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102-06656-DCM/FJO  
February 12, 2013

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Units 1, 2, and 3  
Docket No. STN 50-528, STN 50-529, and STN 50-530  
License No. NPF 41, NPF 51, and NPF 74  
Licensee Event Report 2012-005-00**

Enclosed please find Licensee Event Report (LER) 50-528/2012-005-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports a condition prohibited by Technical Specification 3.3.11 due to deficiencies with the isolation capability for three remote shutdown system control circuits that could impact circuit functions in the event of a control room fire.

In accordance with 10 CFR 50.4, copies of this LER are being forwarded to the Nuclear Regulatory Commission (NRC) Regional Office, NRC Region IV, and the Senior Resident Inspector. If you have questions regarding this submittal, please contact Mark McGhee, Operations Support Manager, Regulatory Affairs, at (623) 393-4972.

Arizona Public Service Company makes no commitments in this letter.

Sincerely,

DCM/FJO/hsc

Enclosure

cc: E. E. Collins Jr. NRC Region IV Regional Administrator  
L. K. Gibson NRC NRR Project Manager for PVNGS  
M. A. Brown NRC Senior Resident Inspector for PVNGS

**LICENSEE EVENT REPORT (LER)**  
(See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NE0B-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

<b>1. FACILITY NAME</b> Palo Verde Nuclear Generating Station (PVNGS) Unit 1	<b>2. DOCKET NUMBER</b> 05000528	<b>3. PAGE</b> 1 OF 6
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**4. TITLE**  
Condition Prohibited by Technical Specifications due to Remote Shutdown System Control Circuit Deficiencies

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	14	2012	2012	- 005 -	00	02	12	2013	PVNGS Unit 2	05000529
									PVNGS Unit 3	05000530

<b>9. OPERATING MODE</b>  1 / 1 / 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§:</b> (Check all that apply)											
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)								
<b>10. POWER LEVEL</b>  100 / 100 / 100	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)								
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)								
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)								
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)								
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)								
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)								
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER									
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A									

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Mark McGhee, Operations Support Manager, Regulatory Affairs	623-393-4972

**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO			

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On December 14, 2012, during a review of remote shutdown system (RSS) control circuits, a deficiency was identified which could prevent proper isolation of the train B pressurizer (PZR) backup heater controls during a control room (CR) fire event. In response, each unit entered Limiting Condition for Operation (LCO) 3.3.11, Condition B, and on December 17, 2012, each unit exited LCO 3.3.11, Condition B, when procedure changes were issued that provided alternate methods for operation of the train B PZR backup heaters. On January 29, 2013, further review of RSS control circuits identified similar deficiencies with the circuits for two chemical and volume control system (CVCS) isolation valves. In response, each unit entered LCO 3.3.11, Condition B, and on February 1, 2013, each unit exited LCO 3.3.11, Condition B, when procedure changes were issued to provide alternate methods of control circuit isolation for the affected CVCS valves.

The cause of the event was an original latent design deficiency. Additionally, RSS control circuit reviews performed during a 2007 evaluation, for a similar event, were conducted without adequate comprehensive review and independent verification.

In the past three years, PVNGS reported one event involving an inoperable RSS component which was caused by inadequate post maintenance testing. (LER 50-530/2010-001-00).

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**NARRATIVE**

All times are Mountain Standard Time and approximate unless otherwise indicated.

**1. REPORTING REQUIREMENT(S):**

This Licensee Event Report (LER) is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(B) for a condition prohibited by Technical Specification Limited Condition for Operation (LCO) 3.3.11. On December 14, 2012, Palo Verde Nuclear Generating Station (PVNGS) determined that the train B pressurizer (PZR) backup heater control circuit isolation features may not properly isolate the circuit during a control room (CR) fire event. In response, each PVNGS unit entered LCO 3.3.11, Condition B, at 1530 on December 14, 2012. On December 17, 2012, at 2247, each unit exited LCO 3.3.11, Condition B, when procedure changes were issued that provided alternate methods for operation of the train B PZR backup heaters during a CR fire event.

LCO 3.3.11 requires that the remote shutdown system (RSS) instrumentation functions in table 3.3.11-1 and each RSS disconnect switch and control circuit shall be operable. Condition B of LCO 3.3.11 requires that, if one or more RSS disconnect switches or control circuits are inoperable, either restore the required switch(s)/circuit(s) to operable status within 30 days or issue procedure changes that identify alternate disconnect methods or control circuits within 30 days. If neither action is completed within 30 days, Condition C then requires the unit be in Mode 3 within 6 hours and be in Mode 4 within 12 hours. Because the deficient RSS control circuit condition has existed since original plant design, the LCO Required Actions were not completed within the allowed completion times.

