Palo Verde Nuclear
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10 CFR 50.73

192-01106-WEI/SAB/REB
May 1, 2002

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-37
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 2000-006-01

Attached please find Licensee Event Report (LER) 50-529/2000-006-01, prepared and submitted pursuant to 10CFR50.73. This LER supplement provides the safety analysis and revises the root cause provided in the original LER submitted to report a Technical Specification Limiting Condition for Operation 3.0.3 entry due to a safety injection tank outlet check valve that was not seated. APS makes no commitments in this submittal.

In accordance with 10CFR50.73(d), a copy of this LER is being forwarded to the Regional Administrator, NRC Region IV and the resident inspector. If you have questions regarding this submittal, please contact Daniel G. Marks, Section Leader, Regulatory Affairs, at (623) 393-6492.

Sincerely,

WEI/SAB/REB/kg

Attachment

cc: E. W. Merschoff (all with attachment)
J. H. Moorman
J. N. Donohew

IE22

NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Palo Verde Nuclear Generating Station Unit 2	05000529	1 OF 5

TITLE (4)

Safety Injection Tank Outlet Check Valve Back-Leakage Causes Degraded Safety Injection Flow

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 NAME	DOCKET NUMBER
11	03	2000	2000	- 006 -	01	05	01	2002	N/A	
									FACILITY NAME: N/A	DOCKET NUMBER:

OPERATING MODE (9)	3
POWER LEVEL (10)	0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Daniel G. Marks, Section Leader, Regulatory Affairs	623-393-6492

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	BQ	V	B350	Y					

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On November 3, 2000, at approximately 1636 Mountain Standard Time (MST), Palo Verde Unit 2 was in Mode 3 (HOT STANDBY) when safety injection tank 2B pressure increased during boration of the cold leg safety injection lines. Operations personnel diagnosed the condition and determined that the safety injection tank 2B outlet check valve (2PSIEV225) was not seated. Since back-leakage through 2PSIEV225 could affect both trains of the high pressure safety injection system, operations personnel entered Technical Specification Limiting Condition for Operation (LCO) 3.0.3. Safety injection tank inventory was used to flush 2PSIEV225 and then reverse flow was used to seat the valve. LCO 3.0.3 was exited at 2352 MST after 2PSIEV225 was returned to an operable status and the HPSI system was returned to its normal alignment.

The root cause was a lack of Preventive Maintenance (PM) activities sufficient enough to prevent the unacceptable accumulation of contaminants around the spherical bearing and hinge pin. Corrective actions include changing the check valve PM program to periodically inspect the safety injection tank outlet check valves.

Previous similar events involving safety injection check valves have been reported.

1. REPORTING REQUIREMENT(S):

APS is reporting this condition pursuant to 10CFR50.73(a)(2)(i)(B) because entry into Technical Specification (TS) Limiting Condition for Operation (LCO) 3.0.3 for any reason or justification is reportable as a TS prohibited operation or condition.

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

2PSIEV225

2PSIEV225 (EIIS: BQ, V) is a Borg-Warner ASME Class 1, 14 inch pressure operated stainless steel swing check valve (model 77810). The valve consists of: a body assembly with a hardfaced (stainless steel) seat; a bonnet, arm and disc assembly which includes a bonnet assembly (a bonnet and a clevis), a disc, an arm, bushings, a pivot pin, a ball, and a stud; a bonnet retainer; a bonnet spacer or a bonnet clamp; a seal; and associated attaching hardware.

Emergency Core Cooling System (ECCS)

The ECCS, of which the high pressure safety injection (HPSI)(EIIS: BQ) is a subsystem, is designed to provide core cooling in the unlikely event of a loss-of-coolant accident (LOCA). 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 the core subcritical during the extended period of time following a LOCA.

The ECCS accomplishes these functional requirements by use of redundant active and passive injection subsystems. The active portion consists of high and low pressure safety injection pumps and associated valves. The passive portion consists of four pressurized safety injection tanks (SIT) (EIIS: BP). During an event requiring ECCS actuation, a flow path is required to supply water from the refueling water tank (RWT)(EIIS: BQ) to the reactor coolant system (RCS)(EIIS: AB) via the HPSI pumps and their respective supply headers to each of the four cold legs.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2000	- 006 -	01	3 OF 6

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

3. INITIAL PLANT CONDITIONS:

Prior to the event, on November 3, 2000, at approximately 1619 MST, Palo Verde Unit 2 was in Mode 3 (Hot standby) with RCS pressure > 1837 pounds per square inch absolute (psia). Startup activities were being performed following completion of the ninth Unit 2 refueling outage. At the start of the event, the "A" train HPSI system was operable and the "B" train HPSI system was inoperable as it was aligned to borate the cold leg portion of the safety injection piping.

4. EVENT DESCRIPTION:

On November 3, 2000, at approximately 1619 MST, operations personnel (utility-licensed operators) declared the "B" train HPSI system inoperable when it was aligned to borate and pressurize the cold leg injection lines in accordance with operating procedures.

At 1636 MST, operations personnel observed rising pressure and level in SIT "2B". When pressure was observed to be above 643 pounds per square inch gauge (psig) and level had increased from 50 to 56 percent on narrow range instrumentation, operations personnel declared SIT 2B inoperable and entered TS Limiting Condition for Operation (LCO) 3.5.1 "Safety Injection Tanks – Operating" condition B. Cold leg boration activities were halted and corrective measures were implemented per the applicable alarm response procedure.

