



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

September 8, 2014

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

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1,2, AND 3 –  
REPORT FOR THE AUDIT REGARDING IMPLEMENTATION OF MITIGATING  
STRATEGIES AND RELIABLE SPENT FUEL POOL INSTRUMENTATION  
RELATED TO ORDERS EA-12-049 AND EA-12-051 (TAC NOS. MF0829,  
MF0830, MF0831, MF0774, MF0775, AND MF0776)

Dear Mr. Edington:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13136A022), Arizona Public Service Company (APS, the licensee) submitted its OIP for Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3 in response to Order EA-12-049. By letter dated June 20, 2013, the NRC sent a request for additional information (RAI) to APS (ADAMS Accession No. ML13161A259, non-public for proprietary reasons). By letter dated July 18, 2013, APS replied to the RAI (ADAMS Accession No. ML13206A006). By letters dated August 28, 2013, and February 28, 2014 (ADAMS Accession Nos. ML13246A007 and ML14066A036, respectively), APS submitted its first two six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the PVNGS interim staff evaluation (ISE) and audit report on November 25, 2013 (ADAMS Accession No. ML13308C153) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13070A077), APS submitted its OIP for PVNGS in response to Order EA-12-051. By letter dated June 10, 2013 (ADAMS Accession No. ML13157A065), the NRC staff sent a RAI to APS. By letter dated July 11, 2013 (ADAMS Accession No. ML13199A033), APS submitted its RAI response. By letters dated August 28, 2013, and February 28, 2014 (ADAMS Accession Nos. ML13246A008 and

ML14065A039, respectively), APS submitted its first two six-month updates to the OIP. The NRC staff's review led to the issuance of the PVNGS ISE and RAI dated October 29, 2013 (ADAMS Accession No. ML13296A006). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audits allow the staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents/Final Integrated Plans while identifying additional information necessary for the licensee to supplement its plan and staff potential concerns.

In support of the ongoing audit of the APS OIPs as supplemented, the NRC staff conducted an onsite audit at PVNGS from April 8-9, 2014, per the audit plan dated March 19, 2014 (ADAMS Accession No. ML14069A516). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

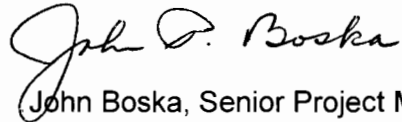
The enclosed audit report provides a summary of the activities for the onsite audit portion. Additionally, this report contains an attachment listing all open audit items currently under NRC staff review.

R. Edington

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If you have any questions, please contact me at 301-415-2901 or by e-mail at [John.Boska@nrc.gov](mailto:John.Boska@nrc.gov).

Sincerely,

A handwritten signature in black ink that reads "John D. Boska". The signature is written in a cursive style with a large, looping initial "J".

John Boska, Senior Project Manager  
Orders Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

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

Enclosure:  
Audit report

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

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO ORDERS EA-12-049 AND EA-12-051 MODIFYING LICENSES  
WITH REGARD TO REQUIREMENTS FOR  
MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS  
AND RELIABLE SPENT FUEL POOL INSTRUMENTATION  
ARIZONA PUBLIC SERVICE COMPANY  
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3  
DOCKET NOS. 50-528, 50-529, and 50-530

BACKGROUND AND AUDIT BASIS

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). Order EA-12-049 directs licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a beyond-design-basis external event (BDBEE). Order EA-12-051 requires, in part, that all operating reactor sites have a reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a BDBEE. The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13136A022), Arizona Public Service Company (APS, the licensee) submitted its OIP for Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3 in response to Order EA-12-049. By letter dated June 20, 2013, the NRC sent a request for additional information (RAI) to APS (ADAMS Accession No. ML13161A259, non-public for proprietary reasons). By letter dated July 18, 2013, APS replied to the RAI (ADAMS Accession No. ML13206A006). By letters dated August 28, 2013, and February 28, 2014 (ADAMS Accession Nos. ML13246A007 and ML14066A036, respectively),

Enclosure

APS submitted its first two six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the PVNGS interim staff evaluation (ISE) and audit report on November 25, 2013 (ADAMS Accession No. ML13308C153) and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13070A077), APS submitted its OIP for PVNGS in response to Order EA-12-051. By letter dated June 10, 2013 (ADAMS Accession No. ML13157A065), the NRC staff sent a RAI to the licensee. By letter dated July 11, 2013 (ADAMS Accession No. ML13199A033), APS submitted its RAI response. By letters dated August 28, 2013, and February 28, 2014 (ADAMS Accession Nos. ML13246A008 and ML14065A039, respectively), APS submitted its first two six-month updates to the OIP. The NRC staff's review led to the issuance of the PVNGS ISE and RAI dated October 29, 2013 (ADAMS Accession No. ML13296A006). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audits allow the staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents (OPDs)/Final Integrated Plans (FIPs) while identifying additional information necessary for the licensee to supplement its plan and address staff potential concerns.

