10 CFR 50.73

*A subsidiary of Pinnacle West Capital Corporation*


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


102-06295-DCM/DCE
December 13, 2010

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

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)**
**Unit 3**
**Docket No. STN 50-530**
**License No. NPF 74**
**Licensee Event Report 2010-002-00**

Attached, please find Licensee Event Report (LER) 50-530/2010-002-00 which reports a condition prohibited by technical specifications resulting from blockage in seven containment spray system spray nozzles.

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 Marianne Webb, Section Leader, Regulatory Affairs, at (623) 393-5730.

Arizona Public Service Company makes no commitments in this letter.

Sincerely,
D.C. Mims

DCM/TNW/DCE/gat

Attachment
cc: E. E. Collins Jr. NRC Region IV Regional Administrator
J. R. Hall NRC NRR Senior Project Manager
L. K. Gibson NRC NRR Project Manager
J. H. Bashore NRC Senior Resident Inspector (acting) for PVNGS



IE22
NRR

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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

# LICENSEE EVENT REPORT (LER)

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

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. PAGE |
|---|---|---|
| Palo Verde Nuclear Generating Station (PVNGS) Unit 3 | 05000530 | 1 OF 4 |

**4. TITLE**

Condition Prohibited by Technical Specification Resulting from Containment Spray Nozzle Obstruction

| 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 |
| | | | | | | | | | | | None | |
| 10 | 13 | 2010 | 2010 | - | 002 | - | 00 | 12 | 13 | 2010 | FACILITY NAME: None | DOCKET NUMBER |

**9. OPERATING MODE**

Defueled

**10. POWER LEVEL**

0

**11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§:** *(Check all that apply)*

| | | | |
|---|---|---|---|
| ☐ 20.2201(b) | ☐ 20.2203(a)(3)(i) | ☐ 50.73(a)(2)(i)(C) | ☒ 50.73(a)(2)(vii) |
| ☐ 20.2201(d) | ☐ 20.2203(a)(3)(ii) | ☐ 50.73(a)(2)(ii)(A) | ☐ 50.73(a)(2)(viii)(A) |
| ☐ 20.2203(a)(1) | ☐ 20.2203(a)(4) | ☐ 50.73(a)(2)(ii)(B) | ☐ 50.73(a)(2)(viii)(B) |
| ☐ 20.2203(a)(2)(i) | ☐ 50.36(c)(1)(i)(A) | ☐ 50.73(a)(2)(iii) | ☐ 50.73(a)(2)(ix)(A) |
| ☐ 20.2203(a)(2)(ii) | ☐ 50.36(c)(1)(ii)(A) | ☐ 50.73(a)(2)(iv)(A) | ☐ 50.73(a)(2)(x) |
| ☐ 20.2203(a)(2)(iii) | ☐ 50.36(c)(2) | ☐ 50.73(a)(2)(v)(A) | ☐ 73.71(a)(4) |
| ☐ 20.2203(a)(2)(iv) | ☐ 50.46(a)(3)(ii) | ☐ 50.73(a)(2)(v)(B) | ☐ 73.71(a)(5) |
| ☐ 20.2203(a)(2)(v) | ☐ 50.73(a)(2)(i)(A) | ☐ 50.73(a)(2)(v)(C) | ☐ OTHER |
| ☐ 20.2203(a)(2)(vi) | ☒ 50.73(a)(2)(i)(B) | ☐ 50.73(a)(2)(v)(D) | Specify in Abstract below or in NRC Form 366A |

**12. LICENSEE CONTACT FOR THIS LER**

| FACILITY NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| Marianne N. Webb, Section Leader, Regulatory Affairs - Compliance | (623) 393-5730 |

**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**

☒ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☐ NO

**15. EXPECTED SUBMISSION DATE**

| MONTH | DAY | YEAR |
|---|---|---|
| 02 | 18 | 2011 |

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


On October 13, 2010, during scheduled surveillance test 73ST-9SI02, "CS Nozzle Air Test," of the containment spray (CS) system spray nozzles, seven obstructed nozzles were identified. Unit 3 was defueled at the time of discovery. The nozzles were obstructed for a period greater than allowed by Technical Specification (TS) 3.6.6 Limiting Condition for Operation. This represents a condition prohibited by TS and a common cause inoperability of independent trains.

The preliminary root cause of the obstruction was that boric acid residue and borated water remained in the CS headers from prior overfill events. The borated water subsequently evaporated causing boric acid to precipitate and form obstructions in the nozzles. The nozzles were inspected, the residue was removed and the nozzles successfully passed the surveillance test procedure prior to entering Mode 4 at the end of the outage.

The root cause investigation is continuing.

In the past three years, PVNGS reported one similar event in LER 50-530/2007-001-00.

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTAL NUMBER | REVISION NUMBER | |
| Palo Verde Nuclear Generating Station Unit 3 | 05000530 | 2010 | -- 002 | -- 00 | 2 OF 4 |

17. NARRATIVE

1. REPORTING REQUIREMENT(S):

This LER is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(B) to report a condition prohibited by Technical Specification (TS) Limiting Condition for Operation (LCO) 3.6.6, Condition B. Specifically, on October 13, 2010, Palo Verde personnel determined that containment spray (CS) nozzles on each of two separate CS train "A" and "B" spray headers were obstructed. The obstructions existed for a period greater than allowed by Technical Specification (TS) 3.6.6 "Containment Spray System" LCO.

