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102-07705-MLL/DJH  
May 9, 2018

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

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station (PVNGS) Unit 1**  
**Docket No. STN 50-528 / License No. NPF 41**  
**Licensee Event Report 2018-003-00**

Enclosed please find Licensee Event Report (LER) 50-528/2018-003-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports a condition prohibited by technical specifications for an inoperable atmospheric dump valve. This LER also reports a defect pursuant to 10 CFR 21.

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 black ink that reads "Maria Lecal".

MLL/DJH

Enclosure

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



**LICENSEE EVENT REPORT (LER)**

(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  
<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, 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.

<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 5
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**4. Title**  
Condition Prohibited by Technical Specification 3.7.4 Due to Inoperable Atmospheric Dump Valve

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
03	15	2018	2018	003	- 00	05	14	2018	Facility Name	Docket Number
										05000
										05000

<b>9. Operating Mode</b> 1	<b>11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)</b>									
	<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)						
<b>10. Power Level</b> 100	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(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)(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 checked="" 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 checked="" type="checkbox"/> Other (Specify in Abstract below or in NRC Form 366A)							

**12. Licensee Contact for this LER**

Licensee Contact Matt Kura, Department Leader, Nuclear Regulatory Affairs	Telephone Number (Include Area Code) 623-393-5379
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**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
B	SB	TD	C600	Y					

<b>14. Supplemental Report Expected</b> <input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date) <input checked="" type="checkbox"/> No	<b>15. Expected Submission Date</b>	Month	Day	Year

Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

On January 5, 2018, an atmospheric dump valve (ADV) failed to open when an open signal was initiated from the Control Room during testing. Troubleshooting determined that the ADV's current to pressure (I/P) converter was not supplying the correct output signal to the valve positioner.

On March 15, 2018, causal analysis concluded that a defective basic component (I/P converter) had been installed in the ADV control loop on April 17, 2016. This defective component rendered the ADV inoperable from installation until the component was replaced and successful post-maintenance testing was completed on the ADV on January 7, 2018.

The cause of the ADV failing to open was a manufacturing defect; the I/P converter nozzle roll pin was not fully inserted into the regulating nozzle.

The condition was corrected when the defective I/P converter was replaced. Four I/P converters of this type are currently installed in ADVs at PVNGS and are scheduled to be examined and replaced if found defective. One spare Model 8005N I/P converter has undergone radiographic examination. This I/P converter has been found defective and has been quarantined. The vendor has been notified of this 10 CFR 21 reportable defect.

No previous similar events have been reported by PVNGS in the last three years.



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

(See NUREG-1022, R.3 for instruction and guidance for completing this form  
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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV. NO.
Palo Verde Nuclear Generating Station (PVNGS) Unit 1	05000-528	2018	- 003	- 00

**NARRATIVE**

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

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

This Licensee Event Report is being submitted pursuant to 10 CFR 50.73 (a)(2)(i)(B) as a condition prohibited by Technical Specification (TS) Limiting Condition for Operation (LCO) 3.7.4, Atmospheric Dump Valves (ADVs). Four ADVs are required to be operable per LCO 3.7.4, when in operating Modes 1, 2, 3, and 4 when steam generator (SG) is being relied upon for heat removal. If one ADV line is inoperable, the line must be returned to operable status within 7 days per LCO Condition A, or the plant must be placed in Mode 3 within 6 hours and in Mode 4 (without reliance on the SG for heat removal) within 24 hours.

An ADV was not operable for a period of 20 months prior to discovery over which time Unit 1 made multiple outage related entries into Modes of applicability without meeting the conditions of TS LCO 3.0.4.

The manufacturing deficiency is reportable as a defect pursuant to 10 CFR 21.

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

The PVNGS design includes two SGs (EIS: AB), each with two main steam lines (EIS: SB) and an ADV (EIS: SB) for each of the four main steam lines. Each ADV line consists of one normally closed ADV and an associated, normally open, block valve. The ADV block valves permit testing and maintenance of the ADVs while a unit is at power.