In support of the ongoing audit of the APS OIPs, as supplemented, the NRC staff conducted an onsite audit at PVNGS from April 8-9, 2014, per the audit plan dated March 19, 2014 (ADAMS Accession No. ML14069A516). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

Following the licensee's declarations of order compliance, the NRC staff will evaluate the OIPs, as supplemented; the resulting site-specific OPDs/FIPs; and, as appropriate, other licensee submittals based on the requirements in the orders. For Order EA-12-049, the staff will make a safety determination using the Nuclear Energy Institute (NEI) developed guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" issued in August 2012 (ADAMS Accession No. ML12242A378), as endorsed by NRC Japan Lessons-Learned Project Directorate (JLD) interim staff guidance (ISG) JLD-ISG-2012-01 "Compliance with Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events'" (ADAMS Accession No. ML12229A174). For Order EA-12-051, the staff will make a safety determination using the NEI developed

guidance document NEI 12-02, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12240A307), as endorsed, with exceptions and clarifications, by NRC ISG JLD-ISG-2012-03 "Compliance with Order EA-12-051, 'Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12221A339) as providing one acceptable means of meeting the order requirements. Should the licensee propose an alternative strategy for compliance, additional staff review will be required to evaluate the alternative strategy in reference to the applicable order.

### AUDIT ACTIVITIES

The onsite audit was conducted at the PVNGS facility from April 8, 2014, through April 9, 2014. The NRC audit team staff was as follows:

<b>Title</b>	<b>Team Member</b>	<b>Organization</b>
Team Lead	James Isom	NRR/DIRS
Technical Support – Electrical	Matthew McConnell	NRR/MSD
Technical Support – Electrical	Prem Sahay	NRR/MSD
Special Advisor	Eric Bowman	NRR/MSD
Regional Support	Mica Baquera	R-IV
Branch Chief – Electrical and Structures	Stewart Bailey	NRR/MSD
Branch Chief - Projects	Jeremy Bowen	NRR/MSD
Director – Mitigating Strategies Directorate	Jack Davis	NRR/MSD
Process Oversight	Victor Cusumano	NRR/MSD
Process Oversight	Mandy Halter	NRR/MSD
Project Manager	John Boska	NRR/MSD

The NRC staff executed the onsite portion of the audit per the three part approach discussed in the March 19, 2014, plan, to include conducting a tabletop discussion of the site's integrated mitigating strategies (MS) compliance program, a review of specific technical review items, and discussion of specific program topics. Activities that were planned to support the above included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

### AUDIT SUMMARY

#### 1.0 Entrance Meeting (April 8, 2014)

At the audit entrance meeting, the NRC staff audit team introduced itself followed by introductions from the licensee's staff. The NRC audit team provided a brief overview of the audit's objectives and anticipated schedule.

## 2.0 Integrated Mitigating Strategies Compliance Program Overview

Per the audit plan and as an introduction to the site's program, the licensee provided a presentation to the NRC audit team titled, "Palo Verde NRC Audit Presentations." The licensee reviewed its strategy to maintain core cooling, containment, and SFP cooling in the event of a BDBEE, and the plant modifications being done in order to implement the strategies. Also reviewed were the design and location of the FLEX equipment storage facility, the FLEX equipment that would be stored there, the interface with the National SAFER Response Center, and the spent fuel pool level indication modification.

## 3.0 Onsite Audit Technical Discussion Topics

Based on the audit plan, and with a particular emphasis on the Part 2 "Specific Technical Review Items," the NRC staff technical reviewers conducted interviews with licensee technical staff, site walk-downs, and detailed document review for the items listed in the plan. Results of these technical reviews and any additional review items needed from the licensee are documented in the audit item status table in Attachment 3, as discussed in the Conclusion section below.

### 3.1 Reactor Systems Technical Discussions and Walk-Downs

NRC staff met with licensee staff to discuss the reactor coolant pump (RCP) seal leakage rate. The NRC staff expressed concerns about the leak rate used by the licensee in their analyses. The licensee committed to provide additional information on the expected RCP seal leakage under Extended Loss of Alternating Current Power (ELAP) conditions.

