

ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9404120019 DOC.DATE: 94/03/30 NOTARIZED: NO DOCKET #
 FACIL:STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi 05000528
 AUTH.NAME AUTHOR AFFILIATION
 GRABO,B.A. Arizona Public Service Co. (formerly Arizona Nuclear Power
 LEVINE,J.M. Arizona Public Service Co. (formerly Arizona Nuclear Power
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 93-009-02:on 931022,determined that 18 MSSV & 4 PSV were
 out of tolerance limits.Cause by MSSVs & PSVs have been
 subject to setpoint drift.Corrective action:MSSVs & PSV were
 reassembled,setpoints were readjusted.W/940330

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 13
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:STANDARDIZED PLANT

05000528 A

| | RECIPIENT | | COPIES | | | RECIPIENT | | COPIES | | |
|-----------|------------------------|--|--------|------|--|-----------------|--|--------|------|--|
| | ID CODE/NAME | | LTR | ENCL | | ID CODE/NAME | | LTR | ENCL | |
| | PDIV-3 PD | | 1 | 1 | | HOLIAN, B | | 1 | 1 | |
| | TRAN,L | | 1 | 1 | | | | | | |
| INTERNAL: | ACRS | | 1 | 1 | | AEOD/DOA | | 1 | 1 | |
| | AEOD/DSP/TPAB | | 1 | 1 | | AEOD/ROAB/DSP | | 2 | 2 | |
| | NRR/DE/EELB | | 1 | 1 | | NRR/DE/EMEB | | 1 | 1 | |
| | NRR/DORS/OEAB | | 1 | 1 | | NRR/DRCH/HHFB | | 1 | 1 | |
| | NRR/DRCH/HICB | | 1 | 1 | | NRR/DRCH/HOLB | | 1 | 1 | |
| | NRR/DRIL/RPEB | | 1 | 1 | | NRR/DRSS/PRPB | | 2 | 2 | |
| | NRR/DSSA/SPLB | | 1 | 1 | | NRR/DSSA/SRXB | | 1 | 1 | |
| | REG-FILE 02 | | 1 | 1 | | RES/DSIR/EIB | | 1 | 1 | |
| | RGN4 FILE 01 | | 1 | 1 | | | | | | |
| EXTERNAL: | EG&G BRYCE,J.H | | 2 | 2 | | L ST LOBBY WARD | | 1 | 1 | |
| | NRC PDR | | 1 | 1 | | NSIC MURPHY,G.A | | 1 | 1 | |
| | NSIC POORE,W. | | 1 | 1 | | NUDOCS FULL TXT | | 1 | 1 | |

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK,
 ROOM PI-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION
 LISTS FOR DOCUMENTS YOU DON'T NEED!

FULL TEXT CONVERSION REQUIRED
 TOTAL NUMBER OF COPIES REQUIRED: LTR 29 ENCL 29

A04

Arizona Public Service Company

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

192-00886-JML/BAG/RJR

March 30, 1994

JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Mail Station P1-37
Washington, D.C. 20555

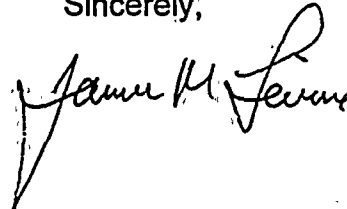
Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528 (License No. NPF-41)
Licensee Event Report 93-009-02
File: 94-020-404

Attached please find Supplement 02 to Licensee Event Report (LER) 93-009, prepared and submitted pursuant to 10CFR50.73. This supplement contains the final evaluation of anomalies identified between Trevitest and Westinghouse methods of Main Steam Safety Valve and Pressurizer Safety Valve setpoint testing. In accordance with 10CFR50.73(d), a copy of this LER is being forwarded to the Regional Administrator, NRC Region V.

