10 CFR 50.73

A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station

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102-05601-CE/CKS/REB
November 30, 2006

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

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528
License No. NPF-41
Licensee Event Report 2006-005-00

Attached please find Licensee Event Report (LER) 50-528/2006-005-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports the failure of a safety injection system check valve to properly seat.

Arizona Public Service Company makes no commitments in this letter.

In accordance with 10 CFR 50.73(d), 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 James Proctor, Section Leader, Regulatory Affairs, at (623) 393-5730.

Sincerely,

David Mauldin
for Cliff Eubanks

CE/CKS/REB/gt

Attachment

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

IE22

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(6-2004)
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

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4. TITLE

TECHNICAL SPECIFICATION PROHIBITED CONDITION DUE TO CHECK VALVE NOT SEATED

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
10	05	2006	2006	- 005 -	00	11	30	2006		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

3

10. POWER LEVEL

000

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

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☒ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
James Proctor, Section Leader, Regulatory Affairs	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
X	BP	V	B350	Y					

14. SUPPLEMENTAL REPORT EXPECTED

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

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
01	31	2007

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

On October 5, 2006, with Unit 1 in Mode 3, Hot Standby, a safety injection check valve failed to seat properly as indicated by surveillance testing. Safety injection check valve 1PSIEV134 (SI-134) was not in its fully seated position at the time of entry into a condition that required the valve to be OPERABLE.

The check valve is a Borg-Warner (B-W), Model 77790, 12 inch, 1500 lb, ASME Class 2, bonnet hung, swing check valve, located on the low pressure safety injection system (LPSI) cold-leg injection piping inside containment. This check valve functions to protect over-pressurization of the LPSI piping during high pressure safety injection pump operation and functions as a containment isolation valve that is open during certain accident conditions.

The valve internals were replaced and surveillance testing was successfully performed. Preliminary investigation results indicate the valve failure is attributable to frictional forces in excess of the force of gravity acting on the disc assembly which prevented the valve disc from fully seating and sealing on its own.

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

All times are Mountain Standard Time and approximate unless otherwise indicated.

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 the Technical Specifications (TS).

Specifically, on October 5, 2006, at 1123 hours operations personnel increased reactor coolant system (RCS)(EIIS: AB) pressure to greater than 1837 psia with the plant in Mode 3, Hot Standby. The TS requires two trains of emergency core cooling systems (ECCS)(EIIS:BP BQ) to be OPERABLE in this condition. However, safety injection check valve 1PSIEV134 (SI-134)(EIIS: V) was not in its seated position at the time of the transition. Proper operation of the check valve is verified in accordance with TS surveillance requirements (TSRs), which require RCS pressure to be greater than 1600 psia. The most recent successful surveillance test prior to this event was completed on October 8, 2005. TSRs permit mode ascension if the current applicable surveillance requirements are met, which in this case, was the October 2005 surveillance test. Operations personnel were not aware of the status (and could not have known) of the check valve position until 1815 hours on October 5, 2006 when testing of the check valve was conducted and revealed that the valve was not seated.

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

The function of the ECCS is to provide core cooling and negative reactivity to ensure that the reactor core is protected after certain accidents. Two redundant, 100% capacity trains are provided. In MODES 1, 2, and 3, with pressurizer pressure (EIIS: PZR) greater than or equal to 1837 psia or with RCS cold leg temperature (Tc) greater than or equal to 485°F both trains are required to be OPERABLE with each train consisting of High Pressure Safety Injection (HPSI)(EIIS: BQ) and Low Pressure Safety Injection

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(LPSI)(EIIS: BP) subsystems. This ensures that 100% of the core cooling requirements can be provided in the event of a single active failure.

SI-134 is a Borg-Warner (B-W), Model 77790, 12 inch, 1500 lb, ASME Class 2, bonnet hung, swing check valve, located on the LPSI cold-leg injection piping inside containment on the 80 foot elevation. This check valve functions to protect from over-pressurization of the LPSI piping during HPSI pump operation. The check valve opens to allow safety injection and shutdown cooling flow to the RCS, closes to prevent diversion of HPSI flow and to provide isolation/protection of the LPSI discharge piping. This valve also functions as a containment isolation (EIIS: BD) valve that is open during certain accident conditions.

3. INITIAL PLANT CONDITIONS:

On October 5, 2006, Unit 1 was in MODE 3 and activities were in progress to return the plant to power operation following a forced outage to repair pressurizer heaters (EIIS: EHTR). There were no structures, systems, or components that were inoperable at the time of discovery that contributed to this condition.

4. EVENT DESCRIPTION:

On October 5, 2006, at 1708 hours Surveillance Test (ST) 73ST-9SI05, Leak Test of HPSI/LPSI Containment Isolation Check Valves, was being performed following a Unit 1 forced outage. During the performance of section 8.3 of the ST, check valve 1PSIEV134 (SI-134) failed to seal properly. This ST uses a high pressure safety injection (HPSI) pump to pressurize the piping downstream of SI-134 while monitoring leakage to piping upstream of the valve through a drain valve. During the test, the pressure and flow rate through the drain connection was unexpectedly high and the test conditions could not be established and a leak rate could not be determined.

