

LICENSEE EVENT REPORT (LER)

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|--|---|---|
| FACILITY NAME (1) <div style="text-align: center; font-weight: bold;">Palo Verde Unit 2</div> | DOCKET NUMBER (2) <div style="text-align: center;">0 5 0 0 0 5 2 9</div> | PAGE (3) <div style="text-align: center;">1 OF 0 6</div> |
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TITLE (4)

Technical Specification required shutdown due to the expiration of LCO time limit.

| 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 NUMBERS | | | | | | | | | | | |
| 1 | 0 | 1 | 9 | 9 | 4 | 9 | 4 | - | 0 | 0 | 5 | - | 0 | 1 | 0 | 7 | 2 | 8 | 9 | 5 | NA | 0 5 0 0 0 0 |
| | | | | | | | | | | | | NA | 0 5 0 0 0 0 | | | | | | | | | |

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| OPERATING MODE (9) <div style="text-align: center;">2</div> | | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11) | | | | | | | | | |
| POWER LEVEL (10) <div style="text-align: center;">0 0 2</div> | | 20.402(b) | | 20.405(c) | | 50.73(a)(2)(v) | | 73.71(b) | | | |
| | | 20.405(a)(1)(i) | | 50.38(c)(1) | | 50.73(a)(2)(v) | | 73.71(c) | | | |
| | | 20.405(a)(1)(ii) | | 50.38(c)(2) | | 50.73(a)(2)(vi) | | OTHER (Specify in Abstract below and in Text, NRC Form 366A) | | | |
| | | 20.405(a)(1)(iii) | X | 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)(viii)(B) | | | | | |
| | | 20.405(a)(1)(v) | | 50.73(a)(2)(iii) | | 50.73(a)(2)(ix) | | | | | |

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| LICENSEE CONTACT FOR THIS LER (12) | | TELEPHONE NUMBER | |
| NAME <div style="text-align: center;">Burton A. Grabo, Supervisor, Nuclear Regulatory Affairs</div> | | AREA CODE <div style="text-align: center;">6 0 2 3 9 3 - 6 4 9 2</div> | |

| COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13) | | | | | | | | | | | |
|--|--------|-----------|--------------|---------------------|-------|--------|-----------|--------------|---------------------|--|--|
| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | | |
| B | B Q | F C V | L 2 0 0 | Y | | | | | | | |
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| SUPPLEMENTAL REPORT EXPECTED (14) | | | | EXPECTED SUBMISSION DATE (15) | | MONTH | DAY | YEAR |
| <input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input type="checkbox"/> NO | | | | | | | | |

ABSTRACT (Limit to 1400 spaces, i.e., approximately 11 lines single-space typewritten lines) (16)

On October 19, 1994, at approximately 1526 MST, Palo Verde Unit 2 was in Mode 2 (STARTUP), operating at approximately 2 percent power when Control Room personnel completed a plant shutdown as required by Technical Specification (TS) 3.5.2. The manual reactor shutdown was required because High Pressure Safety Injection (HPSI) valve SIA-UV-0627 had failed to satisfy ASME Section XI testing on October 16, 1994 and could not be restored to an operable condition within 72 hours as allowed by TS 3.5.2. Action (a). This condition rendered one subsystem of the Emergency Core Cooling System inoperable. A root cause evaluation determined the condition was unique to SIA-UV-0627 and was caused by the simultaneous occurrence of an over-the-seat pressure and a non-repeatable increase in the stem to disc friction.

There have been no previous similar events reported pursuant to 10CFR50.73.

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TEXT

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

At 1526 MST on October 19, 1994, Palo Verde Unit 2 was in Mode 2 (STARTUP) at normal operating temperature and pressure during routine power ascension from a mid-cycle outage.

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

Event Classification: Completion of plant shutdown required by the Technical Specifications (TS).

On October 19, 1994, at approximately 1526 MST, Palo Verde Unit 2 was in Mode 2 (STARTUP), operating at approximately 2 percent power when Control Room personnel completed a plant shutdown as required by Technical Specification (TS) 3.5.2. The manual reactor (AB) shutdown was required because HPSI valve SIA-UV-0627 (BQ)(FCV) failed to satisfy ASME Section XI testing and could not be restored to an operable condition within 72 hours as allowed by TS 3.5.2 Action (a) which states:

"With one ECCS [BP/BQ] subsystem inoperable, restore the inoperable system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours."

The reactor was manually tripped from 2 percent power, and the plant was stabilized in Mode 3 (HOT STANDBY) at approximately 1542 MST on October 19, 1994. The event was classified as an uncomplicated reactor trip by the Shift Supervisor.

Prior to the event, at approximately 1535 MST on October 16, 1994, Unit 2 HPSI valve SIA-UV-0627 failed to open during ASME Section XI testing and was declared inoperable.

