



Palo Verde Nuclear  
Generating Station

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**10CFR50.73**  
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192-01083-WEI/DGM/DJS  
February 16, 2001

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Mail Station P1-37  
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 2000-009-00**

Attached please find Licensee Event Report (LER) 50-529/2000-009-00 which has been prepared and submitted pursuant to 10 CFR 50.73. This voluntary LER reports the findings and corrective actions taken as a result of a single Unit 2 out of tolerance main steam safety valve (MSSV) condition which was discovered during pre-outage surveillance testing.

The Unit 2 MSSV as-found lift pressure was greater than the tolerance allowed by Technical Specification Limiting Condition for Operation 3.7.1.

The corrective actions taken as a result of the out-of-tolerance MSSV and an augmented testing plan described herein are being controlled in accordance with the PVNGS corrective action program. As such, APS may modify these corrective actions as necessary to improve MSSV reliability and performance. No commitments are made to the NRC in this letter.

IE 22

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In accordance with 10CFR50.50.4, a copy of this LER is being forwarded to the Regional Administrator, NRC Region IV and the resident inspector. If you have questions regarding this submittal, please contact Daniel G. Marks, Section Leader, Regulatory Affairs, at (623) 393-6492.

Sincerely,



WEI/DGM/DJS/kg

Attachment

cc: E. W. Merschoff (all with attachment)  
J. H. Moorman  
J. N. Donohew  
INPO Records Center

<b>NRC FORM 366</b> (6-1998)	<b>U.S. NUCLEAR REGULATORY COMMISSION</b>	<b>APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001</b>
<b>LICENSEE EVENT REPORT (LER)</b>  (See reverse for required number of digits/characters for each block)		Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If 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>FACILITY NAME (1)</b>  <b>Palo Verde Nuclear Generating Station Unit 2</b>	<b>DOCKET NUMBER (2)</b>  05000529	<b>PAGE (3)</b>  1 OF 5
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**TITLE (4)**  
**Main Steam Safety Valve Lift Pressure Outside of Technical Specification Limits**

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
09	21	2000	2000	009	00	02	16	2001	N/A	
									N/A	

<b>OPERATING MODE (9)</b>	1	<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)</b>							
		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)	
<b>POWER LEVEL (10)</b>	100	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)	
		20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71	
		20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		X OTHER-Voluntary	
		20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)			Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)			

**LICENSEE CONTACT FOR THIS LER (12)**

<b>NAME</b>	<b>TELEPHONE NUMBER (Include Area Code)</b>
Daniel G. Marks, Section Leader, Regulatory Affairs	623-393-6492

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

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

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

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)**

On September 21, 2000, during the performance of a pre-outage surveillance test, lift pressure verification testing was completed on the main steam safety valves (MSSVs). The testing revealed that as-found lift pressure for one of the twenty Unit 2 MSSVs was above the Technical Specification limits of +/- 3 percent of design lift pressure. The MSSV is believed to have experienced the phenomenon called "sticking" when the MSSV lifted during the surveillance testing. The out of tolerance as-found condition appears in some cases to be the results of the valve disc bonding with the nozzle seat.

Previous similar events have been reported in LERs 50-529/1999-002, 50-530/1998-003, 50-528/1998-004, 50-529/1997-001, and 50-530/1997-003.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

1. REPORTING REQUIREMENT (S):

This voluntary LER 529/009-00 is being submitted to report a condition related to equipment performance that does not meet the reporting requirements of 10CFR50.73 (a) for submitting a LER, but may prove useful and be of generic interest to the nuclear industry.

During routine pre-outage testing of the Unit 2 main steam safety valves (MSSVs) (EIS: RV, SB) completed on September 21, 2000, as-found lift pressure for one of the twenty Unit 2 MSSVs was found to be above the Technical Specification limit.

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

The MSSVs are Dresser/Consolidated 3700 series valves designed for nuclear service and certified under Section III, class 2, of the ASME Code. Palo Verde's specific valves are Maxiflow, spring-loaded, direct acting, model No. 3707-R with 6 inch 1500 pound inlet and a 10 inch 300 pound outlet. Five MSSVs are located on each of the four main steam lines, outside containment (EIS: NH), upstream of the main steam isolation valves (EIS: ISV, SB). The total relieving capacity of the MSSVs is divided equally between the main steam lines and is sufficient to pass the steam flow equivalent to 105 percent of the plant's maximum steam flow. The MSSV design includes staggered setpoints so that only the number of valves needed will actuate. The primary purpose of the MSSVs is to provide overpressure protection for the secondary system. The MSSVs also provide protection against overpressurizing the reactor coolant pressure boundary (EIS: AB) by providing a heat sink for the removal of energy from the reactor coolant system (EIS: AB) if the preferred heat sink, provided by the condenser (EIS: SG) and circulating water system (EIS: KI, KE) is not available.

MSSVs are required to be tested once per five years by Technical Specification (TS) Surveillance Requirement (SR) 3.7.1.1 and the ASME Code requirements, however, Palo Verde tests the valves prior to each refueling outage in accordance with previously specified corrective actions. When MSSVs testing is performed, approved procedures are used and the valves are tested under normal operating pressure and temperature conditions.

3. INITIAL PLANT CONDITIONS:

MSSV lift testing occurred on September 21, 2000, while Unit 2 was in Mode 1 (POWER OPERATION). The surveillance testing of the MSSVs was part of the approved pre-outage work scope.

