



**10 CFR 50.73**

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**Palo Verde**

**Nuclear Generating Station**

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102-06889-DCM/SPD

June 9, 2014

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 (LER) 2013-004-00**

Enclosed please find LER 50-528/2013-004-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports a condition prohibited by Technical Specification 3.7.2, Main Steam Isolation Valves.

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 Mark McGhee, Department Leader, Regulatory Affairs, at (623) 393-4972.

Sincerely,

DCM/SPD/hsc

Enclosure

Cc:	M. L. Dapas	NRC Region IV Regional Administrator
	J. K. Rankin	NRC NRR Project Manager PVNGS
	M. M. Waterford	NRC NRR Project Manager PVNGS
	M. A. Brown	NRC Senior Resident Inspector PVNGS

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**LICENSEE EVENT REPORT (LER)**

(See Page 2 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 and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [Infocollections.Resource@nrc.gov](mailto:Infocollections.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 1

**2. DOCKET NUMBER**

05000528

**3. PAGE**

1 OF 5

**4. TITLE**

Condition Prohibited by Technical Specification 3.7.2 Due to an Inoperable Main Steam Isolation Valve (MSIV)

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
11	06	2013	2013	004	00	06	09	2014	FACILITY NAME	DOCKET NUMBER
9. OPERATING MODE			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)							
1			<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)	
10. POWER LEVEL  100%			<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**

## LICENSEE CONTACT

Mark McGhee, Department Leader, Nuclear 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	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	SB	ISV	A391	Y					

**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 April 10, 2014, a post-event review conducted in response to a proposed NRC non-cited violation concluded the actions to close and deactivate main steam isolation valve SGE-UV-170 (MSIV-170) to address an equipment malfunction on November 6, 2013, did not meet the operability requirements of Technical Specification (TS) Limiting Condition for Operation (LCO) 3.7.2. As a result, the requirement of LCO 3.7.2 Condition G to place the unit in Mode 2 within 6 hours was not completed. MSIV-170 was repaired and returned to service on November 9, 2013.

An investigation determined the cause of the condition prohibited by TSs was the operability determination (OD) was overly focused on the ability of the MSIV to perform its specified safety function and did not adequately consider the definition of operability and compliance with the TS. To prevent recurrence, PVNGS OD guidance will be revised to explicitly require evaluation of applicable LCOs to ensure the OD technical conclusions support compliance with the LCOs.

No similar events have been reported to the NRC by PVNGS in the prior three years.

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CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Palo Verde Nuclear Generating Station (PVNGS) Unit 1	05000528	YEAR	SEQUENTIAL NUMBER	REV NO.	2      OF      5
		2013	-      004	-      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)(i)(B) to report a condition prohibited by Technical Specification (TS) Limiting Condition for Operation (LCO) 3.7.2, Main Steam Isolation Valves (MSIVs). When one MSIV is inoperable in Mode 1, LCO 3.7.2 Condition F requires the MSIV to be restored to operable status in 4 hours. If the required action of Condition F is not completed in 4 hours, then LCO 3.7.2 Condition G requires the Unit to be in Mode 2 within 6 hours.

On April 10, 2014, a post-event review conducted in response to a proposed NRC non-cited violation concluded the actions to close and deactivate MSIV SGE-UV-170 (MSIV-170) to address an equipment malfunction on November 6, 2013, did not meet the operability requirements of LCO 3.7.2. As a result, the requirement of LCO 3.7.2 Condition G to place the unit in Mode 2 within 6 hours was not completed and a condition prohibited by technical specifications occurred.

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

The main steam system (EIS Code: SB) contains two 28-inch main steam lines for each of the two steam generators. One MSIV (EIS Code: SB) is installed in each main steam line outside of, but close to, containment in the main steam support structure building. The four MSIVs are downstream of the main steam safety valves, atmospheric dump valves, and auxiliary feedwater (EIS: BA) pump turbine steam supply valves to prevent those components from being isolated from the steam generators by MSIV closure. Closure of MSIVs isolates each steam generator from the other and isolates the steam generators from the downstream secondary steam loads and piping such as the main turbine, including steam bypass valves, and auxiliary steam supplies. The MSIV isolation function ensures termination of steam flow from the unaffected steam generator following a high energy line break event and supports mitigation of a steam generator tube rupture event.