### 3.2 Electrical Technical Discussions and Walk-Downs

a. NRC staff reviewed the conceptual calculations on extending battery life based on load shedding, and licensee analyses and evaluation on strategies for hydrogen and temperature control in the battery rooms. NRC staff also walked down electrical panels used for load shedding to evaluate feasibility and timing.

b. NRC staff reviewed conceptual calculations for sizing of FLEX electrical equipment.

### 3.3 SFPI Technical Discussions and Walk-Downs

NRC staff walked down the location of the new SFP level sensors in the SFP, and the locations of the readouts and the batteries in the control room area and the reactor auxiliary building. NRC staff also reviewed the routing of the cables. No concerns were identified during the walkdown.

### 3.4 Other Technical Discussion Areas and Walk-Downs

a. NRC staff walked down the proposed storage location for the new FLEX equipment, and Staging Area B, where the Phase 3 FLEX equipment would be delivered to the site. NRC staff also walked down the various Staging Areas A, where Phase 2 and Phase 3

FLEX equipment would be located while it was in operation. Staging Area C was proposed to be at the National Strategic Alliance for FLEX Emergency Response (SAFER) Response Center in Phoenix.

b. NRC staff discussed with licensee staff the SAFER Response Plan for PVNGS. It is a draft plan which needs some details to be finalized, but appeared adequate to guide the delivery of SAFER FLEX equipment to the site.

c. NRC staff met with licensee staff to discuss the FLEX equipment maintenance and testing program. As documented in the ISE for the PVNGS OIP, the licensee is abiding by the generic resolution for equipment maintenance and testing as documented in EPRI Report 3002000623 "Nuclear Maintenance Applications Center: Preventive Maintenance Basis for FLEX Equipment," (ADAMS Accession No. ML13276A573) and endorsed by NRC letter dated October 7, 2013, (ADAMS Accession No. ML13276A224). Draft maintenance and inspection procedures were reviewed by the NRC staff. No concerns were identified.

#### 4.0 Exit Meeting (April 9, 2014)

The NRC staff audit team conducted an exit meeting with licensee staff following the closure of onsite audit activities. The NRC staff highlighted items reviewed and noted that the results of the onsite audit trip will be documented in this report. The following open items were discussed at the exit meeting (see Attachment 3 for additional information):

a. ISE OI 3.1.1.2.A, Means to Move Equipment

The licensee has committed to provide vehicles capable of moving the portable equipment to the desired location in response to the event. The NRC staff has a concern that the storage location for these vehicles may not provide adequate protection during a seismic event. The current plan is to have them stored 6 feet apart, but unrestrained. The staff requests information on the seismic response and the potential for movement and impact of unrestrained equipment.

b. ISE CI 3.1.1.4.A, Utilization of Offsite Resources

The industry has developed two national response centers, either of which can deliver portable equipment to a nuclear plant following an event. This involves the delivery to specific locations called staging areas. The licensee has made progress in preparing for the utilization of this equipment, but the location of the staging areas had not been finalized.

Following the audit, the licensee finalized the location of the staging areas. This item is now closed.

c. ISE CI 3.2.2.A, Spent Fuel Pool Cooling

The licensee has made considerable progress in the plan to provide cooling for the spent fuel pools in the case of a BDBEE. The NRC staff observed the progress on the installation of a new water supply line to one of the spent fuel pools, terminating in nozzles which spray the water into the spent fuel pool. The NRC staff still needs to



review the final flow calculation, which was not yet finalized, and evaluate the flow pattern from the spray nozzles.

d. ISE CI 3.2.4.10.A, Battery Duty Cycle

The licensee is crediting the station batteries for a minimum of 34 hours to supply power to essential loads, depending on the status of the direct current (dc) load shedding. Current battery qualification processes do not extend to that period of time. The NRC staff is requesting additional information on the capability of the batteries to perform adequately over that period of time.

Following the onsite audit, NRC staff is reviewing additional battery information. This item will remain open until the NRC staff completes its review on battery capability beyond 8 hours.

e. OI-4, Mitigation Strategies in Modes 5 and 6

The NRC staff needs to review the shutdown risk management procedures which are being revised to include mitigation strategies.

f. SE-4, 3.2.4.8.B, FLEX Electrical Generator Sizing

The staff needs to review the FLEX generator sizing information against the expected electrical loads, especially when the generators are derated due to high temperature conditions.

g. SE-6, 3.2.4.9, Fuel Management for FLEX Equipment

The NRC staff needs to review the overall refueling strategy to verify that refueling can be achieved such that credited equipment can run continuously if needed.

## CONCLUSION

The NRC staff completed all three parts of the March 19, 2014, onsite audit plan. Each audit item listed in Part 2 of the plan was reviewed by NRC staff members while on site. In addition to the list of NRC and licensee onsite audit staff participants in Attachment 1, Attachment 2 provides a list of documents reviewed during the onsite audit portion.