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

Sincerely,



JML/BAG/RJR/rv

Attachment

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

9404120019 940330
PDR ADDCK 0500052B
S PDR



LICENSEE EVENT REPORT (LER)

| | | |
|--|--|------------------------|
| FACILITY NAME (1) Palo Verde Unit 1 | DOCKET NUMBER (2) 0 5 0 0 0 5 2 8 | PAGE (3) 1 OF 1 2 |
|--|--|------------------------|

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) |
| 1 0 | 2 2 | 9 3 | 9 3 | 0 0 9 | 0 2 | 0 3 | 3 0 | 9 4 | 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 | 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 356A) |
| | 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)(x) | | | | |

| LICENSEE CONTACT FOR THIS LER (12) | | TELEPHONE NUMBER | |
|---|------------------------|----------------------------|--|
| NAME B. A. Grabo, Supervisor, Nuclear Regulatory Affairs | AREA CODE 6 0 2 | 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 NPDOS | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPDOS | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| 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 October 22, 1993, while Unit 1 was in Mode 6 (REFUELING) with the Reactor Coolant System at approximately 96 degrees Fahrenheit and at atmospheric pressure, an Arizona Public Service Company (APS) engineering evaluation of ASME Code surveillance testing results for Unit 1, Cycle 4 determined that 18 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. The testing and adjustments were performed during the period of August 17, 1993 through October 21, 1993.

The MSSVs were disassembled, inspected, reworked (as required), reassembled, and retested. The MSSVs and PSVs lift setpoints were adjusted to within the TS limits. APS is continuing its efforts to enhance MSSV setpoint repeatability to within the TS required plus or minus 1 percent tolerance. This effort is part of an Engineering Issues Plan with a goal of reducing the number of as-found tests outside the TS tolerance.

Previous events were 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, and 529/93-002-01.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME | DOCKET NUMBER | LER NUMBER | | | PAGE | | | | | | | | | | | | | | | |
|-------------------|---------------|------------|-------------------|-----------------|------|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Palo Verde Unit 1 | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | | | | | | | | | | | | | | | |
| | | 0 | 5 | 0 | | | 0 | 5 | 2 | 8 | 9 | 3 | - | 0 | 0 | 9 | - | 0 | 2 | 0 |

TEXT

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

On October 22, 1993, Palo Verde Unit 1 was in Mode 6 (REFUELING) with the Reactor Coolant System (RCS)(AB) at approximately 96 degrees Fahrenheit and at atmospheric pressure during scheduled refueling outage U1R4.

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 1 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 has been conducted at less than the 5-year interval in accordance with the corrective action of previously submitted LERs. The MSSVs are tested in accordance with approved procedures under normal operating steam pressure and temperature 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 certified. In the past three refueling outages, the full complement of MSSVs in all three Units have been refurbished and recertified.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME | DOCKET NUMBER | LER NUMBER | | | PAGE | |
|-------------------|-----------------|------------|-------------------|-----------------|------|--------|
| Palo Verde Unit 1 | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | |
| | | | | | | |
| | 0 5 0 0 0 5 2 8 | 9 3 | 0 0 9 | 0 2 | 0 3 | OF 1 2 |

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 PSV's 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 has been conducted at less than the 5 year interval in accordance with the corrective action of previously submitted LERs. The PSVs are tested in accordance with approved procedures under normal operating pressure and temperature 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 certified. In the past three refueling outages, the full complement of PSVs in all three Units have been refurbished and recertified.

In preparation of outage U1R4, Trevitesting of MSSVs commenced on August 17, 1993. Testing was performed one valve at a time on each steam generator. The first 7 MSSVs tested were found to be outside of the allowed minus 1 percent tolerance. Adjustments were made to these valves during testing and each was returned to service. During the testing of the next two MSSVs, one tested within tolerance and was returned to service, the other one tested outside the minus 1 percent tolerance. No adjustment was made on this valve. Based on these test results, Trevitesting was stopped by APS Engineering Management (utility, nonlicensed). Engineering personnel (utility, nonlicensed) began investigating the anomalies experienced during Trevitesting.