On January 29, 2013, during ongoing reviews of RSS control circuit design, two additional conditions were identified where control circuit isolation features may not properly isolate the circuit during a CR fire event. Specifically, the control circuits for letdown isolation valve CHB-UV-515 and reactor coolant pump seal bleed-off containment isolation valve CHB-UV-505 were found to have similar deficiencies with the circuit isolation features. In response, each PVNGS unit entered LCO 3.3.11, Condition B, at 1805 on January 29, 2013. On February 1, 2013, at 1742, each unit exited LCO 3.3.11, Condition B, when procedure changes were issued that provided alternate methods of control circuit isolation for the two chemical and volume control system (CVCS) isolation valves during a CR fire event.

**2. DESCRIPTION OF STRUCTURE(S), SYSTEM(S) AND COMPONENT(S):**

The RSS provides the CR operator with sufficient instrumentation and controls to place and maintain the unit in a safe shutdown condition from a location other than the CR. In the event that the CR becomes inaccessible, the operators can establish control at the remote shutdown panel and place and maintain the unit in Mode 3. Disconnect switches are provided for specified train B components to isolate the local portion of each control circuit

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from the CR portion of the control circuit. The disconnect switches prevent spurious operation of components during a CR fire event and ensure credited components will function to provide for safe shutdown from the remote shutdown panel. The disconnect switches have two positions: the Remote/Local (R/L) position which enables operation from both CR and local controls and the Local position which isolates the control circuit from potential CR fire induced circuit faults and allows local operation only. Not all controls and control circuit disconnect switches are located at the remote shutdown panel. Some controls and disconnect switches are operated locally at the electrical switchgear, motor control centers, and other local stations.

The operability of the RSS control and instrumentation functions ensures there is sufficient information available and sufficient equipment control available to bring the plant to, and maintain it in, Mode 3 should the CR become inaccessible. The required controls, instrumentation, and disconnect switches are those necessary for reactivity control (initial and long term), reactor coolant system (RCS) (EIS: AB) pressure control, decay heat removal, RCS inventory control and support systems for the above functions which include the essential spray pond system, essential cooling water system, and onsite electrical power system including the diesel generators.

The RCS pressure control remote shutdown function is facilitated by RCS pressure and PZR (EIS: AB) level instrumentation at the remote shutdown panels and local controls for the train B PZR backup heaters and train B PZR auxiliary spray valve. Key PZR functions include maintaining required RCS pressure during steady state operation and limiting the pressure changes caused by reactor coolant thermal expansion and contraction that may occur while shutting down and cooling down the plant. Two groups of PZR backup heaters are designated as the class 1E heaters. The class 1E PZR backup heaters are normally de-energized but can be manually energized or automatically energized by a low PZR pressure signal or a high PZR level error signal. The train B PZR backup heaters are the designated safe shutdown heaters for a control room fire event.

The RCS inventory control remote shutdown function is supported by a number of CVCS (EIS: CA) components which limit losses of RCS coolant and provide makeup capability during remote shutdown operations. The CVCS controls the purity, volume and boric acid content of the reactor coolant. Reactor coolant is removed from the RCS loop 2B cold leg via the letdown portion of the CVCS system. After leaving the RCS, letdown process flow passes through the regenerative heat exchanger in containment where heat is transferred from letdown to the charging flow and then through letdown isolation valve CHB-UV-515 and containment isolation valves CHA-UV-516 and CHB-UV-523 to the letdown heat exchanger in the auxiliary building where letdown process temperature is further reduced prior to filtering and deionization and collection in the volume control tank (VCT) (EIS: CB). The coolant charging pumps take suction on the VCT and pump coolant back to the RCS loop 2A cold leg. The charging system also provides flow to the PZR auxiliary spray and reactor coolant pump (RCP) (EIS: AB) seal injection systems. The RCP seal injection process flow

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is regulated to the pump seals to flush the seals with low temperature, filtered coolant. During normal operations, a portion of the seal injection flow from each RCP is returned to the VCT as RCP seal bleed-off via containment isolation valves CHB-UV-505 and CHA-UV-506. When the seal bleed-off containment isolation valves are closed, RCP seal bleed-off flow is directed to the reactor drain tank in containment or can be isolated by the operator.

**3. INITIAL PLANT CONDITIONS:**

On December 14, 2012, Palo Verde Units 1, 2, and 3 were in Mode 1 (Power Operation), at 100 percent power and normal operating temperature and pressure. There were no structures, systems, or components inoperable that contributed to the event.

**4. EVENT DESCRIPTION:**

On December 14, 2012, during reviews of control circuit drawings for a pending procedure change, a licensed shift manager (SM) determined that the train B PZR backup heater control circuit design did not meet isolation capability requirements because the associated RSS disconnect switch RCB-HS-100-5-2 does not adequately separate a part of the CR circuits from the local circuits. The SM entered the condition into the PVNGS corrective action program and informed control room personnel of the condition. In response, each PVNGS unit declared the affected RSS control circuit inoperable and entered LCO 3.3.11, Condition B, at 1530 on December 14, 2012.

