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 FACIL:STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529
 AUTH.NAME AUTHOR AFFILIATION
 GRABO,B.A. Arizona Public Service Co. (formerly Arizona Nuclear Power
 LEVINE,T.M. Arizona Public Service Co. (formerly Arizona Nuclear Power
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 93-002-02:on 930518,MSSV & PSV as found relief setting
 of tolerance limits specified in TS 3.7.1.1 & 3.4.2.2.Valves
 disassembled,inspected,reassembled,retested, & setpoints
 adjusted.w/931221 ltr.

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 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:Standardized plant.

05000529

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Arizona Public Service Company
PALO VERDE NUCLEAR GENERATING STATION
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

192-00875-JML/BAG/RJR
December 21, 1993

JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

U. S. Nuclear Regulatory Commission
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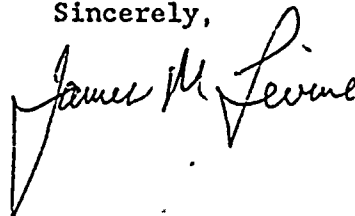
Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 2
Docket No. STN 50-529 (License No. NPF-51)
Licensee Event Report 93-002-02
File: 93-020-404

Attached please find Supplement 02 to Licensee Event Report (LER) 93-002 prepared and submitted pursuant to 10CFR50.73. This supplement updates the original LER valve data. This supplement also identifies that information on Main Steam Safety Valve testing methodology anomalies will be included in the supplement to LER 528/93-009. In accordance with 10CFR50.73(d), a copy of this LER is being forwarded to the Regional Administrator, NRC Region V.

If you have any questions, please contact Burton A. Grabo, Supervisor, Nuclear Regulatory Affairs, at (602) 393-6492.

Sincerely,



JML/BAG/RJR/

Enclosure

cc: W. F. Conway (all with attachment)
B. H. Faulkenberry
K. E. Johnston
INPO Records Center

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Palo Verde Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 5 2 9	PAGE (3) 1 OF 1 0
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TITLE (4) MSSV and PSV Setpoints Out of Tolerance

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 NAMES	DOCKET NUMBER(S)
0 5	1 8	9 3	9 3	0 0 2	0 2	1 2	2 1	9 3	N/A	0 5 0 0 0
									N/A	0 5 0 0 0

OPERATING MODE (9) 6	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)									
POWER LEVEL (10) 0 0 0 0	20.402(b)		20.405(c)		50.73(a)(2)(v)		73.71(b)			
	20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)			
	20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vi)		OTHER (Specify in Abstract below and in Text, NRC Form 388A)			
	20.405(a)(1)(iii)	<input checked="" type="checkbox"/>	50.73(a)(2)(i)		50.73(a)(2)(vii)(A)					
	20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(vii)(B)					
	20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)					

LICENSEE CONTACT FOR THIS LER (12)		TELEPHONE NUMBER
NAME B. A. Grabo, Supervisor, Nuclear Regulatory Affairs	AREA CODE 6 0 2	NUMBER 3 9 3 - 6 4 9 2

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS		

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

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On May 18, 1993, while Unit 2 was in Mode 6 (REFUELING) with the Reactor Coolant System at approximately 96 degrees Fahrenheit and at atmospheric pressure, an Arizona Public Service engineering evaluation of ASME Code surveillance testing results determined that 15 of the 20 Main Steam Safety Valves (MSSV) and 4 of the 4 Pressurizer Safety Valves (PSV) as-found relief settings were out of the tolerance limits specified in Technical Specifications (TS) 3.7.1.1 and 3.4.2.2. As immediate corrective action, the MSSVs and the PSVs were disassembled, inspected, reworked (as required), reassembled, retested, and their lift setpoints were adjusted to within the TS limits.

APS is continuing its efforts to enhance MSSV setpoint repeatability to within the TS required +/- 1 percent tolerance. This effort is part of an Engineering Issues Plan with the goal of significantly reducing the number of as-found tests outside the TS tolerance.

Previous similar events were reported in MSSV and PSV LERs 528/88-014-01, 528/89-007-02, 528/89-010-00, 529/89-002-00, 529/89-007-00, 529/90-004-01, 529/91-005-01, 530/91-001-01, 528/92-004-01, and 530/92-005-00.