Each MSIV is a 28-inch, double-disc, wedge type gate valve manufactured by the Anchor/Darling Valve Company. The actuation system on each MSIV is composed of two redundant safety related pneumatic-hydraulic actuator trains, A and B. The instrumentation and controls for the two actuator trains on each MSIV are physically and electrically separate and redundant. Either actuator train can independently perform the safety function to fast close the MSIV on demand which occurs upon receipt of a main steam isolation signal (MSIS) (EIS Code: JE) from the engineered safety features actuation system. The MSIS is generated by high containment pressure, low steam generator pressure, or high steam generator water level. The MSIVs fail in the closed position on loss of control power, and may also be actuated manually.

For each actuator train, a volume of hydraulic fluid is stored at high pressure in a hydraulic accumulator. The hydraulic accumulator contains a pressurized nitrogen gas pre-charge which is separated from the stored hydraulic fluid by an internal piston to provide the energy required for fast closure of the MSIV upon receipt of a MSIS. The accumulators are filled to the desired hydraulic fluid level and pressure (5000 to 5400 pounds per square inch gauge (psig)) using an air-driven hydraulic pump.

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The common hydraulic pump provides pressurized hydraulic fluid to both actuator trains on an MSIV and is a pneumatically operated positive displacement pump powered by the instrument air system. The pump takes suction on a common hydraulic fluid reservoir and discharges to the hydraulic systems for each actuator train to charge the accumulators with hydraulic fluid. The hydraulic pump is also used to provide motive power during normal operations for slow opening and slow closing of the MSIV.

The hydraulic fluid reservoir is used to make up for fluid system losses and is provided with a low fluid level alarm. The annunciation of low hydraulic reservoir fluid level provides indication to control room operators of loss of hydraulic fluid or loss of nitrogen pre-charge pressure in one of the two hydraulic accumulators on the MSIV. Upon receipt of this alarm, operating and alarm response procedures direct the operators to check fluid reservoir level and to perform nitrogen pre-charge checks to verify each accumulator contains an adequate nitrogen volume. To perform a nitrogen pre-charge check the accumulator's pressurized hydraulic fluid is discharged to the reservoir allowing measurement and adjustment of the accumulator nitrogen pressure. During a nitrogen pre-charge check the tested accumulator is inoperable due to its hydraulic fluid pressure being below the required value; however, the associated MSIV can remain operable due to the opposite actuator train remaining fully capable to fast close the MSIV.

The actuation of the MSIV is controlled by the position of two four-way control valves that operate together to direct hydraulic fluid as needed to change valve position. One four-way valve controls the flow of hydraulic fluid from the pressurized accumulator to the MSIV actuator or the fluid reservoir while the other four-way valve controls the flow of hydraulic fluid to either side of the MSIV actuator hydraulic piston (bottom for opening, top for closing). Instrument air provides pilot air to the four-way control valves to position them as needed for opening and closing the MSIV. An air reservoir is provided on each actuator train as a backup control air supply for positioning the hydraulic fluid control valves. The air reservoirs ensure the MSIV can be closed following loss of instrument air system supply pressure.

While all MSIVs are normally fully open during power operations, PVNGS alarm response procedures provide guidance for plant operation following inadvertent closure of one MSIV during power operations. Engineering analysis has shown that plant operation with one MSIV closed is acceptable below 65 percent power for a limited period of time. Following inadvertent closure of one MSIV, procedures direct operators to reduce power to less than 65 percent, stabilize power and monitor power distribution limits until the MSIV can be reopened.

**3. INITIAL PLANT CONDITIONS:**

On November 6, 2013, at 1307, PVNGS Unit 1 was in Mode 1 (Power Operation) operating steady state at 100 percent power and normal operating temperature and pressure. There were no other major structures, systems, or components out of service that contributed to the event.

