

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Palo Verde Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 5 2 8 1										PAGE (3) 1 OF 4																															
TITLE (4) Reactor Trip on Low SG Level Due to Feedwater Pump Control Circuitry Anomaly																																																			
EVENT DATE (5)						LER NUMBER (6)						REPORT DATE (7)						OTHER FACILITIES INVOLVED (8)																																	
MONTH		DAY		YEAR		YEAR		SEQUENT. AL. NUMBER		REVISION NUMBER		MONTH		DAY		YEAR		FACILITY NAMES																																	
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OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)																																																	
1		20.402(b)										20.405(c)										<input checked="" type="checkbox"/> 50.73(a)(2)(iv)										73.71(b)																			
POWER LEVEL (10)		0 1 8										20.405(a)(1)(i)										50.36(c)(1)										50.73(a)(2)(v)										73.71(c)									
												20.405(a)(1)(ii)										50.36(c)(2)										50.73(a)(2)(vi)										OTHER (Specify in Abstract below and in Text, NRC Form 366A)									
												20.405(a)(1)(iii)										50.73(a)(2)(i)										50.73(a)(2)(vii)(A)																			
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LICENSEE CONTACT FOR THIS LER (12)																																																			
NAME																		TELEPHONE NUMBER																																	
William F. Quinn, Manager - Nuclear Licensing (Extension 4087)																		AREA CODE				6 0 2 9 4 3 - 7 2 0 0																													
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																																																			
CAUSE		SYSTEM		COMPONENT		MANUFACTURER		REPORTABLE TO NPDs				CAUSE		SYSTEM		COMPONENT		MANUFACTURER		REPORTABLE TO NPDs																															
SUPPLEMENTAL REPORT EXPECTED (14)																		EXPECTED SUBMISSION DATE (15)				MONTH		DAY		YEAR																									
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)																		<input checked="" type="checkbox"/> NO																																	

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

On March 7, 1986, at 1857, with Unit 1 operating in Mode 1 (POWER OPERATION) at 18% power, an automatic reactor trip occurred due to a low level condition in steam generator No. 2. Following the trip, all systems and equipment operated as required, and plant conditions were stabilized at 1910. There were no inoperable structures, components, or systems at the start of this event that contributed to the event.

The event was initiated by an anomaly in the speed control circuitry for main feedwater pump A, which resulted in a decrease in pump speed and feedwater flow. The root cause of this anomaly is suspected to be a circuit board in the speed control circuitry for main feedwater pump A which causes a partial closing of the throttle valve to the pump's steam-driven turbine. As corrective action, the circuit board will be replaced.

A supplemental report is not planned unless further investigation identifies a different root cause. The root cause of this event is suspected to be the same as the root cause of the anomaly described in a previous event reported in LER 86-020-00. Component failure information will be provided in the supplement to that LER.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

FACILITY NAME (1) Palo Verde Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 5 2 8	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 6	— 0 1 8	— 0 0	0 2	OF	0 4

TEXT (If more space is required, use additional NRC Form 366A's) (17)

On March 7, 1986, at 1857, with Unit 1 operating in Mode 1 (POWER OPERATION) at approximately 18% power, an automatic reactor (RCT) trip occurred due to a low level condition in steam generator (SG) No. 2. Following the reactor trip, all equipment and systems operated as required, and reactor coolant system (RCS) (AB) parameters were stabilized at 1910. There were no inoperable structures, components, or systems at the start of this event that contributed to the event.

Prior to this event, Unit 1 was performing a controlled shutdown from 90% power to initiate a planned outage. Steam-driven main feedwater pumps (MFP) (P) A and B and their associated main feedwater pump turbines (MFPT) (TRB) were operating. MFP A was then taken out-of-service for performance of a hot pump alignment check (this was a carryover requirement from the preoperational testing program). Following the performance of the alignment, MFPT A would not initially come up to speed when restarted. A vendor representative was dispatched to troubleshoot the problem (note that a similar problem with MFPT A was reported in LER 86-020-00, and since that event, MFPT A has been closely monitored by both utility and vendor personnel in an attempt to determine the cause of this anomaly). The overspeed trip mechanism was exercised to reset MFPT A's speed controls (JK). The turbine was then restarted and accelerated normally, but could not be taken to full speed using manual speed control due to an anomaly which prevented the MFPT A throttle valve from fully opening. The governor (65) controls were then inspected, and nothing unusual was identified. MFPT A was then restarted and operated normally. MFP A was returned to service at 1818. At 1819, with power below 45%, MFP B was taken out-of-service for performance of its hot pump alignment check.