To comply with LCO 3.3.11 Condition B.2, the Control Room Fire abnormal operating procedure, 40AO-9ZZ19, was revised to provide an alternate method for operation of PZR backup heaters during a CR fire event and then, on December 17, 2012, at 2247, each unit exited LCO 3.3.11, Condition B.

On January 29, 2013, during ongoing reviews of RSS control circuit design, the SM discovered two additional RSS control circuits associated with a CVCS letdown isolation valve and a CVCS containment isolation valve that do not completely isolate the CR circuits from the local circuits. Specifically, disconnect switch CHB-HS-515-2 for letdown isolation valve CHB-UV-515 and disconnect switch CHB-HS-505-2 for RCP seal bleed-off containment isolation valve CHB-UV-505 do not meet isolation capability requirements because the disconnect switch does not adequately separate a part of the CR circuits from the local circuits. The SM entered the condition into the PVNGS corrective action program and informed control room personnel of the condition. In response, each PVNGS unit declared the affected RSS control circuits inoperable and entered LCO 3.3.11, Condition B, at 1805 on January 29, 2013.

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To comply with LCO 3.3.11 Condition B.2, the Control Room Fire abnormal operating procedure, 40AO-9ZZ19, was revised to provide an alternate method to isolate the control circuits for the two affected CVCS isolation valves, CHB-UV-515 and CHB-UV-505, and then, on February 1, 2013, at 1742, each unit exited LCO 3.3.11, Condition B.

5. ASSESSMENT OF SAFETY CONSEQUENCES:

The events did not result in a challenge to the fission product barriers or result in the release of radioactive materials; and the events did not adversely affect the safe operation of the plant or health and safety of the public.

The events did not result in a potential for a transient more severe than those analyzed in the Updated Final Safety Evaluation Report chapters 6 and 15. The analysis of record for the limiting 10 CFR 50 Appendix R event (fire in the CR with stuck open atmospheric dump valve) met the acceptance criteria for the limiting fire scenario without the use of the PZR heaters for a four hour duration. A four hour duration would allow sufficient time for Operations personnel to determine the loss of local PZR heater breaker control and then manually close the breaker in the switchgear room adjacent to the remote shut down panel area.

For the two affected CVCS valves, the postulated fire induced control circuit fault will result in the valve control circuit being de-energized and the valve failing in the closed position. The failed closed position of these valves is consistent with the direction in the Control Room Fire abnormal operating procedure, 40AO-9ZZ19, which provides guidance to isolate each of the two flow paths, CVCS letdown and RCP seal bleed-off.

Therefore, the RSS control circuit deficiencies addressed in this LER would not have contributed to a measurable amount of increased risk for core damage or a large early release event.

The design deficiencies for the three affected RSS control circuits did not impact the performance of any other component functions and no other safety functions were impacted as a result of this event. The conditions would not have prevented the fulfillment of a safety function; and, the condition did not result in a safety system functional failure as defined by 10 CFR 50.73 (a)(2)(v).

6. CAUSE OF THE EVENT:

The cause of the event was an original latent design deficiency that did not meet the 10 CFR 50 Appendix R isolation design criteria. Additionally, the extent of condition reviews of control circuits performed during the 2007 root cause evaluation for a similar event,

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reported in LER 50-528/2007-002-00, were conducted without adequate comprehensive review and independent verification.

**7. CORRECTIVE ACTIONS:**

Immediate corrective actions revised the Control Room Fire abnormal operating procedure, 40AO-9ZZ19, to add instructions to manually operate the train B PZR backup heater local breaker controls and to provide alternative isolation of the control circuits for the two affected CVCS isolation valves, CHB-UV-515 and CHB-UV-505. These procedure changes allowed the units to exit LCO 3.3.11, Condition B, for each circumstance.

The remaining RSS control circuits will be evaluated to confirm circuit isolation design features are adequate to isolate the specified control circuits during a CR fire event. These circuit evaluations will include independent verifications to ensure comprehensive review of the design.

PVNGS will evaluate the RSS control circuit design deficiencies to determine if a modification is needed.

*If information is subsequently developed that would significantly affect a reader's understanding or perception of this event, a supplement to this LER will be submitted.*

**8. PREVIOUS SIMILAR EVENTS:**

In the past three years, PVNGS reported an event which affected the remote shutdown system function of the unit 3 train B PZR auxiliary spray valve, CHB-HV-203. That event was caused by inadequate post maintenance testing (LER 50-530/2010-001-00). The corrective actions from the previous event would not have prevented this event.

In 2007, LER 50-528/2007-002-00 was submitted to report a condition with the RSS control circuit isolation capability which is similar to the conditions reported in this LER. The extent of condition reviews from the 2007 event did not prevent this event because it was conducted without adequate comprehensive review and independent verification.