

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Palo Verde Unit 2	DOCKET NUMBER (2) 05000529	PAGE (3) 1 OF 4
---	--------------------------------------	---------------------------

TITLE (4)
Manual reactor trip due to vibration and bearing temperature increases in reactor coolant pump

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
1	0	2	0	9	7	9	7	-	0
				0	0	6	-	0	0
									1
									1
									2
									9
									7
									N/A
									N/A

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)							
1		20.402(b)		20.405(c)		<input checked="" type="checkbox"/>		50.73(a)(2)(v)	
POWER LEVEL (10)		20.405(a)(1)(i)		50.38(c)(1)				73.71(b)	
1		20.405(a)(1)(i)		50.38(c)(2)				73.71(c)	
0		20.405(a)(1)(ii)		50.73(a)(2)(i)				OTHER (Specify in Abstract below and in Text, NRC Form 388A)	
		20.405(a)(1)(iv)		50.73(a)(2)(ii)					
		20.405(a)(1)(v)		50.73(a)(2)(iii)					

LICENSEE CONTACT FOR THIS LER (12)		TELEPHONE NUMBER	
NAME		AREA CODE	
Daniel G. Marks, Section Leader, Nuclear Regulatory Affairs		6	
		0	
		2	
		3	
		9	
		3	
		-	
		6	
		4	
		9	
		2	

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
X	A	B	P	C	4	9	0	N	

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

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

On October 20, 1997, at approximately 1050 MST, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION), operating at approximately 100 percent power when Control Room personnel initiated a manual reactor trip following vibration and bearing temperature increases in reactor coolant pump (RCP) 2B. No other safety system actuations occurred and none were required. At approximately 1051 MST, Control Room personnel secured and quarantined RCP 2B. The event was classified as an uncomplicated reactor trip.

An engineering evaluation determined that the apparent root cause is attributed to a failed lower journal bearing. The most probable cause of the bearing failure was intrusion of debris. The source and composition of the debris is unknown. As corrective action, the bearing assembly was disassembled, inspected, and rebuilt. A metallurgical examination of the bearing pads, shaft protection sleeve, and debris collected from the bearing assembly is currently ongoing.

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

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE	
Palo Verde Unit 2		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		9 7	- 0 0 6	- 0 0	0 2	of 0 4
0 5 0 0 0 5 2 9						

TEXT

1. REPORTING REQUIREMENT:

This LER 529/97-006-00 is being written to report an event that resulted in a manual actuation of the Reactor Protection System (RPS) (JC) as specified in 10 CFR 50.73(a)(2)(iv).

Specifically, at approximately 1050 MST on October 10, 1997, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) operating at approximately 100 percent power when a manual reactor (AC) trip was initiated by Control Room personnel following vibration and bearing temperature increases in reactor coolant pump (RCP) (AB) 2B. No other safety system actuations occurred and none were required.

2. EVENT DESCRIPTION:

Prior to the event, at approximately 1013 MST on October 20, 1997, Control Room personnel received a high temperature alarm for RCP 2B's lower journal bearing. The temperature exceeded the RCP trip setpoint as specified in an approved RCP abnormal operating procedure. Initially, Control Room personnel could not validate the alarm since no other RCP 2B parameters indicated adverse trends. At approximately 1030 MST, Control Room and Engineering personnel validated the RCP 2B lower journal bearing high temperature anomaly when RCP 2B thrust bearing, upper radial bearing, and RCP oil sump temperatures as well as RCP 2B vibration began to increase. Following a tailboard, at approximately 1050 MST, Control Room personnel manually tripped the reactor. At approximately 1051 MST, Control Room personnel secured RCP 2B. RCP 2B was quarantined in accordance with an approved procedure.

All safety systems functioned as required. There were no safety system actuations and none were required. At approximately 1059 MST, the Shift Supervisor classified the event as an uncomplicated reactor trip. At approximately 1615 MST, Control Room personnel commenced reactor coolant system (AB) cooldown and proceeded with the Mode 3 (HOT STANDBY) to Mode 5 (COLD SHUTDOWN) entry procedure in order to facilitate RCP troubleshooting and repairs.