This condition is also being reported under 10 CFR 50.73(a)(2)(vii) as a common cause inoperability of independent trains because both trains contained boric acid deposits that obstructed the spray nozzles.

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

The CS System consists of two independent trains of equal capacity, each capable of meeting the design basis requirement. Each train includes a CS pump, a shutdown cooling heat exchanger, spray headers, nozzles, valves, and piping. Each train is powered from a separate Engineered Safety Feature (ESF) bus.

The CS [EIIS: BP] system, as a subsystem of the safety injection system [EIIS: BP], is an ESF designed to ensure that heat removal can be attained during post accident periods. During a Design Basis Accident (DBA), one CS train is required to maintain the containment peak pressure and temperature below the design limits, to remove iodine from the containment atmosphere to maintain concentrations below those assumed in the safety analysis, and to provide hydrogen mixing. To ensure that these requirements are met, assuming the worst case single active failure occurs, two CS trains are required to be operable.

3. INITIAL PLANT CONDITIONS:

On October 13, 2010, Palo Verde Unit 3 was defueled. There were no major structures, systems, or components inoperable at the start of the event that contributed to the event.

4. EVENT DESCRIPTION:

On October 13, 2010, upon completion of Surveillance Test 73ST-9SI02, "CS Nozzle Air Test," Engineering personnel determined the following spray nozzles were obstructed:

(1) Train "A" header (100' elevation) 3SI-A-430, on the end of the header
(2) Train "A" header (120' elevation) 3SI-A-413, on the end of the header

(3) Train "A" header (120' elevation) 3SI-A-413, second nozzle from the end of the header
(4) Train "B" header (100' elevation) 3SI-B-440, first nozzle from the supply header
(5) Train "B" header (100' elevation) 3SI-B-441, first nozzle from the supply header
(6) Train "B" header (100' elevation) 3SI-B-438, first nozzle from the supply header
(7) Train "B" header (100' elevation) 3SI-B-439, on the end of the header

Technical Specification (TS) Surveillance Requirement (SR) 3.6.6.6 requires verification that each CS system spray nozzle (total of 620 nozzles) is unobstructed. The surveillance test for the CS system uses low pressure air to conduct the test. Each obstruction discovered in Unit 3 consisted of boric acid deposit that was friable and fragmented easily while probing the deposit with a pipe cleaner. The boric acid deposits were the result of boric acid residue and borated water that remained in the CS headers from prior overfill events. The borated water subsequently evaporated causing boric acid to precipitate and form obstructions on the nozzles. The nozzles were cleaned and verified to be unobstructed prior to entering Mode 4.

## 5. ASSESSMENT OF SAFETY CONSEQUENCES:

Since the boric acid deposits were friable and easily removed using a pipe cleaner during the inspections, it is expected that CS header water and associated header pressure would dissolve or easily remove the boric acid deposits out of the nozzles, if an actual CS event occurred.

Even if the boric acid deposits were not displaced or dissolved by CS header water pressure and the nozzles remained obstructed, the remaining spray nozzles that were not obstructed in the CS system would have provided the required spray flow. Therefore, each train would have achieved its safety function to rapidly reduce the containment pressure and temperature following a Loss of Coolant Accident (LOCA) or Main Steam Line Break (MSLB) as required by 10 CFR 50 Appendix A General Design Criteria (GDC) 38, Containment Heat Removal. Additionally, each train would have also met its safety function to control the concentrations of fission products, hydrogen, oxygen, and other substances that may be released into the containment atmosphere following a LOCA as required by GDC 41, Containment Atmosphere Cleanup. Therefore, the blockage would not have prevented the fulfillment of any safety function and did not result in a safety system functional failure as defined by 10 CFR 50.73(a)(2)(v). Since the safety functions would have been met, post-accident radiological releases would not have exceeded those evaluated in the associated safety analyses.

The condition described in this LER did not result in any challenges to fission product barriers or in any offsite releases. Therefore, there were no actual adverse safety consequences or implications as a result of this event and the event did not adversely affect the safe operation of the plant or health and safety of the public.

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTAL NUMBER | REVISION NUMBER | |
| **Palo Verde Nuclear Generating Station Unit 3** | 05000530 | 2010 | -- 002 | -- 00 | 4 OF 4 |

17. NARRATIVE

6. CAUSE OF THE EVENT:

The preliminary root cause of the obstruction was that boric acid residue and borated water remained in the CS headers from prior overfill events. The borated water subsequently evaporated causing boric acid to precipitate and form obstructions in the nozzles.

The root cause investigation is continuing. A supplement to this LER will be provided that will describe the cause of the event.

7. CORRECTIVE ACTIONS:

As described above, the obstructed nozzles were cleaned. The nozzles successfully passed the surveillance test procedure prior to entering Mode 4 at the end of the outage. A supplement to this LER will be provided that will describe the actions to prevent recurrence and the extent of condition.

8. PREVIOUS SIMILAR EVENTS

A prior similar event was reported in 2007 under LER 50-530/2007-001-00 in which two CS "A" train nozzles were obstructed by boric acid deposits. The cause of the prior event was a lack of procedural guidance to detect and respond to a CS header overfill event. The respective operator log procedure was revised to require draining of the header if water from the vertical risers approaches the spill over to the CS header. The corresponding safety injection system operating procedure was changed to provide directions for draining the header. Based on experience to that point, the corrective actions did not consider the potential for future nozzle obstruction caused by the borated water that remained in the header.