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102-07782-MLL/DJH  
August 23, 2018

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

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station (PVNGS) Unit 3**  
**Docket No. STN 50-530 / License No. NPF 74**  
**Licensee Event Report 2018-001-00**

Enclosed please find Licensee Event Report (LER) 50-530/2018-001-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports an automatic actuation of the PVNGS Unit 3 reactor protection system.

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.

Arizona Public Service Company makes no commitments in this letter. If you have questions regarding this submittal, please contact Matthew Kura, Department Leader, Nuclear Regulatory Affairs, at (623) 393-5379.


Sincerely,

A handwritten signature in blue ink that reads "Maria L. Lecal".

MLL/DJH

Enclosure

cc:	K. M. Kennedy	NRC Region IV Regional Administrator
	M. D. Orenak	NRC NRR Project Manager for PVNGS
	C. A. Peabody	NRC Senior Resident Inspector PVNGS

NRC FORM 366 (04-2018)		U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB: NO. 3150-0104    EXPIRES: 03/31/2020					
		<b>LICENSEE EVENT REPORT (LER)</b> (See Page 2 for required number of digits/characters for each block) (See NUREG-1022, R.3 for instruction and guidance for completing this form <a href="http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/">http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/</a> )								
1. Facility Name Palo Verde Nuclear Generating Station (PVNGS) Unit 3					2. Docket Number 05000530		3. Page 1 OF 4			
4. Title Unit 3 Reactor Trip on Low Steam Generator Level										
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
06	27	2018	2018	- 001	- 00	08	23	2018		05000
									Facility Name	Docket Number
										05000
9. Operating Mode  1		11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (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)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
		<input type="checkbox"/> 20.2201(d)		<input type="checkbox"/> 20.2203(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(ii)(B)		<input type="checkbox"/> 50.73(a)(2)(viii)(B)		
		<input type="checkbox"/> 20.2203(a)(1)		<input type="checkbox"/> 20.2203(a)(4)		<input type="checkbox"/> 50.73(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(ix)(A)		
		<input type="checkbox"/> 20.2203(a)(2)(i)		<input type="checkbox"/> 50.36(c)(1)(i)(A)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)		<input type="checkbox"/> 50.73(a)(2)(x)		
10. Power Level  100		<input type="checkbox"/> 20.2203(a)(2)(ii)		<input type="checkbox"/> 50.36(c)(1)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(v)(A)		<input type="checkbox"/> 73.71(a)(4)		
		<input type="checkbox"/> 20.2203(a)(2)(iii)		<input type="checkbox"/> 50.36(c)(2)		<input type="checkbox"/> 50.73(a)(2)(v)(B)		<input type="checkbox"/> 73.71(a)(5)		
		<input type="checkbox"/> 20.2203(a)(2)(iv)		<input type="checkbox"/> 50.46(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(v)(C)		<input type="checkbox"/> 73.77(a)(1)		
		<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)(D)		<input type="checkbox"/> 73.77(a)(2)(ii)		
		<input type="checkbox"/> 20.2203(a)(2)(vi)		<input type="checkbox"/> 50.73(a)(2)(i)(B)		<input type="checkbox"/> 50.73(a)(2)(vii)		<input type="checkbox"/> 73.77(a)(2)(iii)		
				<input type="checkbox"/> 50.73(a)(2)(i)(C)		<input type="checkbox"/> Other (Specify in Abstract below or in NRC Form 366A				
12. Licensee Contact for this LER										
Licensee Contact Matthew Kura, Department Leader, Nuclear Regulatory Affairs								Telephone Number (Include Area Code) 623-393-5379		
13. Complete One Line for each Component Failure Described in this Report										
Cause	System	Component	Manufacturer	Reportable To ICES	Cause	System	Component	Manufacturer	Reportable To ICES	
X	SJ	PCV	F130	Y						
14. Supplemental Report Expected					15. Expected Submission Date			Month	Day	Year
<input checked="" type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date) <input type="checkbox"/> No								11	23	2018
Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines) <p>On June 27, 2018, at approximately 2257 Mountain Standard Time, the PVNGS Unit 3 Control Room received a feedwater control system trouble alarm due to a steam generator feedwater economizer valve position/demand deviation. Interaction with the malfunctioning economizer valve resulted in an unplanned movement of the economizer valve in the closed direction. This caused the main feedwater pump (MFWP) discharge pressure to increase tripping one of two operating MFWPs. This resulted in a rapid decrease in Steam Generator (SG) level that actuated a reactor protection system trip on low SG water level. Water level then rapidly rose to the SG high level trip set point because the malfunctioning economizer valve did not close. At that point an automatic main steam isolation signal occurred, requiring manual actuation of the auxiliary feedwater and essential spray pond (ultimate heat sink) systems.</p> <p>The cause of the event is still under investigation. The results will be reported in a supplement to this Licensee Event Report.</p> <p>The malfunctioning economizer valve was repaired by replacing the economizer trip valve and filter regulator. Positioner calibration, as-left diagnostics, and as-left loop checks were performed satisfactorily.</p> <p>No similar conditions have been reported by PVNGS in the past three years.</p>										





## LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

(See NUREG-1022, R.3 for instruction and guidance for completing this form  
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollects.Resource@nrc.gov](mailto:Infocollects.Resource@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOF-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	2. DOCKET NUMBER	3. LER NUMBER		
Palo Verde Nuclear Generating Station (PVNGS) Unit 3	05000-530	YEAR  2018	SEQUENTIAL NUMBER  - 001	REV NO.  - 00

### 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)(iv)(A) to report an automatic actuation of the PVNGS Unit 3 Plant Protection System (PPS) (EIS: JC) that occurred as a result of an automatic low steam generator (SG) water level generated trip on all four channels of the PPS. This event is additionally being reported pursuant to 10 CFR 50.73 (a)(2)(iv)(A) as an automatic actuation of main steam isolation valves and manual actuation of auxiliary feedwater and essential spray pond (ultimate heat sink) system pumps.

This event was reported to the NRC pursuant to 10 CFR 50.72 (b)(2)(iv)(B) on June 28, 2018 at 0237, via the emergency notification system (EN 53477).

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

##### Reactor Protection System (RPS):

The RPS (EIS: JC) ensures the reactor is rapidly and reliably shut down to protect the fission product barriers and assist the engineered safety features systems in accident mitigation. The RPS consists of four independent, redundant channels and includes a number of sensors, calculators, logic circuits, and supporting equipment that monitor nuclear steam supply system (EIS: AB) parameters. When all four channels of RPS are in service, a reactor trip is actuated when two of four channels generate trip signals. Inputs to the RPS include both a high and a low steam generator (SG) level trip signal. The low level trip prevents exceeding reactor coolant system design pressure due to a loss of heat sink by tripping the reactor during a main feedwater (MFW) pipe break, reactor coolant pump rotor seizure, inadvertent opening of an atmospheric dump valve, or during a loss of MFW or condenser vacuum. The high level trip prevents moisture carryover from the SGs from damaging the main turbine generator. The high SG level reactor trip is coincident with a main steam isolation signal actuation.

##### Main Steam (MS) Isolation Signal (MSIS):

The MSIS, generated by the engineered safety features actuation system (EIS: JE), ensures 10 CFR 100 limits are not exceeded in the event of a steam generator tube rupture by closing the MS isolation valves and the MFW Isolation valves. The MSIS also prevents the unaffected SG from feeding steam into a high energy line break. An MSIS can be generated by high containment pressure, low SG pressure, or high SG water level.

##### Feedwater Control System (FWCS):

The FWCS (EIS: JB) coordinates the adjustment of the two MFW pumps (MFWPs), the downcomer valve, and the economizer valve to automatically regulate feedwater flow to control SG water level. The downcomer valve controls flow at low power levels and closes as flow is transferred to the economizer valve at approximately 15-percent power. The economizer valve then modulates to control flow up to 100 percent power. The downcomer valve reopens to its half-open position at 50-percent power and remains so through 100-percent power operations. Feedwater flow is subsequently transferred back to the downcomer valve when power drops below 15-percent. A reactor trip causes a close signal to be sent to the economizer valve. The economizer valve is controlled by a digital valve controller and a pneumatic trip valve; designed to fail the economizer valve "as-is" on a loss of instrument air.