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

The manual reactor trip did not result in a transient more severe than those already analyzed in the updated Final Safety Evaluation Report Chapters 6 and 15. The primary system and secondary pressure boundary limits were not approached and no violations of the specified acceptable fuel design limits (SAFDL) occurred.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE		
Palo Verde Unit 2		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		9 7	- 0 0 6	- 0 0	0 3	of	0 4

TEXT

The event did not result in any challenges to the fission product barriers or result in any release of radioactive materials. Therefore, there were no adverse safety consequences or implications as a result of this event. This event did not adversely affect the safe operation of the plant or health and safety of the public.

4. CAUSE OF THE EVENT:

An independent investigation of this event is being conducted in accordance with the APS Corrective Action Program. The cause of the reactor trip was due to a manual initiation of the RPS by Control Room personnel following vibration and bearing temperature increases in RCP 2B. An engineering evaluation has determined that the apparent root cause is attributed to a failed lower journal bearing (SALP Cause Code E: Component Failure). The cause of the component failure and the failure mode, mechanism, and effect of the failed component is discussed in Section 5.

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

5. STRUCTURES, SYSTEMS, OR COMPONENTS INFORMATION:

APS Engineering personnel have reviewed the failure of RCP 2B lower journal bearing and have determined that the most probable cause was intrusion of debris into the interface between the lower journal bearing pads and the shaft protection sleeve. The source and composition of the debris material is unknown.

A preliminary evaluation has determined that the apparent failure mechanism appears to be a very small particle of hard material which caused increased friction between the bearing pad faces and the shaft protection sleeve. As the pump shaft rotated, it rolled the material around the shaft, gouging the surface of the shaft protection sleeve and the bearing pads, entraining metal from the shaft protection sleeve and the pads, aggravating the extent of the damage. The increased friction generated additional heat which ultimately resulted in partial melting of the bearing babbit material as evidenced by the physical inspection of the bearing pads.

There were no indications that any structures, systems, or components were inoperable at the start of the event which contributed to this event. No failures of components with multiple functions were involved. No failures that rendered a train of a safety system inoperable were involved.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE	
Palo Verde Unit 2		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		97	- 006	- 00	04	of 04

TEXT

RCP 2B is manufactured by CE-KSB and model number is Type R01.

6. CORRECTIVE ACTIONS TO PREVENT RECURRENCE:

An independent investigation of this event is being conducted in accordance with the APS Corrective Action Program. Actions to prevent recurrence were developed based upon the results of the investigation and are being tracked to completion under the PVNGS Commitment Action Tracking System. These actions include:

1. The bearing assembly was disassembled, inspected, and rebuilt.
2. Oil samples were taken from all four RCPs. There was no abnormal material in RCPs 1A, 1B, and 2A.
3. A metallurgical examination of the bearing pads, shaft protection sleeve, and debris collected from the bearing assembly is currently ongoing.
4. The oil supply reservoir, external to the thrust bearing assembly, was cleaned and inspected. The oil lift pump suction strainer and discharge filters were replaced.

If information is developed that would significantly change the readers' understanding or perception of the implications of the event, a supplement will be submitted.

7. PREVIOUS SIMILAR EVENTS:

No other previous events have been reported pursuant to 10 CFR 50.73 where the reactor was manually tripped due to a failed RCP bearing assembly in the last three years.

8. ADDITIONAL INFORMATION:

Based on the contingency action plan and on reviews by the Plant Review Board, the Management Response Team, and the Incident Investigation Team, unit restart was authorized by the Operations Director in accordance with approved procedures. At approximately 1611 MST on October 28, 1997, Unit 2 entered Mode 2 (STARTUP); at approximately 2135 MST on October 28, 1997, Unit 2 entered Mode 1; and at approximately 2343 MST on October 28, 1997, Unit 2 was synchronized on the grid.