The ADVs are located outside the containment in the main steam support structure, upstream of the main steam isolation valves (MSIVs) (EIS: SB). The ADVs can be operated locally, but are normally operated remotely from the control room by way of a pneumatic valve actuator. The safety function of the ADVs is to allow venting of secondary plant steam to atmosphere, thereby providing a safety grade method for cooling the unit to shutdown cooling entry conditions should the preferred heat sink, the main condenser (EIS: SG) and steam bypass control valves, not be available. The ADVs have the capacity to achieve and maintain safe shutdown conditions following design basis accidents involving a loss of offsite power and/or closure of the MSIVs. Each ADV is sized to accommodate plant cooldown in the event of a steam line break or SG tube rupture which may render one SG unavailable for heat removal.

The ADVs are 12-inch air-operated drag valves. The valve actuator is a piston cylinder with two internal closing springs. Movement of the actuator is controlled via a valve positioner that balances an input pneumatic pressure range of 3-15 pounds per square inch (psi) against the closing spring tensile force to move a balance beam from or to the internal regulating nozzle, changing the pressure of the signal to the actuator. When an opening signal is received, pneumatic pressure is applied to the bottom of the piston and relieved from the top of the piston through the positioner. A closing signal to the positioner reduces the bottom air supply pressure, and increases the top air supply pressure, which assists the springs in closing the valve.

Pneumatic pressure at the valve positioner is controlled by a current to pressure (I/P) converter (Masoneilan Model 8005N) that translates a 4-20 milliamp (mA) current signal from the Control Room to a 3-15 psi pneumatic pressure output. This is achieved by diverting part of the input instrument air through an internal regulating nozzle. A sapphire ball floats inside the nozzle and works in concert with a flapper wire to vary the nozzle orifice. The sapphire ball is maintained in its proper working position by a nozzle roll pin that is fully inserted into the bottom of the nozzle. Movement of the flapper wire is controlled by a coil that varies according to the 4-20 mA input from the control room. When the flapper wire moves away from the nozzle, more air is exhausted and output air pressure to the valve positioner is reduced toward 3 psi. When it moves closer to the nozzle less air is vented and the air pressure to the valve positioner is increased toward 15 psi.



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Palo Verde Nuclear Generating Station (PVNGS) Unit 1	05000-528	2018	- 003	- 00

**3. INITIAL PLANT CONDITIONS:**

On January 5, 2018, PVNGS Unit 1 was in Mode 1 (Power Operation) at 100 percent power. No other major structures, systems, or components were inoperable that contributed to the event.

**4. EVENT DESCRIPTION:**

On January 5, 2018, ADV-179 failed to open when a 50 percent open signal was initiated using the thumbwheel controller in the Control Room during testing. Troubleshooting determined that the I/P converter was not supplying the correct output air signal to the positioner and air pressure indicated an excessive amount of air was being exhausted through the regulating nozzle.

On March 15, 2018, causal analysis concluded that a defective basic component (I/P converter) had been installed in the ADV control loop on April 17, 2016. Although the ADV had successfully completed surveillance testing, staff determined that the defective I/P converter introduced a failure mechanism that challenged the prior presumption of operability. Therefore, ADV-179 was inoperable from the time the I/P converter was installed until it was replaced and successful post-maintenance testing was completed on January 7, 2018.

The causal analysis determined the I/P converter nozzle roll pin was not fully inserted into the regulating nozzle. This allowed the sapphire ball to retreat into the nozzle beyond its designed travel path, becoming less responsive to air flow through the nozzle. As a result, the sapphire ball did not assist the flapper wire mechanism to close the nozzle orifice relative to the control room input signal. Plant staff concluded the defect was introduced during manufacturing. This assessment was discussed with Masoneilan engineers who reviewed the documentation and confirmed the manufacturing deficiency was introduced during assembly at the Dresser Inc. facility.