**4. EVENT DESCRIPTION:**

On November 6, 2013, at 0945, the Unit 1 control room received an alarm for MSIV-170 hydraulic reservoir low fluid level. An operator was sent to respond to the alarm and reported to the control room that there was no evidence of hydraulic fluid leakage, and reservoir level was confirmed to be low. In

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accordance with alarm response and operating procedures operators initiated the performance of MSIV accumulator pre-charge checks for MSIV-170. On November 6, 2013, at 1307, during performance of the train A accumulator pre-charge check, while discharging hydraulic fluid from the pressurized accumulator to the vented reservoir, operators in the main steam support structure reported a major failure of the hydraulic reservoir and ejection of approximately 15 gallons of hydraulic fluid from the reservoir to the surrounding area.

Following the event, the MSIV-170 train A accumulator was inoperable due to the nitrogen pre-charge check and the train B accumulator became inoperable when its hydraulic fluid pressure dropped below 5000 psig due to hydraulic fluid leakage from a mechanical union on the accumulator outlet pipe which was displaced from the failure of the hydraulic reservoir.

At 1307, the control room operators declared MSIV-170 inoperable and entered the following Conditions of LCO 3.7.2:

- Condition A - One MSIV with a single actuator train inoperable
- Condition D - Two actuator trains for one MSIV inoperable
- Condition F - One MSIV inoperable in MODE 1

At 1707, the completion time for LCO 3.7.2 Condition F was exceeded and LCO 3.7.2 Condition G was entered, which requires the Unit be in Mode 2 within 6 hours. At 1952, Unit 1 commenced a power reduction to comply with the shutdown requirement of Condition G. Activities were also initiated to prepare for closure of MSIV-170 during the power reduction.

At 2247, MSIV-170 was closed, deactivated, and declared operable and LCO 3.7.2, Conditions A, D, F, and G were exited. An operability determination was performed that concluded the MSIV was operable because the valve safety function was met with the valve closed and deactivated. Plant power was stabilized at 60 percent.

On November 9, 2013, MSIV-170 was opened at 0028 following completion of corrective maintenance and successful retesting. Following power ascension Unit 1 returned to 100 percent power on November 9, 2013, at approximately 0900.

On April 10, 2014, a post-event review conducted in response to a proposed NRC non-cited violation concluded the actions to close and deactivate MSIV-170 on November 6, 2013, did not meet the operability requirements of LCO 3.7.2. As a result, the requirement of LCO 3.7.2 Condition G to place the unit in Mode 2 within 6 hours was not completed and a condition prohibited by technical specifications occurred.

**5. ASSESSMENT OF SAFETY CONSEQUENCES:**

This event did not result in a potential transient more severe than those analyzed in the Updated Final Safety Analysis Report (UFSAR) or result in the release of radioactive materials to the environment. There were no actual safety consequences as a result of this event and the event did not adversely affect the health and safety of the public.

The safety function of the MSIVs is to isolate the steam generators in the event of a high energy line break (HELB), the most limiting of which is a HELB upstream of the MSIVs inside the containment

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building. The safety analysis for the event assumes the MSIV on the faulted line fails to close upon receipt of an MSIS.

During the period while MSIV-170 was inoperable and open while the reactor was in Mode 1, the three remaining operable MSIVs were capable of actuation and closure to perform the required isolation function to ensure the analyzed safety function would have been met. When MSIV-170 was closed to facilitate repair the safety function was met by all four MSIVs. Therefore, the event did not result in potential safety consequences beyond those analyzed in the UFSAR.

The event 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:**

An investigation determined the cause of the condition prohibited by TSs was the operability determination was overly focused on the ability of the MSIV to perform its specified safety function and did not adequately consider the definition of operability and compliance with the TS.

**7. CORRECTIVE ACTIONS:**

To prevent recurrence, PVNGS operability determination (OD) guidance will be revised to explicitly require evaluation of applicable LCOs to ensure the OD technical conclusions support compliance with the LCOs.

**8. PREVIOUS SIMILAR EVENTS:**

No similar conditions have been reported by PVNGS.