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At 1815 hours SI-134 was declared inoperable and control room personnel entered the applicable TS Required Actions for LCOs 3.0.3 (due to both HPSI trains inoperable), 3.5.3 conditions A and B (LPSI A train and HPSI A train inoperable), 3.6.3 condition A (SI-134 containment isolation function inoperable) and entered the required action for technical requirements manual (TRM) TLCO T3.5.201 condition A (shutdown cooling train A inoperable).

At 1852 hours TS LCOs 3.0.3 and 3.5.3 condition B (for the HPSI A train) were exited when motor operated containment isolation valve SIA-UV-635 (EIIS: INV) was deenergized in its closed position which isolated the piping upstream of SI-134. At 1859 hours TS LCO 3.5.3 condition B was exited for the HPSI B train system following system realignment.

Ultrasonic Test (UT) equipment was used to monitor SI-134 and indicated that the valve disc was in the closed orientation. The plant was cooled down and RCS pressure was decreased to exit the conditions that required two operable ECCS trains and to allow low pressure safety injection (LPSI) A train pump to flush the check valve seat. As forward flow through the check valve was established, UT confirmed that the disc opened and then closed when flow was secured. This verified that the disc was not caught under the valve seat, which had been a previous operating experience concern. The UT did not confirm whether the disc was fully seated.

The unit was cooled down to Mode 4, Hot Shutdown, and on October 6 at 0731 hours TLCO T3.5.201 condition A was exited. Plant management decided to perform maintenance on SI-134 which required the plant to be placed in Mode 5, Cold Shutdown which was achieved on October 6 at 1525 hours. TS LCO 3.6.3 was exited at that time.

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5. ASSESSMENT OF SAFETY CONSEQUENCES:

The condition in which SI-134 did not seal on October 5, 2006 did not result in any challenges to fission product barriers or in any offsite releases. Therefore, there were no actual adverse safety consequences as a result of the valve failure to seal properly.

With SI-134 not in its fully seated position, pressurization of the LPSI piping upstream of SI-134 could occur during accident conditions or an inadvertent safety injection actuation. An engineering calculation has concluded that the affected LPSI piping is qualified for an internal pressure of 1950 psig per the requirements of ASME Section III Appendix F. This pressure bounds the in-service discharge pressure test data of the Unit 1 HPSI pumps taken in both August 2006 and November 2006.

Other aspects of the safety consequences of this event are being evaluated and will be included in the LER supplement.

There were no other failures that rendered a train of a safety system inoperable. The condition would not have prevented the fulfillment of the safety function, and the condition did not result in a safety system functional failure as defined by 10 CFR 50.73(a)(2)(v).

6. CAUSE OF THE EVENT:

An investigation of this event is being conducted in accordance with the PVNGS corrective action program. Preliminary investigation results indicate that the apparent cause of SI-134 failure to properly seal is that frictional forces in excess of the force of gravity acting on the disc assembly prevented the valve disc from fully seating and sealing on its own. Possible areas of friction include the disc to seat landing zone, the spherical bearing outside diameter (OD) against the swing arm bore, and the spherical bearing inside diameter (ID) against the disc stud threads.

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Contributing causes have preliminarily been determined to be:

- Roughness of the valve seat.
- A build up of film on the spherical bearing – CRUD/magnetite that collects in RCS low flow areas.
- Indentations of disc stud threads on the ID of the spherical bearing and a spherical bearing rub mark on the disc stud weld.

A supplement to this LER will be submitted after the investigation has been completed.

No unusual characteristics of the work location (e.g., noise, heat, poor lighting) directly contributed to this event. No personnel or procedural errors have been identified that contributed to this event.

7. CORRECTIVE ACTIONS:

SI-134 was disassembled and inspected. A new bonnet/disc assembly was installed in the valve and the valve passed required testing.

Any additional corrective actions taken as a result of this event will be implemented in accordance with the PVNGS corrective action program.

8. PREVIOUS SIMILAR EVENTS:

LER 50-529/2000-006-01 reported a condition in which a safety injection tank (SIT)(EIIS: TK) discharge check valve did not seat properly. The root cause of that event was reported as a lack of preventive maintenance (PM) activities for the SIT discharge check valves sufficient enough to prevent the unacceptable buildup of contaminants on the spherical bearings and hinge arm joint. Corrective actions from that event were to inspect the 14 inch ECCS check valves however, SI-134 is a 12 inch check valve and was not included in the scope. In 2005 the 12 inch check valves were incorporated into the inspection schedule and SI-134 was scheduled to be inspected during the Unit 1 refueling outage scheduled for the spring of 2007.