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 FACIL: STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi 05000528
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 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-004-00: on 920310, determined that 14 of 20 Main Steam
 Safety Valves & 2 of 4 Pressurizer Safety Valves were out of
 tolerance. Caused by a setpoint drift. Main Steam Safety
 Valves & Pressurizer Valves were reworked. W/920407 ltr.

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

NOTES: STANDARDIZED PLANT

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

192-00778-JML/TRB/RKR
April 7, 1992

JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

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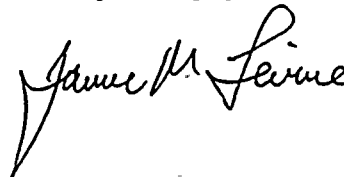
Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528 (License No. NPF-41)
Licensee Event Report 92-004-00
File: 92-020-404

Attached please find Licensee Event Report (LER) 92-004-00 prepared and submitted pursuant to 10CFR50.73. The LER reports Main Steam Safety Valve and Pressurizer Safety Valve as-found relief settings out of the tolerance limits of Technical Specifications 3.7.1.1 and 3.4.2.2. 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 T. R. Bradish, Compliance Manager, at (602) 393-5421.

Very truly yours,



JML/TRB/RKR/mh

Attachment

cc: W. F. Conway (all with attachment)
J. B. Martin
D. H. Coe
INPO Records Center

55000

9204160008 920407
PDR ADDCK 05000528
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LICENSEE EVENT REPORT (LER)

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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 3	1 0	9 2	9 2	0 0 4	0 0	0 4	0 7	9 2	N/A		0 5 0 0 0 0 1
									N/A		0 5 0 0 0 0 1

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	20.402(b)			20.405(c)			50.73(a)(2)(iv)			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 366A)	
	20.405(a)(1)(iii)			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)(viii)					

LICENSEE CONTACT FOR THIS LER (12)									
NAME Thomas R. Bradish, Compliance Manager								TELEPHONE NUMBER 6 0 2 3 9 3 - 5 4 2 1	

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

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH 0 6	DAY 3 0	YEAR 9 2
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On March 10, 1992, while Unit 1 was in Mode 6 (REFUELING) with the Reactor Coolant System at approximately 95 degrees Fahrenheit and at atmospheric pressure, an APS engineering evaluation of ASME surveillance testing results determined that fourteen (14) of the twenty (20) Main Steam Safety Valves (MSSV) and two (2) of the four (4) Pressurizer Safety Valves (PSV) as-found relief settings were out of the tolerance limits specified in Technical Specifications 3.7.1.1 and 3.4.2.2. The testing and adjustments were performed during the period of February 29 thru March 6, 1992, while Unit 1 was in a scheduled refueling outage.

The MSSVs and PSVs have been subject to setpoint drift. The cause of the event is being investigated in accordance with the APS Incident Investigation Program. The results of this investigation and any corrective action to prevent recurrence will be included in a supplement to this LER which is expected to be submitted by June 30, 1992. As immediate corrective action, the MSSVs and PSVs were disassembled, inspected, reworked (as required), reassembled, retested, and their lift setpoints were readjusted.

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, and 530/91-001-01.

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TEXT

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

From February 29 thru March 6, 1992, Palo Verde Unit 1 was in Mode 6 (REFUELING) during a scheduled refueling outage with the Reactor Coolant System (RCS)(AB) at approximately 95 degrees Fahrenheit and at atmospheric pressure.

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

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

Palo Verde Unit 1 is a two-loop pressurized water reactor (PWR). Each loop has a vertical U-tube steam generator (SG)(AB) with two 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 twenty (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 Technical Specification (TS) 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 4.7.1.1 and the ASME Code to be tested once per five (5) years. This testing was being conducted at less than the five (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 Licensee Event Reports (LER) 528/88-014-01, 528/89-010-00, 529/89-002-00, 529/89-007-00, 529/91-005-01, and 530/91-001-01. An enhanced preventive maintenance and testing program is being implemented wherein the MSSVs are removed for testing and sent to an offsite testing facility (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.