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TEXT

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

On May 18, 1993, Palo Verde Unit 2 was in Mode 6 (REFUELING) with the Reactor Coolant System (RCS)(AB) at approximately 96 degrees Fahrenheit and at atmospheric pressure during a scheduled refueling outage.

B. Reportable Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification: Condition Prohibited by the Plant's Technical Specifications (TS).

Palo Verde Unit 2 is a two-loop pressurized water reactor (PWR). Each loop has a vertical U-tube steam generator (SG)(AB) with 2 outlet main steam lines (SB) per steam generator. Overpressure protection for the shell side of the steam generators and the main steam lines up to the inlet of the turbine (TRB) stop valve (SHV)(TA) is provided by 20 flanged, spring loaded, direct acting, ASME Code Main Steam Safety Valves (MSSV)(RV)(SB) which have open bonnets and discharge to the atmosphere. The MSSVs are mounted on each of the main steam lines upstream of the Main Steam Isolation Valves (MSIV)(ISV)(SB), but outside the Containment (CTMT)(NH). The opening pressure of the MSSVs is set in accordance with ASME Code and TS Limiting Condition for Operation (LCO) 3.7.1.1 requirements. The MSSVs are set to lift sequentially at 1250, 1290, and 1315 pounds per square inch gauge (psig).

The MSSVs are required by TS Surveillance Requirement (SR) 4.7.1.1 and the ASME Code to be tested once per 5 years. This testing is being conducted at less than the 5-year interval in accordance with the corrective action for the previous out-of-tolerance relief settings in Units 1, 2, and 3, as reported in LERs 528/88-014-01, 528/89-010-00, 529/89-002-00, 529/89-007-00, 529/91-005-01, 530/91-001-01, 528/92-004-01, and 530/92-005-00. An augmented preventive maintenance and testing program has been implemented wherein MSSVs are removed for testing and are sent offsite to the Westinghouse Test Facility. The MSSVs are tested in accordance with approved procedures under elevated steam pressure conditions. Each MSSV is tested to determine its as-found lift setpoint. Following this testing, the MSSVs are disassembled, inspected, reworked (as required), reassembled, retested, and their lift setpoints are readjusted.

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TEXT

Overpressure protection for the primary loop (AB) is provided by four flanged, spring loaded, direct acting, stainless steel, ASME Code Pressurizer Safety Valves (PSV)(RV)(AB) with enclosed bonnets. The PSVs are mounted on the top of the pressurizer (PZR)(AB). The PSVs opening pressure is set in accordance with ASME Code and TS LCO 3.4.2.2 requirements. The PSVs are all set to lift at 2485 psig plus or minus 1 percent (2460 to 2510 psig).

The PSVs are required by TS SR 4.4.2.2 and the ASME Code to be tested at least once per 5 years. This testing is being conducted at less than the 5 year interval in accordance with the corrective action for the previous out-of-tolerance relief settings in Units 1, 2, and 3, as reported in LERs 528/89-007-002, 529/90-004-01, 529/91-005-01, 530/91-001-01, and 528/92-004-01. An enhanced preventive maintenance and testing program has been implemented wherein the PSVs are removed for testing and are sent offsite to the Westinghouse Test Facility. The PSVs are tested in accordance with approved procedures under elevated steam pressure conditions. Each PSV is tested to determine its as-found lift setpoint. Following this testing, the PSVs are disassembled, inspected, reworked (as required), reassembled, retested, and their lift setpoints are readjusted.

On March 14, 1993, Unit 2 was manually tripped due to a steam generator tube rupture and commenced a planned refueling outage. During the refueling outage, the MSSVs and the PSVs were removed and sent to the Westinghouse Test Facility for scheduled testing. On May 18, 1993, Arizona Public Service Engineering personnel (utility, nonlicensed) completed a review of data obtained for the MSSV and the PSV testing which was conducted at the Westinghouse Test Facility from April 12 through May 18, 1993.

Based upon a review of the test results, 15 of 20 MSSVs as-found relief settings were out of tolerance. Two of the MSSV as-found relief settings were below specification and 13 were above specification. The maximum deviation from the setpoint for the as-found settings was 3.38 percent high. The as-found settings for 4 valves were greater than 1 percent but less than 2 percent high, 7 valves were greater than 2 percent but less than 3 percent high, and 2 valves were greater than 3 percent high. Setpoint and as-found data for these valves have been tabulated in Section V of this report.

