



A subsidiary of Pinnacle West Capital Corporation

10 CFR 50.73

Palo Verde Nuclear
Generating Station

Dwight C. Mims
Vice President
Regulatory Affairs and Plant Improvement

Tel. 623-393-5403
Fax 623-393-6077

Mail Station 7605
P. O. Box 52034
Phoenix, Arizona 85072-2034

102-05685-DCM/TNW/REB/DFH
April 20, 2007

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 2
Docket No. STN 50-529
License No. NPF 51
Licensee Event Report 2007-001-00**

Attached, please find Licensee Event Report (LER) 50-529/2007-001-00 which reports the completion of a shutdown required by Technical Specifications when Unit 2 entered Limiting Condition for Operation 3.5.3, Condition C for the Emergency Core Cooling System.

In accordance with 10 CFR 50.4, copies of this LER are being forwarded to the NRC Regional Office, NRC Region IV and the Senior Resident Inspector. If you have questions regarding this submittal, please contact Ray E. Buzard, Section Leader, Regulatory Affairs, at (623) 393-5317.

Arizona Public Service Company makes no commitments in this letter.

Sincerely,

DCM/TNW/REB/DFH/gt

Attachment

| | | |
|-----|---------------|---|
| cc: | B. S. Mallett | NRC Region IV Regional Administrator |
| | M. B. Fields | NRC NRR Project Manager - (send electronic and paper) |
| | M. T. Markley | NRC NRR Project Manager - (send electronic and paper) |
| | G. G. Warnick | NRC Senior Resident Inspector for PVNGS |

A member of the STARS (Strategic Teaming and Resource Sharing) Alliance
Callaway • Comanche Peak • Diablo Canyon • Palo Verde • South Texas Project • Wolf Creek

IE22

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

| | | | |
|--|--|------------------------------|-------------------|
| 1. FACILITY NAME Palo Verde Nuclear Generating Station Unit 2 | | 2. DOCKET NUMBER 05000529 | 3. PAGE 1 OF 7 |
|--|--|------------------------------|-------------------|

4. TITLE
Completion of a Shutdown Required by Technical Specification 3.5.3, Condition C

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---------------|-----|------|---------------|-------------------|---------|----------------|-----|------|------------------------------|---------------|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO. | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 02 | 19 | 2007 | 2007 | - 001 - | 00 | 04 | 20 | 2007 | None | 05000 |
| | | | | | | | | | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | None | 05000 |

| | | | | | | | | | | |
|--|--|---|---|---|--|--|--|--|--|--|
| 9. OPERATING MODE 1 | 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply) | | | | | | | | | |
| | <input type="checkbox"/> 20.2201(b) | <input type="checkbox"/> 20.2203(a)(3)(i) | <input type="checkbox"/> 50.73(a)(2)(I)(C) | <input type="checkbox"/> 50.73(a)(2)(vii) | | | | | | |
| 10. POWER LEVEL 100 | <input type="checkbox"/> 20.2201(d) | <input type="checkbox"/> 20.2203(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(II)(A) | <input type="checkbox"/> 50.73(a)(2)(viii)(A) | | | | | | |
| | <input type="checkbox"/> 20.2203(a)(1) | <input type="checkbox"/> 20.2203(a)(4) | <input type="checkbox"/> 50.73(a)(2)(II)(B) | <input type="checkbox"/> 50.73(a)(2)(viii)(B) | | | | | | |
| | <input type="checkbox"/> 20.2203(a)(2)(I) | <input type="checkbox"/> 50.36(c)(1)(I)(A) | <input type="checkbox"/> 50.73(a)(2)(III) | <input type="checkbox"/> 50.73(a)(2)(IX)(A) | | | | | | |
| | <input type="checkbox"/> 20.2203(a)(2)(II) | <input type="checkbox"/> 50.36(c)(1)(II)(A) | <input type="checkbox"/> 50.73(a)(2)(IV)(A) | <input type="checkbox"/> 50.73(a)(2)(X) | | | | | | |
| | <input type="checkbox"/> 20.2203(a)(2)(III) | <input type="checkbox"/> 50.36(c)(2) | <input type="checkbox"/> 50.73(a)(2)(V)(A) | <input type="checkbox"/> 73.71(a)(4) | | | | | | |
| | <input type="checkbox"/> 20.2203(a)(2)(IV) | <input type="checkbox"/> 50.46(a)(3)(II) | <input type="checkbox"/> 50.73(a)(2)(V)(B) | <input type="checkbox"/> 73.71(a)(5) | | | | | | |
| <input type="checkbox"/> 20.2203(a)(2)(V) | <input checked="" type="checkbox"/> 50.73(a)(2)(I)(A) | <input type="checkbox"/> 50.73(a)(2)(V)(C) | <input type="checkbox"/> OTHER | | | | | | | |
| <input type="checkbox"/> 20.2203(a)(2)(VI) | <input type="checkbox"/> 50.73(a)(2)(I)(B) | <input type="checkbox"/> 50.73(a)(2)(V)(D) | Specify in Abstract below or in NRC Form 366A | | | | | | | |

