

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Palo Verde Unit 2										DOCKET NUMBER (2) 0 5 0 0 0 5 2 9					PAGE (3) 1 OF 05	
TITLE (4) Reactor Trip Due to Low Steam Generator Level Accompanied by AFAS Actuation																
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				DOCKET NUMBER(S)			
									N/A				0 5 0 0 0			
0 9	2 3	8 6	8 6	0 4 9	0 0	1 0	2 2	8 6	N/A				0 5 0 0 0			
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)(iv)				73.71(b)		
POWER LEVEL (10)		20.405(a)(1)(i)				50.36(c)(1)				50.73(a)(2)(v)				73.71(c)		
0 4 0		20.405(a)(1)(ii)				50.36(c)(2)				50.73(a)(2)(vii)				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)(viii)(A)						
		20.405(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)						
		20.405(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(ix)						
LICENSEE CONTACT FOR THIS LER (12)																
NAME										TELEPHONE NUMBER						
Thomas R. Bradish, Compliance Supervisor (Ext. 6936)										6 0 2 9 3 2 - 5 3 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)

At approximately 1508 MST on September 23, 1986, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) at 40 percent power, when an automatic reactor protection system actuation initiated a reactor trip due to low level in steam generator (SG) #1. Following the trip, an Auxiliary Feedwater Actuation Signal (AFAS) was received.

The root cause of the event was an inadequate operating procedure which allowed the securing of both heater drain pumps (HDP) without ensuring adequate water volume in the condenser hotwells. This action led to the main feedwater pump "A" trip and the resultant reactor trip due to low level in SG #1. All safety systems operated as designed and the trip was evaluated as uncomplicated in accordance with the applicable procedure.

To prevent recurrence, the following actions will be taken. The operating procedures for securing the HDPs will be revised to state that adequate volume in the condenser hotwells must be verified prior to securing the pumps and the appropriate operator training course will be revised to emphasize this issue.

No similar events have been previously reported.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO 3150-0104

EXPIRES 8/31/88

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

At approximately 1508 MST on September 23, 1986, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) at 40 percent power when an actuation of the Reactor Protection System (RPS)(JC) initiated a reactor (RCT) trip due to low level in Steam Generator (SG)(AB)(SG) #1. Following the reactor trip, an Auxiliary Feedwater Actuation Signal (AFAS)(JE) was received. The reactor trip was annunciated and responded to by operators (utility-licensed) in the control room. All safety systems and components operated as designed.

The initial plant conditions prior to the reactor trip, included Main Feedwater Pump (MFP)(SJ)(P) "A" supplying both SGs and Circulating Water (KE) loop "B" isolated to allow for repair of tube leaks in condenser (SG)(COND) "1B". The inventory of the non-isolated condenser hotwell was on the low end of the normal operating band. At 1503 both running Heater Drain Pumps (HDP)(SN)(P) were manually secured in accordance with an approved procedure by an operator (utility-licensed) to support a corrective maintenance effort. The unit is designed to operate up to 80% rated thermal power with no HDPs and three (3) condensate pumps running and up to 60% rated thermal power with no HDPs and two (2) condensate pumps running.

With both HDPs secured, the condensate inventory collects in the Heater Drain Tanks (HDT) as designed instead of being directed to the suction of the MFP. This water is not available to the condenser hotwell until the HDT level is high enough for high level control to dump to the condenser. When water begins dumping to the condenser from the HDTs, sufficient water is transferred to the hotwell to maintain the necessary volume required by the condensate pumps. In this instance however, the initial volume in the hotwell was not sufficient to allow for filling of the HDTs to the high level dump setpoint. The combination of a lower condenser hotwell level together with the securing of both HDPs led to the low condenser level trip of condensate pumps (SG)(P) "A" and "B". This condition caused the MFP "A" trip due to low suction pressure. This resulted in the reactor trip due to low level in SG #1.

Following the reactor trip, an AFAS-1 signal was received for SG #1 which initiated the starting of both essential Auxiliary Feedwater Pumps (AFP)(BA)(P). Both AFPs were automatically aligned to feed SG #1. An operator (utility-licensed) concurrently started the non-essential AFP (SJ)(P) and fed SG #2. The water level in SG #2 never reached the AFAS-2 setpoint. The two essential AFPs returned SG #1 water level above the AFAS setpoint and the essential Auxiliary Feedwater Valves (BA)(V) automatically closed. The non-essential AFP was then utilized to feed both SGs and stabilize the plant.

