required water level. The licensee also considered other SFP drain-down flow paths and concluded that there are no components that could, upon failure, result in rapid drain-down of the SFP water level to below 3 m (10 ft) above the top of the fuel. After reviewing the information provided in this section the NRC 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 4 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 one seismic review team of at least two Seismic Walkdown Engineers (SWEs) conducted the seismic walkdowns and area walk-bys together during the weeks of August 6, through August 9, 2012. The NRC staff reviewed the seismic walkdown checklists (SWCs) and area walk-by checklists (AWCs) and noted that they were all signed on November 26, 2012. 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 A and B of the walkdown report provide

the completed SWCs and AWCs, documenting the results for each item of equipment on SWELs 1 and 2 and each area containing SWEL equipment. The licensee used the checklists provided in Appendix C of the walkdown guidance report without modification. The licensee documented cases of potentially adverse seismic conditions (PASCs) in the SWCs and AWCs for further evaluation. In Appendix D, Licensing Evaluation Summary, of the walkdown report the licensee included a table describing the identified PASCs, how the condition was addressed (e.g., placement in the CAP), their resolution, and its current status.

By letter dated November 1, 2013, the NRC staff requested additional information (RAI) in order to obtain additional clarification regarding the process followed by the licensee when evaluating conditions identified in the field during the walkdowns and walk-bys. Specifically, in RAI-1, the 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 confirms that all PASCs, including conditions for which a calculation, analysis (if more than a simple analysis), or evaluation was used for a determination, identified during the walkdowns and walk-bys were addressed and included in the submitted reports. The licensee stated that the process and the methodology of the original walkdowns and walk-bys were also applied during the supplemental walkdowns and walk-bys, performed during outages. The licensee indicated that the process applied during the walkdowns and walk-bys consisted of SWEs to identify PASCs using its engineering judgment based upon experience and training, and supplemented by existing CLB plant documentation and analyses. The licensee stated that the observations identified in the field requiring judgment to conclude whether the component or area met the CLB had the supporting technical basis clearly documented in the SWC or AWC, including the field determinations denoted by Yes ("Y"), No ("N"), or Unknown ("U"). The licensee indicated that components or areas determined in the field to meet CLB were denoted as "Y" on the checklists, and no further action was taken. For the components or areas determined to not meet CLB, the licensee denoted them as "N" on the checklists, and entered into the CAP by generating a Palo Verde Action Request (PVAR). The PVARs were documented in both, Section 4.3 and the respective checklist of the walkdown report. In addition, the licensee indicated that components or areas for which conditions could not be determined to meet the CLB were considered PASCs and denoted as "U" on the checklists. These items were then evaluated further under the licensing basis evaluation process and documented in Appendix D of the walkdown report. The electrical components whose interiors could not be inspected during the initial walkdowns were also denoted as "U" and deferred for additional inspection during the next outage.

After evaluating the licensee's response and Appendix D of the walkdown report, the NRC staff concludes that the licensee responded appropriately to RAI-1 and that PASCs were identified and documented properly.

While reviewing the walkdown checklists the NRC staff noted 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.

In Section 3.4 of the walkdown report, the licensee indicated that following the completion of the Unit 3 initial walkdowns, it was made aware of the NRC staff position on opening electrical cabinets to inspect for other adverse seismic conditions. As a result, the licensee planned to

conduct supplemental inspections of 18 electrical cabinets during the next Unit 3 refueling outage. The list of electrical cabinets that require supplemental inspection is included in Table 3-6 of the walkdown report. Since the licensee has committed to open a representative number of cabinets to verify their internal components and provided the schedules for performing these actions, the NRC staff concludes this is an acceptable approach.

The equipment and areas that were inaccessible during the 180-day period are listed in Table 3-5 of the walkdown report. Section 3.4 of the walkdown report indicates that items with electrical safety challenges or items within the containment were deferred to the refueling outage to ensure safety during inspections. A limited number of SWEL components (total of twenty) were inaccessible at the time of the initial walkdowns. The walkdowns for all of the remaining inaccessible items, including cabinets, were committed to be completed by the end of the next scheduled refueling outage (fall 2013). The licensee committed to provide a supplemental submittal with the results of these walkdown items by April 2014.