On February 15, 1992, Unit 1 was shut down for a planned refueling outage. During the refueling outage, the MSSVs were removed and sent to the offsite testing facility for scheduled testing. On

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March 10, 1992, APS engineering personnel (utility, non-licensed) completed a review of data obtained for the MSSV testing conducted at the offsite testing facility from March 1 through March 6, 1992. Based upon a review of the actual test results, fourteen (14) of twenty (20) MSSVs' as-found relief settings were out of tolerance. One (1) MSSV as-found relief setting was below specification, twelve (12) MSSV as-found relief settings were above specification, and one (1) MSSV as-found relief setting could not be determined due to excessive leakage. The maximum deviations from setpoint of the as-found settings were 4.5 percent high and 1.2 percent low. The as-found settings for eight (8) valves were greater than one (1) percent but less than two (2) percent high, one (1) valve was greater than three (3) percent but less than four (4) percent high, three (3) valves were greater than four (4) percent high (4.5 percent) and one (1) valve was greater than one (1) percent low (1.2 percent).

Since fourteen (14) of the twenty (20) MSSV as-found relief settings were outside the TS limit, it is assumed that one (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 3.7.1.1.

Overpressure protection for the primary loops (AB) is provided by four (4) 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 requirements. The PSVs are all set to lift at 2485 psig plus or minus one (1) percent (2460 to 2510 psig).

The PSVs are required by TS 4.4.2.2 and the ASME Code to be tested at least once per five (5) years. This testing was being conducted at less than the five (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 528/89-007-02, 529/90-004-01, 529/91-005-01, and 530/91-001-01. An enhanced preventive maintenance and testing program is being implemented wherein the PSVs are removed during each refueling outage and sent to an offsite testing facility (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 February 15, 1992, Unit 1 was shut down for a planned refueling outage. During the refueling outage, the PSVs were removed and

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TEXT

sent to the offsite testing facility for scheduled testing. On March 10, 1992, APS engineering personnel (utility, non-licensed) completed a review of data obtained from PSV testing conducted by the offsite testing facility from February 29 thru March 2, 1992. Two (2) of the four (4) PSV as-found relief settings were out of tolerance on the initial lift. The out-of-tolerance lift setpoints were 1.7 percent above the required relief setting and 2.5 percent below the required relief setting.

Since two (2) of the four (4) PSV as-found relief settings were outside the TS limit on the initial lift, it is assumed that one (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 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 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.

- 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.

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TEXT

I. Cause of Event:

The MSSVs and PSVs have been subject to setpoint drift as 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, and 530/91-001-01. APS is implementing an enhanced preventive maintenance and testing program as described in Sections I.B and III.B.

During the last Unit 1 refueling outage, the Unit 1 MSSVs were tested in place using the Furmanite Trevitest method described in previous LERs. The MSSVs were removed and tested during this refueling outage as part of the enhanced preventive maintenance and testing program for MSSVs described in Sections I.B and III.B. Unit 1 is currently in the third refueling outage.

During MSSV disassembly and inspection, all of the MSSVs had galling between the disc holder and the disc guide. The seating surface on some of the discs was not flat, and some of the MSSVs had steam cut seats. The galling causes the MSSV to require a higher steam pressure to overcome the breakaway force of the galled disc holder. The seat leakage due to the galling and cut seats was more severe for the MSSVs that had as-found lift settings greater than three (3) percent. The MSSV with the indeterminate as-found relief setting due to excessive leakage was found to have seating surfaces that were not flat, creating gaps between the disc and nozzle seats and the resultant leakage. The cause of the galling and the seating surface on some of the discs not being flat is being investigated in accordance with the APS Incident Investigation Program. The investigation is expected to be completed by May 31, 1992. The results of this investigation will be included in a supplement to this LER which is expected to be submitted by June 30, 1992.

During the last Unit 1 Refueling outage, the Unit 1 PSVs were tested using the Furmanite Trevitest method described in the above LERs. The PSVs were removed and tested during this refueling outage as part of the enhanced preventive maintenance and testing program for PSVs described in Sections I.B and III.B.

Two (2) of the PSVs had seat leakage during testing and the as-found blowdown ring settings for all four (4) PSVs may have been outside their specification. The seat leakage and the blowdown ring settings are being investigated in accordance with the APS Incident Investigation Program. The investigation is expected to be completed by May 31, 1992. The results of this investigation will be included in a supplement to this LER which is expected to be submitted by June 30, 1992.

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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.

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

2. PSVs

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

Model No: 6" 31709NA-1 Consolidated Type 31700 Crossed
Bonnet Maxiflow Safety Valves.

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

As described above, 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. Review of the as-found condition of the MSSV setpoints found 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 (SB). In addition, it should be noted that secondary side pressure is monitored by Reactor Operators 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.