Based on procedural guidance, operations personnel determined that SIT 2B outlet check valve 2PSIEV225 was not seated. TS LCO 3.4.15 "RCS Pressure Isolation Valve Leakage" condition A was entered because 2PSIEV225 is a pressure isolation valve and TS LCO 3.0.3 was entered because excessive leakage past 2PSIEV225 could affect the available train "A" HPSI system's ability to provide minimum safety injection flow.

At 2036 MST, compliance with TS LCO 3.4.15 Required Action A.1 was achieved when operations personnel confirmed that cold leg loop "2B" check valve 2PSIEV227 was isolating the high and the low pressure systems.

At 2105 MST, HPSI system injection valves 2JSIBHV626 and 2JSIAHV627 were closed and down-powered, effectively isolating SIT 2B outlet check valve 2PSIEV225 from the HPSI system and precluding potential damage to SIT 2B in the event of a safety injection system actuation. An engineering action plan to seat 2PSIEV225 was developed, reviewed and approved. The plan allowed limited SIT inventory to forward flow through 2PSIEV225 to the refueling water tank (RWT)(EIIS: BQ, TK) and then the HPSI "B" pump would be used to provide limited reverse flow against 2PSIEV225 to seat the valve.

The engineering action plan was implemented and at 2138 MST, differential pressure across 2PSIEV225 demonstrated the valve was seated and capable of preventing back-leakage. An additional back-leakage test of 2PSIEV225 was completed at 2340 MST, which confirmed 2PSIEV225 was seated.

By 2352 MST, power had been restored to HPSI system injection valves 2JSIBHV626 and 2JSIAHV627, HPSI systems "A" and "B" and SIT 2B had been declared operable, and Unit 2 had exited LCO 3.0.3 and Condition B of LCO 3.5.1.

At 0932 MST, on November 4, 2000, LCO 3.4.15 was exited when surveillance testing demonstrated that measured leakage past 2PSIEV225 was < 1 gallon per minute.

5. ASSESSMENT OF SAFETY CONSEQUENCES:

The temporarily degraded SIT 2B outlet check valve did not result in any challenges to the fission product barriers or result in any offsite releases. Therefore, there were no actual adverse safety consequences as a result of this condition.

In addition, an evaluation was performed to assess the potential safety significance of the condition. Failure of the SIT isolation check valve would have resulted in over-pressurization of the tank in the event that a design basis accident occurred that subsequently initiated a SIAS (i.e., HPSI pump start).

The maximum tank pressure would have been approximately 1700 psig in the event that the HPSI pumps started on a SIAS during an event in which the RCS pressure remained at or above the HPSI pump shut-off head. The design pressure of this tank is 700 psig.

However, the maximum pressure would have resulted in vessel wall stress levels well below the tensile strength of the material. Hence, it is reasonable to assume that the tank would have remained intact.

HPSI system performance was also assessed in order to determine the expected injection flow during accident conditions with the degraded check valve condition. The calculated delivery curve identified that, for RCS pressures above the SIT relief valve set-pressure, the delivered HPSI flow would have been significantly less than the flow rates currently assumed in the UFSAR Chapter 6 LOCA analyses. However, the resultant HPSI delivery flow rates are greater than that established for the Unit 2 HPSI pump discharge check valve failures (2PSIAV404 / 2PSIBV405), previous reported in LERs 50-529/2000-005, 50-528/1998-006-01. That delivery curve produced acceptable peak cladding temperature results using the realistic SBLOCA methodology. Consequently, for those LOCA scenarios where SIT function is not credited (i.e., small breaks), these results suggest that the consequences of that particular event were acceptable.

The only other event, which requires HPSI injection at elevated RCS pressure conditions, is the main steam line break. The consequences of degraded HPSI flow have been previously evaluated (see Section 8-Previous Similar Events) and were determined to be acceptable.

No automatically or manually initiated safety system actuations occurred and none were required. The condition would not have prevented the fulfillment of a safety function and the condition did not result in a safety system functional failure as defined by 10CFR50.73(a)(2)(v).

6. CAUSE OF THE EVENT:

The investigation into the condition concluded that the probable direct cause for SIT 2B discharge check valve failing to fully seat was due to binding in the spherical bearing resulting from a buildup of contaminants on and around the spherical bearing.

The root cause was determined to be 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.

7. CORRECTIVE ACTIONS:

SIT inventory was used to flush (forward flow) through 2PSIEV225 and then a HPSI pump was used to provide limited reverse flow to seat the valve. Back-leakage testing was completed at 2340 MST on November 3, 2000 which confirmed that 2PSIEV225 was seated.

To prevent recurrence, corrective actions include changing the PM program to require periodic inspection of the SIT outlet check valves and the RCS loop check valves, which are identical to the SIT outlet check valves. In addition, other check valves with a safety function to close are being evaluated to determine if changes to the PM program are needed.

8. PREVIOUS SIMILAR EVENTS:

Previous similar events involving ECCS check valve back-leakage have been reported (e.g., LERs 50-529/2000-005, 50-528/1998-006-01). The causes of these events did not include contaminant build-up on the spherical bearing and the corrective actions would not be expected to prevent the SIT outlet check valve condition.