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TEXT

Since 15 of the 20 MSSV as-found relief settings were outside the TS limit, it is assumed that 1 or more of these valves were outside the TS limit during operation. Therefore, it is assumed that the OPERABILITY requirements and the associated ACTIONS were not met for TS LCO 3.7.1.1.

Additionally, the review of the actual test results revealed that 1 of the PSV as-found relief settings was below specification and 3 were above specification. The maximum deviation from the setpoint for the as-found settings was 2.32 percent high. The as-found settings for 1 valve was greater than 1 percent but less than 2 percent high, and 2 valves were greater than 2 percent but less than 3 percent high. Setpoint and as-found data for these valves have been tabulated in Section V of this report.

Since all 4 of the PSV as-found relief settings were outside the TS limit, it is assumed that 1 or more of these valves were outside the TS limit during operation. Therefore, it is assumed that the OPERABILITY requirements and the associated ACTIONS were not met for TS LCO 3.4.2.2.

- C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the event:

Other than the MSSVs and the PSVs described in Section I.B, no structures, systems, or components were inoperable which contributed to the event.

- D. Cause of each component or system failure, if known:

Not applicable - no component or system failures were involved.

- E. Failure mode, mechanism, and effect of each failed component, if known:

Not applicable - no component failures were involved.

- F. For failures of components with multiple functions, list of systems or secondary functions that were also affected:

Not applicable - no component failures were involved.

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TEXT

- G. For a failure that rendered a train of a safety system inoperable, estimated time elapsed from the discovery of the failure until the train was returned to service:

Not applicable - no failures were involved which rendered a train of a safety system inoperable.

- H. Method of discovery of each component or system failure or procedural error:

Not applicable - there have been no component or system failures or procedural errors identified.

- I. Cause of Event:

The MSSVs and PSVs have been subject to setpoint drift as reported in LERs 528/88-014-01, 528/89-007-02, 528/89-010-00, 529/89-002-00, 529/89-007-00, 529/90-004-01, 529/91-005-01, 530/91-001-01, 528/92-004-01, and 530/92-005-00. APS has implemented an aggressive preventive maintenance and testing program as described in Section I.B. During the current Unit 2 refueling outage, all 20 MSSVs and all 4 PSVs were sent offsite and tested at the Westinghouse Test Facility as part of the augmented preventive maintenance and testing program for MSSVs and PSVs. During valve disassembly and inspection, it was determined that most valves exhibited seat wear, some of the valves had steam cut seats, and a total of 3 discs needed to be replaced. No galling between the disc holder and disc guide was observed, as had been previously observed in Unit 1 valves (LER 528/92-004-01). No obvious additional information relating to the setpoint drift of these valves was obtained from these inspections and tests.

- J. Safety System Response:

Not applicable - there were no safety system responses and none were necessary.

- K. Failed Component Information:

Although there were no failed components associated with this event the following data is provided for information:

1. MSSVs

Manufacturer: Dresser Valve and Controls Division
Dresser Industries, Inc.

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TEXT

Model No: 6" Inlet, Model 3707R, Consolidated Main
Steam Safety Valves, Type 3700

2. PSVs

Manufacturer: Dresser Valve and Controls Division
Dresser Industries, Inc.

Model No: 6" Inlet, Model 31709NA, Consolidated
Crossed Bonnet Maxiflow Safety Valves,
Type 31700

II. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:

As described in Section I.B, the MSSVs are intended to provide overpressure protection for the secondary side from the steam generators and main steam lines up to the turbine stop valves. The MSSVs ensure that steam generator pressure remains below 110 percent of design pressure and the RCS pressure remains below the acceptance criteria of 120 percent of design pressure for large feedwater line breaks, for Control Element Assembly (ROD)(AA) ejections and 110 percent of design pressure for all other overpressurization events.