In support of the continuing audit process as the licensee proceeds towards orders compliance for this site, Attachment 3 provides the status of all open audit review items that the NRC staff is evaluating in anticipation of issuance of a combined safety evaluation for both the Mitigation Strategies and Spent Fuel Pool Level Instrumentation orders. The five sources for the audit items referenced below are as follows:

- a. Interim Staff Evaluation (ISE) Open Items (OIs) and Confirmatory Items (CIs)
- b. Audit Questions (AQs)
- c. Licensee-identified Overall Integrated Plan (OIP) Open Items (OIs)

- d. Spent Fuel Pool Level Instrumentation (SFPLI) Requests for Additional Information (RAIs)
- e. Additional Safety Evaluation (SE) needed information

The attachments provide audit information as follows:

- a. Attachment 1: List of NRC staff and licensee staff audit participants
- b. Attachment 2: List of documents reviewed during the onsite audit
- c. Attachment 3: PVNGS MS/SFPI SE Audit Items currently under NRC staff review (licensee input needed as noted)

While this report notes the completion of the onsite portion of the audit per the plan dated March 19, 2014, the ongoing audit process continues as per the letters dated August 28, 2013 and March 26, 2014, to all licensees and construction permit holders for both orders. Additionally, while Attachment 3 provides a list of currently open items, the status and progress of the NRC staff's review may change based on licensee plan changes, resolution of generic issues, and other NRC staff concerns not previously documented. Changes in the NRC staff review will be communicated in the ongoing audit process.

Attachments:

1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite Audit Documents Reviewed
3. MS/SFPI Audit Items currently under NRC staff review

## Onsite Audit Participants

### NRC Staff:

James Isom	NRR/DIRS/IRIB
John Boska	NRR/MSD/MSPB
Mica Baquera	R-IV
Matthew McConnell	NRR/MSD/MSEB
Prem Sahay	NRR/MSD/MSEB
Eric Bowman	NRR/MSD

Jack Davis	NRR/MSD
Stewart Bailey	NRR/MSD/MSEB
Sheena Whaley	NRR/MSD/MRSB
Victor Cusumano	NRR/MSD/MSPB
Mandy Halter	NRR/MSD/MSPB

### PVNGS Staff:

Michael Powell	Director, Fukushima Initiatives
Daniel Hautala	Engineer Sr, Nuclear Regulatory Affairs, Compliance
Nawaporn AaronsCooke	Engineer III, Nuclear Regulatory Affairs, Compliance
David Kelsey	Section Leader, Nuclear Regulatory Affairs, Licensing
Gene Eimar	Shift Manager, Operations Support
Hamid Mortazavi	Consulting Engineer Sr, Design Mechanical Engineering Administration
Kevin Foster	Dept Leader Fire Protection, Fire Protection Administration
James Sheely	Nuclear Project Manager, New Construction & Upgrade Project Administration
Bob Logue	Manager Information Technology, Field Services - PVNGS
Kevin Graham	Manager Work Management, Work Management Outage
Joe Morales	Nuclear Auxiliary Operator Sr, Unit 1 Operations
Martin Schjoll	Emergency Services Department Program Advisor Sr, Fire Protection Administration
James Wieser	Engineer II, Design Electrical Engineering
Chuck Karlson	Section Leader Engineering, Design Electrical Engineering

### **Documents Reviewed**

- 14DP-0BD01, "PVNGS Portable FLEX Equipment Deployment Strategy."
- 01DP-0AP01, "Procedure Process," Revision 49.
- SAFER Response Plan for Palo Verde Nuclear Generating Station
- Regional Response Center Project: Palo Verde Nuclear Generating Station Trip Report
- FSG 79IS-9ZZ07, PVNGS Extended Loss of All Site AC Guideline
- 40EP-9EO08, Station Blackout (SBO) emergency operations.
- 40EP-9EO10, Standard Appendices.
- CN-PEUS-13-02, Revision 1, "Palo Verde Unit 3 FLEX – Load Flow & Motor Starting Calculation – 480V Train A".
- CN-PEUS-13-04, Revision 1, "Palo Verde Unit 3 Flex – Load Flow & Motor Starting Calculation – 480V Train B".
- CN-PEUS-13-02, Revision 1.
- CN-PEUS-13-04, Revision 1.
- DS-PEUS-13-15, Revision 1, "Palo Verde Nuclear Generating Station FLEX Electrical System Design Specification".
- Battery Discharge Capacity Study (Document No. NM1000-A00048, "Project Study Report – For The Battery Discharge Capacity During Extended Loss Of AC Power").

