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10 CFR 50.73

Palo Verde Nuclear  
Generating Station

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102-06554-DCM/TNW/MAM/DCE  
July 23, 2012

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

Dear Sirs:


Subject: **Palo Verde Nuclear Generating Station (PVNGS) Unit 2  
Docket No. STN 50-529  
License No. NPF- 51  
Licensee Event Report 2011-002-01**

Enclosed please find Licensee Event Report (LER) supplement 50-529/2011-002-01 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER supplement provides the causes and corrective actions determined for the previously reported event involving the Unit 2 Channel A Steam Generator #1 Low Pressure Reactor Trip and Main Steam Isolation Signal setpoint that was below the allowable value required by Technical Specifications.

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,

  
FOR D.C. MIMS

DCM/TNW/MAM/DCE/hsc

Enclosure

cc:

E. E. Collins Jr. NRC Region IV Regional Administrator  
L. K. Gibson NRC NRR Project Manager (electronic / paper)  
M. A. Brown NRC Senior Resident Inspector for PVNGS

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**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, NEOB-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.

1. FACILITY NAME  
Palo Verde Nuclear Generating Station (PVNGS) Unit 2

2. DOCKET NUMBER  
05000529

3. PAGE  
1 OF 7

4. TITLE  
Inoperable Steam Generator Low Pressure Reactor Trip and Main Steam Isolation Signal Channels

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
05	02	2011	2011	- 002 -	01	07	23	2012	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE  
3

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)

10. POWER LEVEL 0	<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)
	<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: Mark McGhee, Operations Support Manager, Regulatory Affairs  
TELEPHONE NUMBER (Include Area Code): 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

14. SUPPLEMENTAL REPORT EXPECTED

YES (If yes, complete 15. EXPECTED SUBMISSION DATE)  NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On May 5, 2011, at approximately 01:53, Unit 2 was in Mode 3 and preparing for entry into Mode 2 at the completion of its 16<sup>th</sup> refueling outage. Prior to Mode 2 entry, the Channel A setpoint for Steam Generator (SG) #1 Low Pressure (SGLP) Reactor Trip and Main Steam Isolation Signal (MSIS) was found to be 950.4 pounds per square inch absolute (psia), which is below the allowable value, greater than or equal to 955 psia, required by Technical Specifications (TSs) 3.3.2 and 3.3.5 for the reactor trip channel and the MSIS channel, respectively. The setpoint for those channels had been at the discovered value since approximately the time Unit 2 had reached normal operating temperature on May 2, 2011. Upon identification, SG #1 SGLP Channel A was placed into bypass as required by the TSs. Subsequently, the SGLP setpoint was adjusted to a value above 955 psia, the channel was taken out of bypass, and was declared operable at 17:19 on May 5, 2011. The cause of the event was procedural inadequacies. Station procedures did not require verification of SGLP bistable setpoints after completion of outage activities and prior to plant conditions requiring them to be OPERABLE in Mode 3. Corrective actions included the establishment of procedure requirements to verify the plant protection system variable setpoints prior to plant conditions requiring them to be OPERABLE. Similar reportable events have not occurred within the last three years.

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 7
		2011	-- 002	-- 01	

NARRATIVE

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

1. REPORTING REQUIREMENT(S):

This event is reportable as a condition prohibited by Technical Specifications (TSs) per 10 CFR 50.73(a)(2)(i)(B). The applicable TSs are described below:

TS Limiting Condition for Operation (LCO) 3.3.2, Reactor Protective System Instrumentation – Shutdown, for the Steam Generator Low Pressure (SGLP) reactor trip function is applicable in Mode 3, (Hot Standby) with any reactor trip circuit breakers (RTCBs) closed and any control element assembly (CEA)(EIS: AA) capable of being withdrawn. The associated channel functional test surveillance requirement (SR) 3.3.2.2 specifies that the SGLP function is tested every 92 days. The functional test includes verification that SGLP bistable maximum setpoint is greater than or equal to ( $\geq$ ) 955 pounds per square inch absolute (psia), the TS allowable value. If the LCO is not met because of a single inoperable channel, Required Action A.1 directs the inoperable channel to be placed in bypass within one hour. If the action is not completed within the completion time, Required Action C.1 requires all of the RTCBs to be opened within 1 hour.