APS Engineering has completed a preliminary review of the as-found condition of the MSSV setpoints and determined that, for the design basis accidents, the MSSVs would have prevented system pressure from exceeding 110 percent of steam generator design pressure (peak analyzed pressure was approximately 108 percent of steam generator design pressure) and the sequential lifting scheme would have ensured that steam generator integrity would not be compromised. Furthermore, if an event occurred in which the MSIVs remained open, overpressure protection could have been automatically provided by the Steam Bypass Control System (JI). In addition, it should be noted that secondary side pressure is monitored by Reactor Operators (utility, licensed) in the Control Room (NA), and manual overpressure protection is provided by remote operation of the Atmospheric Dump Valves (ADV)(PCV)(SB) from the Control Room.

During operation, all PSVs must be OPERABLE to prevent the RCS from being pressurized above its safety limit of 2750 pounds per square inch absolute (psia). The combined relief capacity of these valves is sufficient to limit the system pressure to within its safety limit of 2750 psia following a complete loss of turbine generator (TA) load while operating at RATED THERMAL POWER, assuming no reactor trip until the first Reactor Protection System (JC) trip setpoint (Pressurizer Pressure - High) is reached (there is no direct reactor trip on the loss of turbine) and no operation of the ADVs.

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TEXT

The Bounding Anticipated Operational Occurrence for overpressure events at Palo Verde is a Loss Of Condenser (SG) Vacuum (LOCV). The LOCV event is the limiting event for a decrease in heat removal by the secondary system. APS Engineering performed a preliminary LOCV analysis to determine if the as-found condition for the MSSVs and the PSVs could have resulted in the steam generator pressure or RCS pressure exceeding the limit of 110 percent of design pressure. The analysis used the as-found MSSV and PSV setpoints. The assumptions used for this analysis are similar to assumptions used in the previous MSSV and PSV setpoint tolerance calculations described in the LERs discussed in Section IV. The peak RCS pressure reached during the analysis was 2744 psia, which remained below the limit of 2750 psia. The peak steam generator pressure reached during the analysis was 1351 psia, which remained below the limit of 1375 psia.

The assumptions made in this LOCV analysis are similar to the assumptions made in the Updated Final Safety Analysis Report (UFSAR). The analysis in the UFSAR estimates that RCS pressure will reach approximately 2742 psia. Three additional assumptions, each supported by either tests or analyses, have been made to limit the RCS peak pressure increase. These assumptions are summarized below:

- 1) The High Pressurizer (AB) Pressure Trip (HPPT) response time was changed to 0.5 seconds from 1.15 seconds. Surveillance testing for the three units has shown that the HPPT trip response time is consistently less than 0.3 seconds. An assumed response time of 0.5 seconds is therefore conservative.
- 2) The surge line friction form loss factor was reduced to 3.0 from 3.9 to reflect actual Palo Verde design. This change was analytically justified in a calculation performed by ABB - Combustion Engineering in May 1989.
- 3) In previous analyses, the PSVs were assumed to open to 70 percent of the nominal area opening at the setpoint pressure. In this analysis, the PSVs are assumed to open to 100 percent (modeled in the CESEC code as 0.99 of the nominal area opening) at the setpoint pressure. This operation of the PSVs is justified based on the test data presented in ABB-Combustion Engineering Topical Report GEN-227 "Summary Report on the Operability of Pressurizer Safety Valves in CE Designed Plants." This report was accepted by the NRC for use at Palo Verde in Supplement 8 of the Safety Evaluation Report (NUREG-0857).

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TEXT

The assumptions used for the preliminary analysis are similar to the assumptions used in previous MSSV setpoint tolerance calculations described in the LERs discussed in Section IV. If the results of the final analysis are significantly different than the preliminary analysis, the results of the final analysis will be discussed in a supplement to this report. Based on the preliminary results of the analyses described above, there were no safety consequences or implications resulting from this event.

III. CORRECTIVE ACTION:

A. Immediate:

Following the testing, the MSSVs and the PSVs were disassembled, inspected, reworked (as required), reassembled, retested, and their lift setpoints were readjusted. Six original Unit 2 MSSVs were returned to the Unit and 14 were replaced with pre-tested spares that had been included in the preventive maintenance program. The 4 original Unit 2 PSVs were returned to the Unit.

A tracking system, using individual serial numbers, has been implemented to facilitate trending test results as the valves are not necessarily returned to the same unit or location.

B. Action to Prevent Recurrence:

APS has submitted amendments to TS LCO 3.7.1.1 and TS LCO 3.4.2.2 to increase the tolerance on the MSSV and PSV setpoints (161-03587-WFC/JST, dated November 13, 1990).