12. LICENSEE CONTACT FOR THIS LER

| | |
|---|--|
| FACILITY NAME Ray E. Buzard, Section Leader, Regulatory Affairs - Compliance | TELEPHONE NUMBER (Include Area Code) (623) 393-5317 |
|---|--|

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|-------|--------|-----------|---------------|--------------------|-------|--------|-----------|---------------|--------------------|
| | | | | | | | | | |

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

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

On February 16, 2007, Unit 2 was in Mode 1 at approximately 100 percent rated thermal power, running the High Pressure Safety Injection (HPSI) 2A pump in support of activities to determine the leak rate of oil from the pump bearings. The oil leak rate was found to be greater than acceptable and at approximately 13:01 Mountain Standard Time (MST), Operations personnel declared the HPSI 2A pump inoperable and entered Technical Specification (TS) Limiting Condition for Operation (LCO) 3.5.3, Condition B, placing the plant in a 72 hour action. Corrective actions could not restore the pump to an operable status within the TS LCO allowed time. On February 19, 2007, at approximately 14:56 MST, Operations commenced a plant shutdown and at 16:45 MST, the reactor was manually tripped from approximately 20 percent power and the unit entered Mode 3. No TS LCO allowed action times were exceeded.

The oil leaks were corrected and on February 22, 2007, at approximately 05:02 MST Unit 2 declared HPSI 2A operable. The corrective actions were also implemented in the other five HPSI pumps on site.

In the past three years, there were two events reported for a TS shutdown that became necessary when attempted repairs could not be performed within the completion time for the TS LCO required action.

LICENSEE EVENT REPORT (LER)

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|---|-----------|---------------|----------------------|--------------------|---------|
| Palo Verde Nuclear Generating Station Unit 2 | 05000529 | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | 2 OF 7 |
| | | 2007 | - 001 | - 00 | |

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

Note: All times listed in this event report are approximate and Mountain Standard Time (MST) unless otherwise indicated.

1. REPORTING REQUIREMENT(S):

This LER (50-529/2007-001-00) is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(A) for the completion of a shutdown required by Technical Specification (TS) Limiting Condition for Operation (LCO) 3.5.3, Condition C. Notification of this event was made to the Nuclear Regulatory Commission (NRC) on February 19, 2007, at 17:19 via the Event Notification System (ENS) on ENS report 43173.

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

System Description:

The High Pressure Safety Injection (HPSI) system (EIS Code: BQ) is part of the Emergency Core Cooling System (ECCS). The ECCS prevents significant alteration of core geometry, precludes fuel melting, limits the cladding metal-water reaction, removes the energy generated in the core and maintains sub-critical core conditions during the extended period of time following a Loss of Coolant Accident (LOCA). The primary function of the HPSI system is to inject borated water into the Reactor Coolant System (RCS) (EIS Code: AB) if a break occurs in the RCS boundary. HPSI system cold leg injection is automatically initiated by a Safety Injection Actuation Signal (SIAS). For small breaks, the RCS pressure remains high for a long period of time following the accident, and the HPSI pumps ensure sufficient flow is injected. The HPSI system is also used during the recirculation mode to maintain borated water flow through the core for extended periods of time following a LOCA. For long-term cooling, the HPSI system is manually realigned for simultaneous hot and cold leg injection. This ensures flushing and sub-cooling of the core independent of break location. For small breaks, the HPSI pumps continue injecting into the RCS to provide makeup for spillage out the break while a normal cool-down progresses.