##### Reactor Power Cutback System (RPCS):

The RPCS responds to large load rejections or failures of either MFWP by dropping pre-selected control element assemblies and initiating other necessary control actions to obtain a rapid reduction in reactor power. This allows the plant to remain on-line during these events and significantly reduces the requirements for steam bypass valve and MFWP capacity.



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

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Palo Verde Nuclear Generating Station (PVNGS) Unit 3	05000-530	2018	- 001	- 00

**3. INITIAL PLANT CONDITIONS:**

On June 27, 2018, PVNGS Unit 3 was in Mode 1 (Power Operation) at 100 percent power with the reactor coolant system at normal operating temperature and normal operating pressure. There were no other structures, systems, or components out of service that contributed to this event.

**4. EVENT DESCRIPTION:**

On June 27th, 2018 at 22:57 the Unit 3 Control Room received a FWCS trouble alarm indicating a SG1 economizer valve position/demand deviation. In accordance with the alarm response procedure, an attempt was made to take manual control of the economizer valve from the control room. The control room operator reduced the output demand but SG level continued to slowly rise with no indicated change in economizer valve position. An auxiliary plant operator was dispatched to investigate locally and reported that air was porting from somewhere in the location of the economizer valve. Without direction from the control room, the auxiliary operator placed his thumb sequentially over the two vent ports on the economizer trip valve. When his thumb was placed over the second port, the economizer valve responded by moving in the closed direction from the steady state position of approximately 70 percent open to approximately 30 percent open. Steam generator water level began to lower and MFWP discharge pressure increased causing the "B" MFWP to trip on high discharge pressure. The MFWP trip initiated a reactor power cutback. SG level continued to lower and 28 seconds after the RPCS actuation, the SG low level reactor trip set point was reached and the reactor automatically tripped.

The control room staff entered the standard post-reactor trip actions procedure. During this time, the SG level began to rise rapidly because the economizer valve did not automatically close on the reactor trip signal but remained unresponsive at one quarter open. In approximately four minutes, SG water level reached its high level setpoint and initiated an MSIS which tripped the remaining "A" MFWP. Control room staff took manual control of steam pressure using atmospheric dump valves and started the essential motor-driven auxiliary feedwater pump (AFWP) to control SG level and the essential spray pond pump to support cooling the AFWP room.

It was later determined that a diaphragm in the economizer valve, Fisher Controls model 475-16-100, pneumatic control valve (E1IS: PCV) had failed, leaving the economizer valve in its "as-is" position and rendering it unresponsive to the FWCS.

The cause of the event is still under investigation. The results will be reported in a supplement to this Licensee Event Report.

**5. ASSESSMENT OF SAFETY CONSEQUENCES:**

This event did not result in a challenge to the fission product barriers or result in the release of radioactive materials to the environment. There were no actual safety consequences as a result of this event and it did not adversely affect the health and safety of the public.

The RPS functioned as designed and initiated an automatic reactor trip that placed the plant in a safe condition. All CEAs fully inserted into the reactor core.

The Unit 3 reactor trip did not result in a transient more severe than those already analyzed. The primary system and secondary pressure boundary limits were not approached.

**6. CAUSE OF THE EVENT:**

The cause of the event is still under investigation. The results will be reported in a supplement to this Licensee Event Report.

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**7. CORRECTIVE ACTIONS:**

The malfunctioning economizer valve trip valve was replaced with a new trip valve and filter regulator. Positioner calibration, as-left diagnostics, and as-left loop checks were performed satisfactorily.

The cause of the event is still under investigation. The results will be reported in a supplement to this Licensee Event Report.

**8. PREVIOUS SIMILAR EVENTS:**

The station reported a similar event on February 2, 1998, when Unit 1 experienced a low SG water level automatic reactor trip and an engineered safety feature actuation of auxiliary feedwater due to the spurious closure of an economizer valve. The cause was a failed dynamic compensator card in the FWCS master controller. (LER 528-1998-002-00).