Based on the above, 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 5 of the PVNGS-3 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. Those PASCs that could not readily be shown to meet their CLB were entered into the PVNGS-3 CAP. Appendix D of the walkdown report provides the licensing basis evaluation summary, including a description of the item, its conditions, current status, and action taken for each item judged as a PASC.

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

#### 3.2.5 Conclusion

Based on the 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 6 of the PVNGS-3 walkdown report which describes the conduct of the peer review. In addition, the NRC staff reviewed Appendix C, Peer Review Checklists, which contains all findings noted by the independent reviewers and the resolution. The licensee stated that the peer review process provided real-time feedback to the SWEs during performance of the walkdowns, and confirmed that the licensing basis evaluations carefully compared the actual as-found plant configurations to the CLB documentation. 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 the peer reviews for both the original and the subsequent supplemental seismic walkdowns inspections were performed in accordance with page 6-1 of the walkdown guidance. The licensee stated that an individual involved in performing any given walkdown activity was not a peer reviewer for that same activity. The NRC staff reviewed the licensee's summary of each of these activities, the peer review findings, and resolution of peer review comments.

After reviewing the licensee's submittals, the NRC staff concludes that the licensee documented the results of the peer review activities sufficiently 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, "Individual Plant Examination of External Events for Severe Accident Vulnerabilities," dated November 23, 1988,<sup>9</sup> licensees previously had performed a systematic examination to identify any plant-specific vulnerabilities to severe accidents.

In Section 7 of the walkdown report the licensee stated that no plant-specific seismic vulnerabilities were identified at PVNGS-3 by the IPEEE program and that no significant changes to plant design were required in order to demonstrate the ability to mitigate the Review Level Earthquake (RLE). The licensee indicated that all observations identified from the IPEEE walkdowns were resolved prior to issuing of the IPEEE report on June 1, 1995. The IPEEE report concluded that all components have capacities exceeding the 0.3g peak ground acceleration of the RLE. However, an action was taken to improve the seismic capacity of the bookcases located behind the control cabinets in the Unit 3 control room. While the condition was also noted for the same bookcases in Unit 1, the IPEEE report did not specify action to provide additional anchorage for these bookcases. As a result of this observation, as part of walkdown activities, the licensee generated a PVNGS CAP entry and removed these bookcases from the zone of influence of the main control boards in all three units.

Based on the NRC staff's 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,<sup>10</sup> the NRC issued Temporary Instruction (TI) 2515/188 "Inspection of Near-Term Task Force Recommendation 2.3 Seismic Walkdowns." In accordance with the TI, NRC inspectors independently verified that the 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,<sup>11</sup> documents the results of this inspection and states that no findings were identified.

### 4.0 INACCESSIBLE ITEMS

The equipment and areas that were inaccessible during the 180-day period are listed in in Table 3-5 of the walkdown report. In Section 3.4 of the walkdown report, the licensee stated that the walkdowns for all of the remaining inaccessible items, including cabinets, will be

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

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

<sup>11</sup> ADAMS Accession No. ML13038A565.

completed by the end of the next scheduled refueling outage (fall 2013). The licensee committed to provide a supplemental submittal with the results of these delayed walkdown items by April 2014.

The NRC staff concludes that the inaccessible equipment list was developed consistent with the walkdown guidance. The schedule for completion these walkdowns are consistent with the time frame of the next scheduled refueling outage.

## 5.0 CONCLUSION

The NRC staff concludes that the licensee's implementation of seismic walkdown methodology meets the intent of the walkdown guidance. The 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. Furthermore, the NRC staff notes that no immediate safety concerns were identified. The NRC staff acknowledges that a supplemental letter will be provided by April 2014 addressing the remaining inaccessible items consistent with the regulatory commitment. The NRC staff reviewed the information provided and determined that sufficient information was provided to be responsive to Enclosure 3 of the 50.54(f) letter.



R. Edington

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If you have any questions, please contact me at (301) 415-1530 or via e-mail at [jennivine.rankin@nrc.gov](mailto:jennivine.rankin@nrc.gov).

Sincerely,

*/RA/*

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Office of Nuclear Reactor Regulation

Docket Nos. STN 50-528, STN 50-529,  
and STN 50-530

Enclosures:

1. Unit 1 Staff Assessment of Seismic Walkdown Report
2. Unit 2 Staff Assessment of Seismic Walkdown Report
3. Unit 3 Staff Assessment of Seismic Walkdown Report

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