Pump Description:

The HPSI pump is an Ingersoll-Rand model 4x11 CA-8, horizontal centrifugal pump. The pump is an eight stage, high pressure, barrel type boiler feed pump. The pump runs at approximately 3600 revolutions per minute and is designed to pump 900 gallons per minute at 2850 feet of head. The pump's rotating element incorporates a balancing drum to balance axial hydraulic thrust load and thus minimize the load on the outboard thrust bearings. The rotating element also consists of the following major components: impellers, sleeves, fluid seals, wearing rings, balance drum, and rolling element (ball) bearings.

LICENSEE EVENT REPORT (LER)

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|---|-----------|---------------|----------------------|--------------------|---------|
| Palo Verde Nuclear Generating Station Unit 2 | 05000529 | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | 3 OF 7 |
| | | 2007 | -- 001 | -- 00 | |

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

Oil System Description:

The HPSI bearings provide bearing support and thrust support for the HPSI pump. The pump shaft is 2 1/8" diameter. The roller bearings have a 5 1/2" diameter. At the bottom of the housing is an oil bath. The housing contains an oil slinger that consists of a hoop that rides on a shaft sleeve and extends into the oil bath. When the pump is operating the oil slinger lubricates the bearings by slinging oil throughout the bearing housing.

The shaft penetrates the bearing housing cover through an oil flinger. The flinger is attached to the shaft with a single set screw. The flinger's purpose is to prevent contaminants from entering the oil bath from the outside. There is no seal between the flinger and the pump shaft.

An oiler, attached to the bottom of the bearing housing, provides the capability to make up a small quantity of oil to the bearing. The oiler is used to set the oil level in the bearing housing. The height of the oiler is adjustable over about a 1" range.

Bearing Description and Arrangement:

The pump shaft and bearing arrangement consists of a single inboard ball bearing and a set of two outboard ball bearings. The inboard bearing uses a deep groove ball bearing. The inboard bearing supports radial loads only and is allowed to move axially in its bearing housing to accommodate shaft thermal growth. The outboard bearing arrangement uses a set of two angular contact bearings mounted back to back. The outboard bearing set is designed to accommodate both radial and axial loads. The outboard bearing set is also designed to be fixed on the shaft and also fixed in its bearing housing. The inboard bearing is allowed to float in its bearing housing.

3. INITIAL PLANT CONDITIONS:

On February 19, 2007, Palo Verde Unit 2 was in Mode 1 (power operations), operating at approximately 100 percent power. The HPSI 2A pump was inoperable and had been since February 16, 2007, at 13:01 when Operations personnel entered LCO 3.5.3, Condition B, placing the plant in a 72 hour action to restore the pump to an operable status.

4. EVENT DESCRIPTION:

In January 2007, NRC personnel requested information related to an Operability Determination (OD) for oil leakage from the bearing housing of the HPSI 2A pump. The OD was prepared to establish a leak rate limit of 1.5 drops/hour based on a 182 day

LICENSEE EVENT REPORT (LER)

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|---|-----------|---------------|----------------------|--------------------|---------|
| Palo Verde Nuclear Generating Station Unit 2 | 05000529 | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | 4 OF 7 |
| | | 2007 | -- 001 | -- 00 | |

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

mission time (a previously generated OD had established 3 drops/hour as acceptable). The new OD addressed non-conservative assumptions developed for the original OD and was approved on February 10, 2007. On February 13, 2007, Palo Verde staff members received a request from NRC personnel to provide a summary of the extent of current oil leakage for the HPSI 2A pump.

On February 16, 2007, with Unit 2 at 100 percent power, a Surveillance Test (ST) (73ST-9SI10), "HPSI Pumps Miniflow - Inservice Test," was performed to demonstrate that the HPSI 2A pump oil leak was within the leak rate established by the OD, which would validate that the HPSI pump could meet its safety function/mission time of 182 days. The HPSI 2A Pump was started at 12:13. At 13:01 on February 16, 2007, Operations personnel declared the HPSI 2A pump inoperable and entered TS LCO 3.5.3, Condition B, placing the plant in a 72 hour action to restore the pump to an operable status. The pump was considered inoperable when the minimum flow recirculation (mini-flow) orifice bypass valve was opened to establish a higher flowrate as required when the system is in the recirculation configuration for greater than 1 hour.