On August 23, 1993, at approximately 0729 MST reactor power was reduced to less than 65.5 percent while APS Engineering completed investigation of the anomalies. At approximately 1600 MST it was determined by APS Engineering that the MSSVs which were reset using the Trevitest methodology were considered suspect. Those 7 valves plus the last valve tested were declared inoperable and the variable overpower trip setpoint was reduced to 75.3 percent as required by TS LCO 3.7.1.1.a, Table 3.7-2. The unit continued to operate at the reduced power level until the planned cycle 4 refueling outage.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME | DOCKET NUMBER | LER NUMBER | | | PAGE | | |
|-------------------|---------------|------------|-------------------|-----------------|------|----|----|
| Palo Verde Unit 1 | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | | |
| | | 0500052893 | -0009- | 02 | 04 | OF | 12 |

TEXT

On September 4, 1993, Unit 1 was shut down to commence the planned Cycle 4 refueling outage. During the refueling outage, all 20 MSSVs and the 4 PSVs were removed and sent to the Westinghouse Test Facility for scheduled testing. On October 22, 1993, APS Engineering personnel completed a review of data obtained for the MSSV and the PSV testing which was conducted at the Westinghouse Test Facility from September 28, 1993, through October 21, 1993.

Based upon a review of the test results, 18 of 20 MSSVs as-found relief settings were out of tolerance; 16 of the MSSV as-found relief settings were below specification and 2 were above specification. The maximum deviation of as-found data below any nominal setpoint was 5.44 percent low. The as-found settings for 2 valves were greater than 5 percent but less than 6 percent low, 3 valves were greater than 3 percent but less than 4 percent low, 4 valves were greater than 2 percent but less than 3 percent low, and 7 valves were greater than 1 percent, but less than 2 percent low. The maximum deviation of as-found data above any nominal setpoint was 2.56 percent high. The as-found setting for 1 valve was greater than 1 percent but less than 2 percent high, and 1 valve was 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.

Following the testing, the MSSVs were disassembled, inspected, reworked (as required), reassembled, retested, and their lift setpoints were certified. Of the 20 Unit 1 MSSVs, 7 were returned to the Unit and 13 were replaced with pre-tested spares that had been included in the preventive maintenance program.

Since 18 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 all 4 of the PSV as-found relief settings were above specification. The maximum deviation from the nominal setpoint for the as-found settings was 2.71 percent high. The as-found settings for 2 valves were 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.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME | DOCKET NUMBER | LER NUMBER | | | PAGE | |
|-------------------|---------------|------------|----------------------|--------------------|------|-------|
| Palo Verde Unit 1 | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | |
| | | 93 | - 0109 | - 02 | 05 | OF 12 |

TEXT

Following the testing, the PSVs were disassembled, inspected, reworked (as required), reassembled, retested, and their lift setpoints were certified. All 4 of the Unit 1 PSVs were reinstalled in the Unit.

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.

On November 20, 1993, Unit 1 was in Mode 3 performing post outage testing. At approximately 2016 MST, while performing prerequisites for Atmospheric Dump Valve (ADV)(PSV) testing, MSSV 572, located on steam generator number 1, lifted for approximately 1 minute and 50 seconds. MSSV 572 was last tested and certified by Westinghouse in March 1993 and had an as-left setpoint of 1247 psig. The steam pressure during the event was approximately 1193 to 1206 psig. ADV testing was terminated and an Incident Investigation was conducted. MSSV 572 was declared inoperable at approximately 2050 MST and TS LCO 3.7.1.1.b was entered.

A review of available documentation on MSSV 572 was performed which included the testing on March 11, 1993, when the valve was last certified by Westinghouse. The valve's performance during testing was analyzed for:

- response between sequential tests
- response following setpoint adjustment
- change in setpoint for a given adjustment

The review of the data identified that MSSV 572 was tested 11 times and adjusted twice to obtain the required 3 consecutive tests within the TS tolerance of plus or minus 1 percent of the nameplate setpoint of 1250 psig (1264.7 psia). The valve's as-left setpoint was recorded as 1247 psig. It was also noted that following an adjustment of -2.5 flats, the valve's setpoint decreased as expected for the following two tests. Then, with no additional adjustments, the setpoint increased on the third test by 26 psig. The valve required an additional adjustment of -1.5 flats to be certified to within the allowable tolerance.