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

The root cause of the event was an inadequate operating procedure which allowed the securing of the HDPs without specifying the minimum required level in the hotwell. In order to prevent recurrence, the HDP operating procedures (all 3 units) will be revised to state that when the HDPs are shutdown, the water level in the heater drain tanks will increase to the high level dump valve control setpoint and that adequate volume in the condenser hotwells must be ensured prior to this operation. Additionally, an engineering evaluation has been completed which identifies a minimum level required to be in the condenser hotwell prior to shutdown of both HDPs. This level will be incorporated into the HDP procedures. The appropriate lesson plan will be revised to emphasize this issue and will be utilized in the next training cycle.

The event was diagnosed in accordance with approved procedures as an uncomplicated reactor trip and the appropriate Recovery Operation Procedure was implemented. Plant conditions were stabilized at approximately 1530. The duration of the event was approximately 27 minutes.

There were no structures, components, or systems, other than those previously discussed, that were inoperable at the start of the event which contributed to the event.

The following timeline indicates the sequence of events:

SEQUENCE OF EVENTS

<u>TIME</u>	<u>DESCRIPTION OF EVENT</u>
15:03:18	Heater drain pump "A" manually secured
15:03:42	Heater drain pump "B" manually secured
15:04:00	Condenser hotwell level "2C" decreased to Lo level
15:04:58	Condenser hotwell level "2C" decreased to Lo-Lo level
15:06:46	Condensate pumps "A" and "B" trip due to low condenser level
15:06:47	Main feedwater pump "A" trip signal received due to low suction pressure (15 sec time delay prior to pump trip)
15:07:04	Heater drain pumps "A" and "B" restarted by Operations

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

15:07:07 Main feedwater pump "A" tripped

15:07:16 Condensate pump "A" restarted by Operations

15:07:20 Condensate pump "B" restarted by Operations

15:08:00:615 Lo SG #1 Channel "B" (RPS) - Trip

15:08:02:156 Lo SG #1 Channel "A" (RPS) - Trip

15:08:02:189 Lo SG #1 Channel "D" (RPS) - Trip

15:08:02 Reactor Trips Due to Low Level in SG #1

15:08:02:389 Reactor Trip Initiated Turbine Trip

15:08:02:611 Lo SG #2 level Channel "B" (RPS) - Trip

15:08:02:719 Lo SG #2 level Channel "C" (RPS) - Trip

15:08:03:193 Lo SG #2 level Channel "D" (RPS) - Trip

15:08:03:195 Lo SG #2 level Channel "A" (RPS) - Trip

15:08:03:209 Lo SG #1 level Channel "C" (RPS) - Trip

15:08:55:000 Lo SG #1 level Channel "B" (AFAS) - Trip

15:08:58:465 Lo SG #1 level Channel "A" (AFAS) - Trip

15:08:59:797 Lo SG #1 level Channel "C" (AFAS) - Trip

15:08:59 AFAS-1 A Leg 1-3 - Trip  
AFAS-1 A Leg 2-4 - Trip  
AFAS-1 B Leg 1-3 - Trip  
AFAS-1 B Leg 2-4 - Trip  
(Essential Auxiliary Feedwater Pumps  
Started)

15:09:02:203 Lo SG #1 level Channel "D" (AFAS) - Trip

15:11:02 Level in SG #1 increases to above AFAS-1  
Setpoint

15:30 Level in Both Steam Generators Restored to  
Approximately 50% Wide Range. Plant Stabilized  
in Mode 3 (Hot Standby).

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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EXPIRES 8/31/88

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

The Sequence of Events (SOE) alarm processing program (IQ) runs on the Plant Monitoring System (PMS) (ID) with the highest priority. SOE alarm times are considered to be accurate. Non-SOE alarms are accumulated in memory buffers. As PMS Central Processing Unit (CPU) time becomes available the buffered data is output to the alarm (ALM) typer. For that reason the times associated with information received from the non-SOE alarm typer may not reflect actual times of the events.

The events described above were identified by control room alarms or through subsequent evaluations.

Operator (utility-licensed) actions during this event were proper and in accordance with approved procedures. All safety systems and components operated as designed, and no fission product boundaries were challenged; therefore, this event did not adversely affect the safe operation of the plant or the health and safety of the public.

All potential safety concerns were evaluated and properly dispositioned prior to returning the unit to power operation.

No similar events have previously been reported.



## Arizona Nuclear Power Project

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ANPP-00090-JGH/TDS/TJB/96.03

October 22, 1986

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

Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Unit 2  
Docket No. STN 50-529  
Licensee Event Report-86-049-00  
File: 86-020-404

Dear Sirs:

Attached please find Licensee Event Report (LER) No.86-049-00 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 T. R. Bradish, Compliance Supervisor at (602)932-5300 Ext.6936.

Very truly yours,

J. G. Haynes  
Vice President  
Nuclear Production

JGH/TJB/cld  
Attachment

cc: O. M. DeMichele (all w/a)  
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