During the test, the outboard bearing began to leak, but the leakage stopped after approximately 5 hours when the oil in the bearing reservoir reached a lower, optimum level. Approximately 2 hours into the pump test, the inboard bearing began to leak. This leak rate increased to approximately 3 drops/hour and on February 17, 2007, at 11:19, with no signs of decreasing leakage from the inboard bearing, the pump was stopped.

Vendor information was provided to Palo Verde and a Temporary Modification (T-Mod) to decrease the reservoir oil level was developed. On February 18, 2007, at 19:11, following the installation of the T-Mod, a second HPSI 2A pump test commenced. The leak rate continued as observed in the previous test and on February 19, 2007, at 09:28, HPSI 2A pump was secured. Later, at 13:01, Operators entered LCO 3.5.3, Condition C and by 14:56 commenced a plant shutdown. At 16:45, with reactor power less than 20 percent, Unit 2 was manually tripped and entered Mode 3.

On February 22, 2007, after installation of the T-Mod and adjustment of clearances for the flinger ring, a 5 hour test run was completed on the HPSI 2A pump. No leakage was observed during the run.

5. ASSESSMENT OF SAFETY CONSEQUENCES:

Palo Verde Unit 2 operated within the requirements of its Operating License and complied with the TS actions within the required time. The plant shutdown was based on an inoperable HPSI 2A pump that could not be returned to an operable condition within the TS action statement allowed time.

LICENSEE EVENT REPORT (LER)

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|---|-----------|---------------|----------------------|--------------------|---------|
| Palo Verde Nuclear Generating Station Unit 2 | 05000529 | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | 6 OF 7 |
| | | 2007 | -- 001 | -- 00 | |

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

5. Contributing Cause #2: Interim actions identified during the Significant Investigation for a previous event in Unit 2 (Shutdown Due to Inability to Repair Valve 2JSA-UV-138A Within Time Permitted by Technical Specifications) were not effectively implemented.

6. Apparent Cause #1: Bearing oil leak: The apparent cause of the HPSI pump inboard bearing housing oil leak was a combination of high oil level and flinger ring position.

7. CORRECTIVE ACTIONS:

The following immediate corrective actions were implemented for both trains in all three units.

1. Installed a T-Mod which decreased the reservoir oil level and added dual 8 ounce oilers on the inboard side of the pump.
2. New clearances were developed for the bearing flinger ring.
3. Mission time for the HPSI pump was evaluated as 30 days.

To prevent recurrence, the following actions are planned.

1. Implement a new process that employs a systematic approach for troubleshooting equipment failures.
2. Formalize the station management team response for entry into time dependent Technical Specification.
3. Implement program/process changes that ensure contingency planning is included as part of the work management process.

Any additional corrective actions taken as a result of this event will be implemented in accordance with the APS corrective action program. If information is subsequently developed that would significantly affect a reader's understanding or perception of this event, a supplement to this LER will be submitted.

8. PREVIOUS SIMILAR EVENTS:

In the past three years, there were two similar events reported for a TS shutdown that became necessary when attempted repairs could not be performed within the allowed TS LCO action time.

LER 05000528-2005-004 reported a failure of a voltage regulator on the 1A Emergency Diesel Generator (EDG). Replacement of the automatic voltage regulator (AVR) required post maintenance load rejection surveillance testing in accordance with Technical Specification Surveillance Requirement 3.8.1.9. Performance of this surveillance is

LICENSEE EVENT REPORT (LER)

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|---|-----------|---------------|----------------------|--------------------|---------|
| Palo Verde Nuclear Generating Station Unit 2 | 05000529 | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | 7 OF 7 |
| | | 2007 | -- 001 | -- 00 | |

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

prohibited in Modes 1 through 4, therefore, a shutdown became necessary to support retesting of the AVR. Corrective actions developed for this event would not have prevented this event.

LER 05000529-2006-001 reported the failure of an Auxiliary Feedwater Turbine steam supply valve. The actions developed for this event were not effectively implemented, and as such, did not prevent this event.