MSSV 572 was inspected and found leaking and therefore not Trevitested. The setpoint on MSSV 572 was increased to stop the leakage. The valve was mechanically gagged and left inoperable.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME | DOCKET NUMBER | LER NUMBER | | | PAGE | |
|-------------------|---------------|------------|----------------------|--------------------|------|-------|
| Palo Verde Unit 1 | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | |
| | | 93 | 009 | 02 | 06 | OF 12 |

TEXT

Using this information, the test data on the remaining 19 Unit 1 MSSVs, and the 40 MSSVs in Units 2 and 3, were reviewed for:

- responses in the correct direction following setpoint adjustments
- responses that were reasonable for the adjustments that were made

Two additional MSSVs (578 and 557), both in Unit 1, displayed some similar testing abnormalities.

MSSV 578 has a nameplate setpoint of 1290 psig (1304.7 psia) and was certified by Westinghouse as set at 1289 psig on April 17, 1993. During the data review it was identified that following an adjustment to increase the setpoint the subsequent test response was a decrease in the setpoint by 14 psig.

MSSV 557 has a nameplate setpoint of 1315 psig (1329.7 psia) and was certified by Westinghouse as set at 1326 psig on May 11, 1993. During the data review it was identified that following an adjustment to increase the setpoint, the subsequent test response was a decrease in the setpoint by 37 psig. The valve also required 11 tests and 3 adjustments to be certified.

In order to better access the operational readiness and mechanical performance of these valves, MSSVs 578 and 557 were Trevitested on November 22, 1993. Each valve was tested 3 times and the setpoints recorded. No setpoint adjustments were made. MSSV 578 tested at 1280.6, 1271.5, and 1281.2 psig. This resulted in a maximum deviation of 9.7 psig between tests. MSSV 557 tested at 1279.5, 1298.3, and 1289.7 psig. This resulted in a maximum deviation of 18.8 psig and was outside the expected calculated range.

Based on the small deviation experienced during the Westinghouse re-certification testing and the very repeatable Trevitest results, APS Engineering determined that MSSV 578 can be expected to perform as required within the TS limit. Based on a review of Westinghouse re-certification testing and current Trevitest results, APS Engineering determined that MSSV 557 was not consistent with regards to repeatability and may not perform as required. It was declared inoperable and it was mechanically gagged. MSSV 557 is located on number 2 steam generator. Both MSSVs 572 and 557 remain gagged and inoperable.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME | DOCKET NUMBER | LER NUMBER | | | PAGE | | |
|-------------------|---------------|------------|----------------------|--------------------|------|----|----|
| Palo Verde Unit 1 | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | | |
| | | 05 | 00528 | 93 | 009 | 02 | 07 |

TEXT

Table 3.7-2 of TS LCO 3.7.1.1 limits steady state power to 98.2 percent of rated thermal power with the variable overpower trip setpoint at 108.0 percent of rated thermal power with one inoperable MSSV on an OPERABLE steam generator.

- 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.

- 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, 530/92-005-00, and 529/93-002-01. In the past three refueling outages, the full complement of MSSVs and PSVs in all three Units has been refurbished and recertified. No additional information relating to the setpoint drift of these

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME | DOCKET NUMBER | LER NUMBER | | | PAGE | | | | | | | | | | | | | | | | |
|-------------------|---------------|------------|-------------------|-----------------|------|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Palo Verde Unit 1 | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | | | | | | | | | | | | | | | | |
| | | 0 | 5 | 0 | | | 0 | 0 | 5 | 2 | 8 | 9 | 3 | - | 0 | 0 | 9 | - | 0 | 2 | 0 |

TEXT

valves was obtained from the inspection and testing of these valves.