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TEXT

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 completed loss of turbine generator (TA) load while operating at RATED THERMAL POWER and 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 also assuming no operation of the ADVs.

The Bounding Anticipated Operational Occurrence for overpressure events at Palo Verde is a loss of condenser vacuum (LOCV). The LOCV event is the limiting event for a decrease in heat removal by the secondary system. An LOCV analysis was performed to determine if the as-found condition for the MSSVs and 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 the analysis are the same 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 2702.6 psia, which remained below the limit of 2750 psia. The peak steam generator pressure reached during the analysis was 1354.1 psia, which remained below the limit of 1375 psia.

The as-found lift pressure of 2439 psia for one (1) of the PSVs was lower than the High Pressurizer Pressure Trip (HPPT) setpoint of 2450 psia assumed in the Updated FSAR Chapter 15 safety analysis and above the TS HPPT setpoint of 2388 psia. APS engineering evaluated the effect of the as-found PSV lift pressure being low and found that the peak pressures in the analysis described above were also slightly higher than the peak pressures that would be predicted if the as-found PSV lift pressure was within the TS tolerance limits. The evaluation showed that an LOCV event with an as-found PSV lift pressure of 2439 psia resulted in a small time delay (approximately 0.1 seconds) for the HPPT trip signal, causing a small increase in RCS pressure (less than 1.0 psia) and steam generator pressure (less than 0.1 psia).

APS engineering also evaluated the effect of the MSSV leakage during plant operation on the radiological consequences for the steam generator tube rupture (SGTR) event described in the Updated FSAR. The evaluation showed that the radiological consequences of the leaking MSSVs were small [less than 0.5 rem increase in the two (2) hour iodine dose at the exclusion area boundary] and that the resulting offsite doses were still well within the 10CFR100 and Updated FSAR acceptance criteria of 300 rem.

The assumptions made in this LOCV analysis are similar to the assumptions made in the Updated FSAR. The analysis in the Updated FSAR estimates that RCS pressure will reach approximately 2742 psia. Three

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TEXT

(3) 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 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 (CE) 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 CEN-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).

Based on the 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 PSVs were disassembled, inspected, reworked (as required), reassembled, retested, and their lift setpoints were readjusted.

B. Action to Prevent Recurrence:

An ongoing investigation is in progress to determine if any actions can be taken to reduce the setpoint drift. If any significant actions are identified which can reduce setpoint drift, a supplement to this report will be issued.

APS submitted an amendment to the TS to increase the tolerance on the MSSV and PSV setpoints, (161-03587-WFC/JSC, dated November 13, 1990).

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TEXT

MSSVs

Due to the tendency toward setpoint drift exhibited by these valves and NRC Information Notice 89-90, APS has started an enhanced preventive maintenance and testing program to remove approximately ten (10) MSSVs every other refueling outage (starting with Unit 2, 1991 refueling outage) so that the valves can be tested, disassembled, inspected, reworked (as required), reassembled, retested, and have their lift setpoints readjusted. It should be noted that the twenty (20) Unit 1 MSSVs were removed during the current Unit 1 outage and shipped to the offsite testing facility. The twenty (20) Unit 3 MSSVs and a minimum of ten (10) Unit 2 MSSVs are scheduled to be removed and shipped to the offsite testing facility during the next refueling outages for each unit. This cycling of the valves will support the root cause of failure analysis. The investigation of the cause of the galling and the seating surface on some of the discs not being flat, as described in Section I.I, is expected to be completed by May 31, 1992. The results of this investigation and any corrective action to prevent recurrence will be included in a supplement to this LER which is expected to be submitted by June 30, 1992.

PSVs

Based on the results of prior PSV testing, the PSVs will be removed and tested in accordance with the enhanced preventive maintenance and testing program each refueling outage until APS engineering determines that a longer interval is appropriate. The investigation of the seat leakage and the blowdown ring settings described in Section I.I is expected to be completed by May 31, 1992. The results of this investigation and any corrective action to prevent recurrence will be included in a supplement to this LER which is expected to be submitted by June 30, 1992.

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TEXT

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, and 530/91-001-01 describe events where MSSVs were out of the tolerance limits specified in TS 3.7.1.1 and PSVs were out of the tolerance limits specified in TS 3.4.2.2. Corrective action for these MSSV and PSV events include readjustment of the valves and an administrative reduction of the five (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.