APS is continuing its efforts to enhance MSSV setpoint repeatability to within the TS required +/- 1 percent tolerance. This effort is part of an Engineering Issues Plan (EIP) with the goal of significantly reducing the number of as-found tests outside of the TS tolerance. The EIP is in its initial development stages and any resultant actions will be tracked in accordance with the APS Incident Investigation Program. If information is developed which would affect the reader's understanding or perception of this event, a supplement will be included in the most current LER on the subject. No supplement to LERs 528/92-004-01 or 530/92-005-00 will be issued. No supplement to this LER is expected.

During the pre-outage testing of Unit 1 MSSVs, APS Engineering discovered that differences in the testing methodologies used to test the Unit 1 MSSVs (Westinghouse and Fermanite Trevitest) were causing anomalies in the test results. This condition is specific

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		0	2	0	2	0
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TEXT

to Unit 1 because the safety valves were tested at Westinghouse, installed in the unit, and then pre-outage testing was started using the Fermanite Trevitest method. The investigation of the Unit 1 pre-outage test data obtained by Trevitesting and the data obtained by Westinghouse testing is expected to be completed by March 1994, and will be included in a supplement to Unit 1 LER 528/93-009.

IV. PREVIOUS SIMILAR EVENTS:

MSSV and PSV LERs 528/88-014-01, 528/89-007-02, 528/89-010-00, 529/89-002-00, 529/89-007-00, 529/90-004-01, 529/91-005-01, 530/91-001-01, 528/92-004-01, and 530/92-005-00 describe events where MSSVs were out of the tolerance limits specified in TS LCO 3.7.1.1 and PSVs were out of the tolerance limits specified in TS LCO 3.4.2.2. Corrective actions to date for these MSSV and PSV events include readjustment of the valves and an administrative reduction of the 5-year testing interval, as described in Sections I.B and III.B.

Previous corrective actions could not have prevented these events because they would not affect the tendency toward setpoint drift exhibited by the MSSVs and PSVs as described in the previous LERs.

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TEXT

V. ADDITIONAL INFORMATION *

Main Steam and Pressurizer Safety Valve Test Results March 1993, Unit 2 Refueling Outage

<u>MSSV Tag Number</u>	<u>Setpoint (Tolerance)</u>	<u>As Found Pressure</u>	<u>Variance %</u>
PSV0554	1250 psig (1238-1262)	1242 psig	-0.63
PSV0555	1290 (1278-1302)	1274	-1.23
PSV0556	1315 (1302-1328)	1353	+2.86
PSV0557	1315 (1302-1328)	1344	+2.18
PSV0558	1315 (1302-1328)	1348	+2.48
PSV0559	1315 (1302-1328)	1350	+2.63
PSV0560	1290 (1278-1302)	1333	+3.30
PSV0561	1250 (1238-1262)	1280	+2.37
PSV0572	1250 (1238-1262)	1238	-0.95
PSV0573	1290 (1278-1302)	1272	-1.38
PSV0574	1315 (1302-1328)	1321	+0.45
PSV0575	1315 (1302-1328)	1360	+3.38
PSV0576	1315 (1302-1328)	1302	-0.98
PSV0577	1315 (1302-1329)	1332	+1.28
PSV0578	1290 (1278-1302)	1289	-0.08
PSV0579	1250 (1238-1262)	1280	+2.37
PSV0691	1315 (1302-1328)	1333	+1.35
PSV0692	1315 (1302-1328)	1329	+1.05
PSV0694	1315 (1302-1328)	1345	+2.26
PSV0695	1315 (1302-1328)	1338	+1.73

<u>PSV Tag Number</u>	<u>Setpoint (Tolerance)</u>	<u>As Found Pressure</u>	<u>Variance %</u>
PSV0200	2485 psig (2460-2509)	2453 psig	-1.29
PSV0201	2485 (2460-2509)	2538	+2.12
PSV0202	2485 (2460-2509)	2543	+2.32
PSV0203	2485 (2460-2509)	2531	+1.84

* Note: The values presented in this table reflect the values in APS letter No. 102-02727-WFC/RAB/RKR, dated November 12, 1993.

ENCLOSURE 3

LICENSEE EVENT REPORT 50-528/93-009