LCO 3.3.5, Engineered Safety Features Actuation System (ESFAS) (EIS: JE) for the Main Steam Isolation Signal (MSIS) function is applicable in Mode 3 while any of the containment isolation valves (CIVs) (EIS: SB) actuated by MSIS are opened. The associated channel functional test SR 3.3.5.2 specifies that the SGLP function is tested every 92 days. The functional test includes verification that SGLP bistable maximum setpoint is  $\geq$  955 psia, the TS allowable value. If the LCO is not met because of a single inoperable channel, Required Action A.1 directs the inoperable channel to be placed in bypass within one hour. If the action is not completed within the completion time, Required Action E.1 requires the unit to be in Mode 3 within 6 hours and Required Action E.2 requires the unit to be in Mode 4 (Hot Shutdown) within 12 hours.

The condition was determined to be reportable as a result of further data review on May 13, 2011, after the event occurred on May 5, 2011.

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 7
		2011	-- 002	-- 01	

NARRATIVE

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

The Reactor Protective System (RPS) (EIS: JC), part of the Plant Protection System (PPS) (EIS: JC), provides automatic protective action to assure that acceptable plant and fuel design limits are not exceeded during anticipated operational occurrences and to initiate automatic protective action during accident conditions to aid the engineered safety features actuation system. The trip signals open the RTCBs to de-energize the control element drive mechanism coils. The CEAs drop into the reactor core as a result, completing the reactor trip sequence.

Among the reactor trip functions is a SGLP trip for each Steam Generator (SG) (EIS: AB). Each function provides four independent measurement channels (A, B, C and D), each with a bistable which compares SG pressure to a variable setpoint. During cooldown, the SGLP setpoint is manually lowered by a push button that decreases the setpoint by approximately 190 pounds per square inch gauge (psig) below the current SG pressure. During plant heatup, the setpoint automatically raises to keep the setpoint within 190 psig of actual SG pressure until the maximum setpoint is reached.

When any two of the four SGLP channel bistables from a SG senses SG pressure below the setpoint, a reactor trip will occur. A trip bypass feature (a push button) is provided for each channel so that one channel at a time may be bypassed for testing or maintenance. While a channel is bypassed, two of the remaining three bistable setpoints are sufficient to trip the reactor.

The SGLP bistables also send an output to ESFAS to generate an MSIS to isolate the SGs during events such as Main Steam or Main Feedwater line breaks. The MSIS automatically shuts the Main Steam, Main Feedwater, SG Blowdown, and SG Sample System CIVs to mitigate analyzed accidents. As with the reactor trip function, an MSIS is generated when any two of the four SGLP bistables from a SG senses SG pressure below the trip setpoint. The same trip bypass push button that bypasses the reactor trip channel also bypasses the corresponding MSIS channel so that one channel at a time may be bypassed for testing or maintenance. While a channel is bypassed, two of the remaining three bistable setpoints are sufficient to actuate an MSIS.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 7
		2011	-- 002	-- 01	

**NARRATIVE**

Each SGLP channel bistable resides in a Bistable Control Panel (BCP) with other RPS trip functions for the corresponding channel (A, B, C, and D). The BCP provides a digital voltmeter (DVM) display and selector switches to read various selected RPS function parameters, including the SGLP bistable setpoint.

In addition to the channel functional test SRs 3.3.2.2 and 3.3.5.2 verification of the SGLP bistable setpoints, station procedures require verification of the SGLP bistable maximum setpoint for each channel once per day in Mode 1 (Power Operations) and Mode 2 (Startup). Additionally the readings are obtained prior to entry into Mode 2 and Mode 1. The setpoint verifications are obtained by performing readings from the each of the respective channels' DVM displays. These additional setpoint readings are required as the result of incorporating input from industry operating practices.

The SGLP bistable maximum pressure setpoint acceptance criterion is  $\geq 6.267$  volts, which corresponds to  $\geq 955$  psia, specified in TSs 3.3.2 and 3.3.5 surveillance requirements.

**3. INITIAL PLANT CONDITIONS:**

At the time the condition was discovered on May 5, 2011, at 01:53, Unit 2 was in Mode 3 nearing completion of its 16<sup>th</sup> refueling outage. The plant had entered Mode 3 at 01:26 on May 2, 2011. Reactor Coolant System cold leg temperature was at approximately normal operating temperature (565 degrees Fahrenheit) since 14:06 on May 2. SG pressure was approximately 1165 psig during the corresponding period. CIVs actuated by the MSIS were in various alignments since Mode 3 entry, alternatively open or closed, such that at any given time, at least one of CIV was open. LCO 3.3.5 had been applicable since Mode 3 entry.

On May 5, 2011, at 01:53, RTCBs were open and had been since 00:17 on May 5, 2011, when they were opened for CEA drop time testing. Prior to 00:17 on May 5, RTCBs were closed and CEAs were capable of being withdrawn since 12:47 on May 2, 2011. LCO 3.3.2 was not applicable at the time of discovery, but was applicable during the period from 12:47 on May 2 through 00:17 on May 5.