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Following the manual reactor trip, at approximately 2044 MST October 19, 1994, repairs and modifications to HPSI valve SIA-UV-0627, which included the replacement of internal valve components and the motor operator (20), had been completed. ASME Section XI testing was successfully completed at 2305 MST on October 19, 1994, the valve was declared operable and LCO 3.5.2 Action (a) was exited. At approximately 0117 MST on October 20, 1994, Unit 2 commenced reactor start-up. At approximately 0408 MST on October 20, 1994 the unit entered Mode 2 and the reactor was declared critical at approximately 0525 MST.

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

Unit 2 HPSI valve SIA-UV-0627 was declared inoperable at approximately 1535 MST on October 16, 1994, because the valve failed to open during ASME Section XI testing.

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

Root cause analysis revealed the cause of 2JSIAUV0627's failure to open was a combination of pressure over the seat and excessive stem to disc connection friction. The pressure over the seat was the result of downstream check valve leakage. The specific cause of the excessive stem to disc friction could not be conclusively determined. However, both pressure over the seat and a high stem/disc interface friction had to occur simultaneously for the failure to be repeated.

It is believed that the stem to disc friction changed between the time the stem/disc assembly was initially removed from 2JSIAUV0627 and when it was later tested in a root cause of failure test valve. Decontamination of the stem/disc assembly using ultra-sonic and grit-blasting methods is believed to have reduced the stem/disc interface friction. Because the actual field conditions could not be reproduced, root cause evaluators simulated the high stem/disc friction by welding the stem to the disc.

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Test results indicate the incident was unique to this particular motor operated valve and was made possible by the simultaneous occurrence of an over-the-seat pressure and a non-repeatable increase in the stem to disc friction. From test data it was determined the high stem/disc friction condition will not prevent the valve from opening if over the seat pressure is less than 1866 p.s.i.d.

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

The failure of HPSI valve SIA-UV-0627 to open during testing resulted in one train of the ECCS being rendered inoperable and potentially being unable to provide flow to the RCS. The effect of the failure could be a potential core temperature transient if alternate means of cooling are not provided. Alternate means of cooling could be provided and are specifically delineated in the PVNGS emergency procedures. These are any of the following: removal of core heat through the steam generators (AB); redundant train of the HPSI system; upon depressurization of the RCS, both trains of the Low Pressure Safety Injection System (LPSI) (BP); or upon failure of the LPSI system, the Containment Spray (CS) system (BE) could be aligned to provide coolant.

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

Not applicable - no failures of components with multiple functions 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:

HPSI valve SIA-UV-0627 was declared inoperable at approximately 1535 MST on October 16, 1994 and was restored to an operable condition at 2305 MST on October 19, 1994. The time from discovery until the valve was returned to service was 79 hours and 30 minutes.

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

During the performance of ASME Section XI testing, Control Room personnel attempted to open HPSI valve SIA-UV-0627 in accordance with procedural requirements and received a dual indication for valve position. Subsequent investigation confirmed the valve was in the closed position.

I. Cause of Event:

SALP cause code E: Component Failure

The event (plant shutdown as required by TS LCO 3.5.2.) was due to the failure of valve SIA-UV-0627 to open during surveillance testing and the inability to restore the component to an operable condition within the time allowed by the TS.

J. Safety System Response:

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

K. Failed Component Information:

HPSI A SIA-UV-0627 is a 2-inch globe valve, model number 79640, which was manufactured by the Nuclear Valve Division of Borg Warner and was supplied by Combustion Engineering.

The valve's motor operator was manufactured by Limitorque Corporation and was supplied as model number SMC-04.

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

The event did not result in any challenges to the fission product barriers or result in any releases of radioactive materials. Therefore, there were no adverse safety consequences or implications as a result of this event.

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However, the failure of HPSI valve SIA-UV-0627 to open during testing did result in one train of the ECCS being rendered inoperable, and potentially being unable to provide flow to the RCS. The effect of the failure could be a potential core temperature transient if alternate means of cooling are not provided.

This event did not adversely affect the safe operation of the plant or the health and safety of the public.

III. CORRECTIVE ACTION:

A. Immediate:

A previously approved design change was implemented which upgraded the valve's motor operator from a Limitorque SMC-04 to a Limitorque SMB-00.

An approved Operations procedure was revised by the addition of notes advising of potential impact of stroking the valve against pressures greater than 1235 p.s.i.d. The procedure also specifies actions to notify valve services engineering and to equalize header pressure prior to reaching 1235 p.s.i.d.

B. Action to Prevent Recurrence:

Design change options have been identified and will be reviewed to determine if valve and/or motor operator replacement or modification is necessary.

IV. PREVIOUS SIMILAR EVENTS:

No other previous events have been reported pursuant to 10CFR50.73 where a plant shutdown was required by Technical Specification (TS) 3.5.2. within the last three years.