On March 2, 1994, APS Engineering completed the investigation into the differing test results attributed to Trevitest and Westinghouse testing of the MSSVs. During this investigation, APS Engineering identified that the calculation used in the Trevitest setpoint equation contained an analytically derived variable, Mean Seat Area (MSA).

Of the six variables in the following setpoint equation:

$$Sp = \frac{(Rs) \times (L/C) \times (\%F) - W}{MSA} + Lp$$

Rs - Recorder Scale

L/C - Load Cell Capacity

Lp - Line Pressure

W - Rig Weight

MSA - Mean Seat Area

%F - Percent Force

the MSA is the only variable not directly measured. The MSA was originally determined by Furmanite using the average inside and outside dimensions of the nozzle to determine the Mean Seat Diameter (MSD). Once the MSD was determined, the MSA was calculated using the cross-sectional relationship;

$$MSA = \pi (D^2) / 4$$

D - Diameter (mean)

The original calculated MSA used in previous Trevitesting for PVNGS model valves was 24.626 square inches. APS Engineering personnel, with the support of Furmanite, determined a new MSA based on experimental testing which was performed at the Westinghouse service facility. The newly determined MSA that Furmanite will use for Palo Verde model valves is 23.046 square inches.

Temperature is also known to play a significant part in the resultant setpoint. When valves are removed from their normal environment, and tested at Westinghouse, blankets and heaters are used to simulate the valves' in-plant conditions. Through the use of APS thermography techniques, it was determined that plant conditions could be more accurately simulated since changes in the simulated temperature affect the spring tension which in-turn directly influences the setpoint. As a result, Westinghouse was required to make changes to their test procedures to more accurately model Palo Verde conditions. The results of the changes were reverified using APS thermography techniques.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME | DOCKET NUMBER | LER NUMBER | | | PAGE | | |
|-------------------|---------------|-----------------|----------------------|--------------------|------|-----|-----|
| Paio Verde Unit 1 | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | | |
| | | 9 | 3 | 0 | 0 | 9 | 0 |
| | | 0 5 0 0 0 5 2 8 | | | 0 9 | 0 1 | 0 2 |

TEXT

APS is continuing its efforts to enhance MSSV setpoint repeatability to within the TS required plus or minus 1 percent tolerance. This effort is currently focusing on valve design and material properties as they relate to setpoint drift. This effort is part of an Engineering Issues Plan (EIP) (SG-0010-026) with the goal of reducing the number of as-found tests outside of the TS tolerance.

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" 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.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME | DOCKET NUMBER | LER NUMBER | | | PAGE | |
|-------------------|---------------------|------------|----------------------|--------------------|------|-------------|
| Palo Verde Unit 1 | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | |
| | | | | | | |
| | 0 5 0 0 0 5 2 8 9 3 | - | 0 0 9 | - | 0 2 | 1 10 OF 1 2 |

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 complete loss of turbine generator (TA) load while operating at RATED THERMAL POWER, assuming no reactor trip until the first Reactor Protection System (JCS) trip setpoint (Pressurizer Pressure - High) is reached (there is no direct reactor trip on the loss of turbine) and no operation of the ADVs.

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 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 Unit 1, Cycle 4 as-found MSSV and PSV setpoints were compared to the previously performed Unit 2, Cycle 1 as-found analysis. The analysis performed for Unit 2, Cycle 1 as-found resulted in a peak primary pressure of 2749.2 psia and a peak secondary pressure of 1361.7 psia. Both of these pressures are below 110 percent of the design pressures. Since the as-found opening pressures of both the PSVs and MSSVs for Unit 1, Cycle 4 are less than the opening pressures used in the Unit 2, Cycle 1 analysis, the LOCV analysis for Unit 2, Cycle 1 is bounding for the Unit 1, Cycle 4 data.

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. Of the 20 Unit 1 MSSVs, 7 were returned to the Unit and 13 were replaced with pre-tested spares that had been included in the preventive maintenance program. The 4 tested Unit 1 PSVs, were all returned to the Unit.