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There were no structures, systems, or components that were inoperable that contributed to this condition. There were no failures that rendered a train of a safety system inoperable and no failures of components with multiple functions were involved.

**4. EVENT DESCRIPTION:**

On September 21, 2000, Unit 2 was in Mode 1 (Power Operations) when set pressure verification testing was commenced on the Unit 2 MSSVs using the Furmanite Digital Trevitest method. Engineering personnel (utility, non-licensed) conduct pre-outage testing to determine which MSSVs will require removal due to seat leakage or erratic behavior, and sent off site for vendor maintenance.

Specifically, during testing which occurred on September 21, 2000, at 1332 MST, one MSSV was identified as having an as-found setpoint outside of the technical specification limit of +/- 3 percent of design set pressure. The valve, (PSV0573), found out of the required range has a 1315 psig setpoint, with an as-found test of 1345 psig or +4.3% of setpoint.

At 1332 MST, Operations declared the valve inoperable and entered Technical Specification LCO 3.7.1 condition A. The valve was reset, per plant procedures, to +/-1% of the required setpoint. At 1358 MST, Operations declared the valve operable and exited LCO 3.7.1 condition A.

**5. SAFETY CONSEQUENCES:**

An analysis of the safety consequences of the Unit 2 as-found PSV and MSSV testing results is being conducted in accordance with PVNGS procedures. This analysis will encompass the effects of the two PSVs which were out of tolerance, as well as, the effects of Unit 2 main steam safety valves (MSSVs)(EIIIS: RV, SB) which were found to be out of tolerance prior to Unit 2's ninth refueling outage (reference: LER 50-529/2000-002).

The analysis of safety consequences will be used to determine if the primary or secondary design peak pressures would have been exceeded under accident conditions. Based on past as-found setpoints, APS does not anticipate the analysis will produce unbounded results and expects the safety function of the PSVs and the MSSVs would have been met and this condition is therefore not reportable under 10CFR50.73(a)(2)(v).

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If however, the final safety consequence analysis demonstrates that primary or secondary peak pressures would have been exceeded during accident conditions, or other accident conditions would have been unacceptable as a result of this condition, APS will provide the results of the analysis in a supplement to this LER.

The pre-outage MSSV surveillance testing was being conducted in accordance with an approved station procedure. This approved surveillance test verifies lift setpoints in accordance with the Inservice Testing Program.

6. CAUSE OF THE EVENT:

The out of tolerance as-found condition appears in some cases to be the results of the valve disc bonding with the nozzle seat.

There are two principal failure modes where the MSSV as-found test results exceed setpoint by greater than the allowed 3%. One cause for the high as-found reading is a phenomenon called "sticking." Sticking occurs when the as-found setpoint is 2% or more, higher than the test results from second and subsequent tests. In most cases, the second lift point is within the as-found range of +/- 3% of set point.

The out of tolerance as-found MSSV setpoint condition has been attributed to the valve disc bonding with the nozzle seat. The disc bonding phenomena predominately affects valves which have been in service less than one operating cycle. APS has not conclusively determined the root causes of the disc bonding phenomenon, but in-house and industry evidence suggests that it occurs as a result of the MSSVs being heated up and remaining at relatively constant temperatures for extended periods of time. It is believed that improved plant performance has contributed to the phenomena by exposing the MSSVs to longer run cycles.

APS is continuing to investigate the root cause of this condition. Based upon the findings from augmented testing and industry operating experience, APS engineering has reasonable indication that by performing a number of lifts at normal operating pressure and temperature reduces the likelihood that subsequent disc bonding will occur. It is believed that the additional lifts allow for oxidation of the valve disc and nozzle surfaces which reduces incidents of disc bonding.

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The second failure mode is "drifting" and is defined as a changing lift setpoint between succeeding lifts (as left to as-found, or 2nd to 3rd) with no physical changes being made by the testing personnel.

Since "sticking" occurs only one time during the testing sequence (between the first and second lift) and "drifting" can occur between any of the lifts, the failure modes can sometimes be differentiated. During the performance of this surveillance test, the setpoint was optimized (adjusted) between the first and second test lift. Due to the circumstances related to the performance of surveillance test, PVNGS engineering could not conclusively determine whether the condition was due to sticking or drift. However, based on previous experience and similar events at PVNGS, the high as-found reading is most likely due to sticking. The setpoint out of tolerance was determined to be a Maintenance Rule Functional Failure (MRFF).

No unusual characteristics of the work location (e.g., noise, heat, poor lighting) directly contributed to this event. No personnel or procedures errors contributed to this event.

**7. CORRECTIVE ACTIONS:**

(Immediate Corrective Actions)

Unit 2 MSSV PSV-573 discovered to have high as-found lift pressures outside of the technical specification limit during the surveillance testing was adjusted and retested in accordance with procedure and returned to service.

(Actions to Prevent Recurrence)

APS engineering has previously implemented an augmented testing program to test each MSSV prior to each refueling outage and if necessary, reset MSSVs setpoints.

**8. PREVIOUS SIMILAR EVENTS:**

Previous similar events have been reported in LERs 50-529/99-002, 50-530/98-003; 50-528/98-004; 50-529/97-001 and 50-530/97-003. Previous corrective actions taken to reduce out of tolerance conditions have improved as-found test results, however, as-found out of tolerance conditions continue to occur. Previous corrective actions included a wider setpoint tolerance, control of unit chemistry to reduce iron transport, increase frequency testing on valves that exhibit sticking conditions, and an increase in testing frequency from five years to 18 months.