**Palo Verde Nuclear Generating Station  
Mitigation Strategies/Spent Fuel Pool Instrumentation Safety Evaluation Audit Items:**

**Audit Items Currently Under NRC Staff Review, Requiring Licensee Input As Noted**

<b>Audit Item Reference</b>	<b>Item Description</b>	<b>Licensee Input Needed</b>
ISE OI 3.1.1.2.A	The licensee has committed to provide vehicles capable of moving the portable equipment to the desired location in response to the event. The NRC staff has a concern that the storage location for these vehicles may not provide adequate protection during a seismic event. The current plan is to have them stored 6 feet apart, but unrestrained.	An analysis to confirm that 6 feet of separation for vehicles parked under the canopy is adequate to avoid seismic interactions.
ISE OI 3.2.1.2.A	RCP Seal leakage Rate: Following the onsite audit, the NRC staff reviewed licensee information on the seal leakage rate and revised ELAP analysis. The NRC staff has determined that the licensee's revised ELAP analysis using 25 gpm for the initial seal leakage rate per RCP is acceptable.	This item is now closed, but the NRC staff will review the revised OIP sequence events timeline and the FLEX procedures to ensure they have been updated to adequately reflect the results of the ELAP analysis using an initial seal leakage rate of 25 gpm.
ISE OI 3.2.1.2.B	RCP Seal Pop-Open Concerns: Following the onsite audit, the NRC staff reviewed licensee information on the seal pop-open concerns. The NRC staff has determined that the licensee's strategy is acceptable.	This item is now closed.
ISE CI 3.2.2.A	Spent fuel pool cooling.	Refer to notes from the exit meeting, section 4.0 in this report.
ISE CI 3.2.4.10.A	Battery run time is greater than 8 hours.	Refer to notes from the exit meeting, section 4.0 in this report.
RAI-2	Are procedures consistent with the analysis and can they be performed within the required completion times?	Validation and verification of FLEX procedures is needed. The NRC staff will review the results.

Audit Item Reference	Item Description	Licensee Input Needed
RAI-11	PVNGS plans to start plant cooldown at one hour into the event, which is shorter than the two hours analyzed in WCAP-17601. Verify that all procedures, such as dc load shed, can be performed in that short time.	Validation and verification of FLEX procedures is needed. The NRC staff will review the results.
RAI-12	There is a time constraint of 34 hours to have FLEX generators begin charging the batteries.	Validation and verification of FLEX procedures is needed. The NRC staff will review the results.
RAI-14	FLEX equipment should be rated for the environmental conditions in which it may be required to operate.	The licensee will provide this information in a six-month update.
RAI-27	Discuss how the operator actions are modeled in the ELAP to determine the required flow rates of the portable pumps, and justify that the capacities of each of the above discussed pumps are adequate to maintain core cooling during phases 2 and 3 of ELAP.	Validation and verification of FLEX procedures is needed. The NRC staff will review the results.
SE-4, 3.2.4.8.B	The staff needs to review the FLEX generator sizing information against the expected electrical loads, especially when the generators are derated due to high temperature conditions.	<p>NRC staff needs the following information to complete its review:</p> <p>a. Licensee to provide revised Tables 1 and 20 in conceptual calculation CN-PEUS-13-02 and Tables 1 and 17 in conceptual calculation CN-PEUS-13-04 to include and reflect calculated power factor (pf) of the total load demand and to confirm that the 480 V FLEX generators derated capacity (500KW at 0.8 pf) exceeds total load demand (KW) at total demand pf.</p> <p>b. Licensee needs to provide a summary of the sizing calculation including manufacturer's technical data for four 1.1 MW, 4160 V FLEX generators to demonstrate that the proposed 4160 V generators will be capable of supporting Phase 3 load operations.</p>

<b>Audit Item Reference</b>	<b>Item Description</b>	<b>Licensee Input Needed</b>
SE-6, 3.2.4.9	Fuel Management for FLEX Equipment.	Licensee to provide its overall assessment of the refueling strategy to ensure that the credited diesel operated FLEX equipment can continuously perform its expected function.
SE-8	Validation and Verification - The licensee was developing procedures for validation and verification of the revised plant procedures and the new Flex Support Guidelines. The NRC will review those procedures.	Validation and verification procedures which also address human factors concerns.

R. Edington

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If you have any questions, please contact me at 301-415-2901 or by e-mail at John.Boska@nrc.gov.

Sincerely,

*/RA/*

John Boska, Senior Project Manager  
Orders Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

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

Enclosure:  
Audit report

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**\*Via email**

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