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). This is currently planned to be implemented in December 1994.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME | DOCKET NUMBER | LER NUMBER | | | PAGE | |
|-------------------|---------------|-------------|----------------------|--------------------|------|-------|
| Palo Verde Unit 1 | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | |
| | | 0500052893- | 009- | 02 | 11 | OF 12 |

TEXT

APS Engineering has completed its investigation into the differing test results attributed to Trevitest verses Westinghouse testing of the MSSVs which resulted in Furmanite revising the value for Mean Seat Area used in the calculation. This reduced the differences in results between the Trevitest and Westinghouse testing methods. Westinghouse was also required to make changes in how PVNGS plant conditions are simulated and verified.

APS is continuing its efforts to enhance MSSV setpoint repeatability to within the TS required plus or minus 1 percent tolerance. This effort is currently focusing on valve design and material properties as they relate to setpoint drift. This effort is part of EIP SG-0010-026. If during the completion of actions associated with EIP SG-0010-026 additional information is developed which would affect the reader's understanding of this event, a supplement will be included in the most current LER on the subject.

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, 530/92-005-00, and 529/93-002-01 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.

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.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| | | | | | | |
|--|--------------------------------------|------------|----------------------|--------------------|------|--------|
| FACILITY NAME Palo Verde Unit 1 | DOCKET NUMBER 0 5 0 0 0 5 2 8 | LER NUMBER | | | PAGE | |
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | |
| | | 93 | - 0 0 9 | - 0 2 | 1 2 | OF 1 2 |

TEXT V. ADDITIONAL INFORMATION

Main Steam and Pressurizer Safety Valve Test Results 1993, Unit 1 Refueling Outage

| <u>MSSV Tag Number</u> | <u>Setpoint (Tolerance)</u> | <u>As-Found Pressure</u> | <u>Variance %</u> |
|------------------------|-----------------------------|--------------------------|-------------------|
| PSV0554 | 1250 psig (1238-1262) | 1227 psig | -1.82 |
| PSV0555 | 1290 (1278-1302) | 1276 | -1.07 |
| PSV0556 | 1315 (1302-1328) | 1297 | -1.35 |
| PSV0557 | 1315 (1302-1328) | 1295 | -1.50 |
| PSV0558 | 1315 (1302-1328) | 1325 | +0.74 |
| PSV0559 | 1315 (1302-1328) | 1269 | -3.46 |
| PSV0560 | 1290 (1278-1302) | 1221 | -5.32 |
| PSV0561 | 1250 (1238-1262) | 1227 | -1.79 |
| PSV0572 | 1250 (1238-1262) | 1224 | -2.03 |
| PSV0573 | 1290 (1278-1302) | 1256 | -2.62 |
| PSV0574 | 1315 (1302-1328) | 1243 | -5.44 |
| PSV0575 | 1315 (1302-1328) | 1271 | -3.31 |
| PSV0576 | 1315 (1302-1328) | 1288 | -2.03 |
| PSV0577 | 1315 (1302-1329) | 1293 | -1.65 |
| PSV0578 | 1290 (1278-1302) | 1265 | -1.92 |
| PSV0579 | 1250 (1238-1262) | 1263 | +1.03 |
| PSV0691 | 1315 (1302-1328) | 1276 | -2.93 |
| PSV0692 | 1315 (1302-1328) | 1271 | -3.31 |
| PSV0694 | 1315 (1302-1328) | 1320 | +0.38 |
| PSV0695 | 1315 (1302-1328) | 1349 | +2.56 |

| <u>PSV Tag Number</u> | <u>Setpoint (Tolerance)</u> | <u>As-Found Pressure</u> | <u>Variance %</u> |
|-----------------------|-----------------------------|--------------------------|-------------------|
| PSV0200 | 2485 psig (2460-2509) | 2544 psig | +2.35 |
| PSV0201 | 2485 (2460-2509) | 2553 | +2.71 |
| PSV0202 | 2485 (2460-2509) | 2519 | +1.35 |
| PSV0203 | 2485 (2460-2509) | 2525 | +1.19 |