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 7
		2011	-- 002	-- 01	

NARRATIVE

4. EVENT DESCRIPTION:

On May 5, 2011, at 01:53, in preparation for Mode 2 entry, a reading of the SGLP bistable maximum setpoints obtained a SG #1 SGLP Channel A maximum setpoint result of 6.236 volts, which was below the acceptance criteria of  $\geq 6.267$  volts specified for TSs 3.3.2 and 3.3.5. The reading corresponded to a setpoint of 950.4 psia, which was below the TS minimum allowable value of 955 psia. The reading was obtained during performance of the Mode 2 procedure *Operations Mode 2 Surveillance Logs* which was being performed in preparation for Mode 2. SG #1 SGLP Channels B, C, and D bistables' maximum setpoints were all  $\geq 6.267$  volts, as required, as were all four channels for SG #2.

Upon discovery, Unit 2 entered Condition A of LCO 3.3.5 for the inoperable Channel A MSIS function and, at 02:04, SG #1 SGLP Channel A was placed into bypass to comply with Required Action A.1 of TS 3.3.5. Placing Channel A into bypass also complied with TS 3.3.2 Required Action A.1, though the LCO was not immediately applicable at the time of discovery.

SG #1 SGLP Channel A was declared operable at 17:19 on May 5, 2011, after maintenance and testing was performed to adjust the setpoint above the TS minimum allowable value. SG #1 SGLP Channel A was taken out of bypass at which time Condition A of both TSs 3.3.1 and 3.3.5 were exited.

On May 13, 2011, further review of data logged by the plant computer determined that when normal operating temperature was reached at 13:59 on May 2, the SG #1 SGLP Channel A bistable maximum setpoint read approximately 949.3 psia. The prior functional tests of the channel for SRs 3.3.2.2 and 3.3.5.2 had been performed on March 23, 2011, and recorded an as-left DVM reading of 6.298 volts for the SG #1 SGLP Channel A bistable maximum setpoint, which met the acceptance criteria of  $\geq 6.267$  volts. Therefore, the SG #1 SGLP Channel A bistable maximum setpoint DVM as found reading on May 5 had decreased 0.062 volts from the as left reading taken prior to the outage on March 23.

Because the RTCBs remained closed during the period from 12:47 on May 2 through 00:17 on May 5, 2011, Unit 2 was in a condition prohibited by LCO 3.3.2 because the SG #1 SGLP Channel A maximum setpoint was below 955 psia.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 OF 7
		2011	-- 002	-- 01	

**NARRATIVE**

Similarly, Unit 2 was in a condition prohibited by LCO 3.3.5 because Unit 2 did not descend into Mode 4 while various open CIVs that are actuated by MSIS remained open with the SG #1 SGLP Channel A maximum setpoint below 955 psia.

**5. ASSESSMENT OF SAFETY CONSEQUENCES:**

The as-found SG #1 SGLP Channel A bistable maximum setpoint at 950.4 psia was not significantly below the allowable value of  $\geq 955$  psia. The setpoint remained above the low limiting SGLP maximum setpoint of 948.8 psia provided in the safety analysis. Therefore, though inoperable, Channel A reactor trip and MSIS safety functions would have been fulfilled in the event of analyzed accidents. The remaining three channels were operable and available to respond as expected during analyzed events.

This event did not result in any challenges to the fission product barriers or result in the release of radioactive materials. There were no actual safety consequences as a result of this event. This event did not prevent the fulfillment of a safety function and did not result in a safety system functional failure as described by 10 CFR 50.73 (a)(2)(v).

**6. CAUSE OF THE EVENT:**

The cause of the event was procedural inadequacies. Station procedures did not require verification of SGLP bistable setpoints after completion of outage activities and prior to plant conditions requiring them to be OPERABLE in Mode 3.

**7. CORRECTIVE ACTIONS:**

Maintenance and testing were performed to adjust the SG #1 SGLP Channel A setpoint above the TS minimum allowable value to restore operability.

Corrective actions included the establishment of procedure requirements to verify the PPS variable setpoints prior to plant conditions requiring them to be OPERABLE.

**LICENSEE EVENT REPORT (LER)  
 CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	7 OF 7
		2011	-- 002	-- 01	

**NARRATIVE**

**8. PREVIOUS SIMILAR EVENTS:**

The station has not reported any similar events related to inoperable RPS or ESFAS actuation parameters resulting from setpoints that were below allowable values.