**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 incremental conditional core damage probability and incremental conditional large early release probability associated with the period ADV-179 was inoperable were estimated to be 1.3E-8 and 1.2E-9 respectively, using the PVNGS at-power probability risk assessment model developed for 10 CFR 50.65 (a) (4) risk evaluations.

At least one ADV line remained operable during the 20-month period prior to discovery.

**6. CAUSE OF THE EVENT:**

The cause of the ADV failing to open was a manufacturing defect; the I/P converter nozzle roll pin was not fully inserted into the regulating nozzle. The manufacturer, GE / Masoneilan, corroborates this cause and attributes the defect to an error in assembly at the Dresser Inc. facility.

**7. CORRECTIVE ACTIONS:**

On January 7, 2018 the defective I/P converter was replaced and post maintenance testing was satisfactorily completed. Use of the Masoneilan 8005 series I/P converters at PVNGS is limited to the ADVs. All 12 ADVs have been determined operable. Three ADVs have I/P converters from a different manufacturer and of a different design. Five have Masoneilan Model 8005A I/P converters which have been installed for over 10 years and are to be replaced with Model 8005N I/P converters in accordance with the preventive maintenance program. The remaining four ADVs, have Model 8005N I/P converters installed. This includes the replaced I/P converter in ADV-179. The four will undergo radiographic examination in accordance with the PVNGS corrective action program and be replaced if defective. One spare Model



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8005N I/P converter has undergone radiographic examination. It has been found defective and has been quarantined. PVNGS staff has submitted a Vendor Corrective Action Request (VCAR VC-DRF1-18-003) to Dresser Inc.

**8. PREVIOUS OCCURRENCES:**

No previous similar events have been reported by PVNGS in the last 3 years.

**9. PART 21 REPORT DETAILS:**

- (i) Name and address of the individual or individuals informing the Commission.

Maria L. Lecal  
Senior Vice President, Regulatory and Oversight  
Palo Verde Nuclear Generating Station  
P.O. Box 52034  
Phoenix, AZ 85072

- (ii) Identification of the facility, the activity, or the basic component supplied for such facility or such activity within the United States which fails to comply or contains a defect.

Facility:  
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

Basic Component:  
Transducer, Electro-pneumatic; (I/P Converter)  
Model Number 8005N

- (iii) Identification of the firm constructing the facility or supplying the basic component which fails to comply or contains a defect.

Dresser, Inc. Jacksonville Operations  
12970 Normandy Blvd  
Jacksonville, FL 32221

- (iv) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

The I/P converter nozzle roll pin was not fully inserted into the regulating nozzle. This allowed the sapphire ball to retreat into the nozzle beyond its designed travel path, affecting air flow through the nozzle.

- (v) The date on which the information of such defect or failure to comply was obtained.

This defect was identified upon completion of a causal evaluation on March 15, 2018.

- (vi) In the case of a basic component which contains a defect or fails to comply, the number and location of these components in use at, supplied for, being supplied for, or may be supplied for, manufactured, or being manufactured for one or more facilities or activities subject to the regulations in this part.

On January 7, 2018 the defective I/P converter was replaced and post maintenance testing was satisfactorily completed. Use of the Masoneilan 8005 series I/P converters at PVNGS is limited to the ADVs. All 12 ADVs have been determined to be operable. One Model 8005N in stock has undergone radiographic examination. This I/P converter has been found defective and has been quarantined.

- (vii) The corrective action which has been, is being, or will be taken; the name of the individual or organization



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		2018	- 003	- 00

responsible for the action; and the length of time that has been or will be taken to complete the action.

On January 7, 2018 the defective I/P converter was replaced and post maintenance testing was satisfactorily completed. PVNGS has initiated a Vendor Corrective Action Report (VC-DRF1-18-003) to Dresser Inc.

Individual Responsible for Actions:

John Kerr  
Nuclear Quality Manager  
Dresser, Inc. Jacksonville Operations  
  
12970 Normandy Blvd  
Jacksonville, FL 32221  
  
(904) 781-7071