During the time that MFP A was supplying all feedwater, its operation was monitored by a utility operations engineer. An anomaly was observed as indicated by throttle valve (SCV) going partially closed. However, the throttles then reopened, and SG level was stabilized. Due to this observed anomaly, the utility operations engineer recommended a more rapid power reduction. The shift supervisor (utility-licensed) concurred and accelerated the controlled shutdown of the plant. At 1852, the MFPT anomaly recurred as indicated by the throttle valves going partially closed, and pump speed decreasing. Manual control was taken of MFPT A, but the pump did not respond. SG levels continued to decrease, and the non-essential auxiliary feedwater (AFW) (BA) pump was started at 1855. The main turbine was manually tripped at 1856; however, SG levels could not initially be recovered due to the expected shrink which occurred as a result of the addition of relatively colder auxiliary feedwater. The reactor automatically tripped at 1857 from 18% power due to a low level condition in SG NO. 2. Plant conditions were subsequently stabilized at 1910.

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APPROVED OMB NO 3150-0104

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FACILITY NAME (1) Palo Verde Unit 1	DOCKET NUMBER (2) 05000528	LER NUMBER (6)			PAGE (3)		
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

The decision to rely on MFP A for all feedwater when reactor power was below 45%, was based on the limited data obtained from the previous event (LER 86-020-00) involving this anomaly. The MFPT receives steam from two sources; high pressure steam from the main steam header, and hot reheat steam from the supply steam to the low pressure turbine. The anomaly has been observed to be associated with MFPT A's throttle valve operating cylinder position feedback circuit, and results in the throttles closing to a position that effectively results in only hot reheat steam supplying the MFPT. This is automatically compensated for by an increase in the speed demand signal to the throttle valve. However, in single pump operation at power levels greater than 50%, the operating cylinder position feedback signal is great enough to result in saturation of the compensating speed demand signal (i.e., further increases in speed demand will not result), and sufficient feedwater flow cannot be maintained. Based on this information, operations engineering estimated that the compensating speed demand signal would not be saturated if the anomaly were to occur with MFP A supplying all feedwater at power levels below 45%. When the anomaly occurred in this event, the compensating speed demand signal did not saturate, but hot reheat steam pressure/volume was not high enough to maintain MFPT A speed, resulting in insufficient feedwater flow. The original estimation had been based on a hot reheat steam pressure/volume which is available at 100% power.

An objective of the controlled shutdown of Unit 1 was to facilitate troubleshooting of MFPT A speed control circuitry. The intent was to shift feedwater supply to the auxiliary feedwater system following completion of hot pump alignment of MFP B, and then test MFPT A speed control circuit boards (CPU) while steam was available to operate the MFP. The root cause of the anomaly is suspected to be a component in one of these speed control circuit boards which causes the partial closing of MFPT A's throttle valve. As corrective action, the suspected circuit board will be replaced. A supplemental report is not planned for this LER unless a different root cause is identified. However, since the root cause of this event is suspected to be the same as the root cause of the feedwater anomaly described in LER 86-020-00, component failure information will be provided in the supplement to LER 86-020-00. This supplement is expected to be submitted by June 6, 1986, since the ongoing outage must be completed and testing of MFP A will then be performed to ensure the problem has been corrected.

There are no unanalyzed safety consequences or implications associated with this event since feedwater was available throughout the event from the auxiliary feedwater system, and the reactor protection system (JC) functioned as designed and tripped the reactor at the SG low level setpoint. Observation of this anomaly under 2 pump operating conditions has verified that the decrease in feedwater flow, that occurs when MFPT A throttles partially closed, is automatically compensated for by an increase in flow from MFP B. Therefore, the anomaly has not limited plant operation since procedurally, both MFP's must be operating prior to exceeding 50% power.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

There were no personnel errors associated with this event. Existing procedures were adequate and were complied with. There was no impact on public health and safety associated with this event. Automatically initiated safety features responded correctly.

Should this event occur in other operating units at Palo Verde, appropriate evaluations will be initiated consistent with plant operating conditions.



Arizona Nuclear Power Project

P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

April 7, 1986
ANPP-35961-EEVB/BJA/98.05

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528 (License NPF-41)
Licensee Event Report - 86-018-00
File: 86-020-404

Dear Sirs:

Attached please find Licensee Event Report (LER) No. 86-018-00 prepared and submitted pursuant to 10 CFR 50.73. In accordance with 10 CFR 50.73(d), we are herewith forwarding a copy of the LER to the Regional Administrator of the Region V Office.

If you have any questions, please contact me.

Very truly yours,

E. E. Van Brunt, Jr.
Executive Vice President
Project Director

EEVB/BJA/rw
Attachment

cc: J. B. Martin (all w/a)
R. P. Zimmerman
A. L. Hon
E. A. Licitra
A. C. Gehr
INPO Records Center

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