NRC Form 366 (9-83)				LIC	ENSEE	EVE	NT RE	PORT	(LER)	U.S. NU	CLEAR REGUL APPROVED ON EXP:RES: 8/31/	ATORY COMMIS AB NO. 3150-0104 88	SION
FACILITY NAME (1)								D	OCKET NUMBER	(2)	PAGE	(3)
Palo	Verd	ie Un	it 2						0	0 5 0 0	015121	9 1 OF	016
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Inva	Invalid Floating Foint Fault in core Protection Calculator Cause						· Causes	s Reactor Trip					
MONTH DAY	YEAR	YEAR	SEQUENTIAL	REVISION	MONTH	DAY	YEAR		FACILITY NAM	ES	DOCKET NUM	BER(S)	
			NUMBER	NUMBER				N/A			0 5 0	01011	1
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POWER		20.4	02(b) 05(a)(1)(i)	-	20.405(c))		X	50.73(a)(2)(iv)		73.71(b)		833
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		20.4	05(a)(1)(iii)		50.73(e)((2)(i)			50.73(a)(2)(viii)(A)	below an 366A)	d in Text, NRC F	form
		20.4	05(a)(1)(iv)		50.73(a)(2)(ii)			50.73(a)(2)(viii)(8)	,			
	l	20.4	05(s)(1)(v)		50.73(a)(2)(iii)			50.73(a)(2)(x)				
NAME				L	ICENSEE C	ONTACT	FOR THIS	LER (12)		1	TELEPHONE N	UMBER	
Thom	as R.	. Bra	dish, Com	pliance	Supe	rviso	or (E	ct. 60	936)	AREA CODE	91312	-151310	010
			COMPLETE	ONE LINE FOR	EACH CO	MPONENT	FAILURE	DESCRIBE	D IN THIS REPORT	(13)		1	
CAUSE SYSTEM	COMPO	NENT	MANUFAC TURER	REPORTABLE TO NPRDS			CAUSE	SYSTEM	COMPONENT	MANUFAC- TURER	REPORTABL TO NPRDS	E	
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ABSTRACT /Limit to	0 1400 spe	Ces	proximately fifteen	single-space type	A written line	NO (16)							
At 0215 on July 25, 1986, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) operating at approximately 50 percent power when a reactor trip occurred due to a Core Protection (CPC) generated High Local Power Density trip. In order to perform a power ascension test, Core Protection Calculator (CPC) channel "D" was placed in bypass. Due to equipment problems with a temperature element, CPC channel "A" was placed in the tripped position until the test could be completed. An invalid floating point fault in CPC channel "C" caused the channel to perform an automatic restart and trip. This resulted in a reactor trip. Resolution of the root cause of the CPC auto restarts is an on-going effort. Auto restarts are not expected to be eliminated entirely at Palo Verde or other CPC plants. This fact is recognized in the CPC design and its associated surveillance and startup testing programs.													
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NRC Form 366

LICENSEE EVE	NT REPORT	(LER) TEXT	CONTINUATION
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U.S. NUCLEAR REGULATORY COMMISSION APPROVED OMB NO. 3150-0104

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FACILITY NAME (1)	DOCKET NUMBER (2)		PAGE (3)							
		YEAR		NUMBER		NUMBER		Τ		
Palo Verde Unit 2	0 15 10 10 10 1 5 2 19	816	-	01417	-	010	012	OF	0	16
TEXT /N more space is manipul use additional NBC from SHEA's (117)			-		-					-

At 0215 on July 25, 1986, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) operating at approximately 50 percent power when a reactor trip occurred due to a Core Protection Calcualtor (CPC)(JC)(CPU) generated High Local Power Density (LPD) trip.

In order to perform power ascension test procedure (channel "D" Linear Power Channel Calibration) CPC channel "D" was required to be placed in bypass to allow testing. Due to equipment problems with Temperature Element 112CA (TI)(Reactor Coolant System (RCS)(AB) Cold Leg), which feeds the CPC Departure from Nucleate Boiling Ratio calculation, the channel "A" CPC was placed in the tripped condition. Thus, at the time of the reactor trip, CPC channel "A" DNBR/LPD was in the tripped position and channel "D" was in the bypassed position. This resulted in the Plant Protection System (JC) being in a one out of two trip logic scheme (i.e., any trip on CPC channel "B" or "C" for DNBR/LPD would cause a reactor trip).

At 0215 on July 25, 1986, an invalid floating point fault in the CPC channel "C" caused the channel to perform an automatic restart. By design the CPC DNBR and LPD trip contact outputs were automatically set until the restart was completed. With the one out of two trip logic in effect, the trips generated by the CPC channel "C" automatic restart caused the Plant Protection System trip matrix to be satisfied and generated the reactor trip. The trips were then reset automatically.

The event was diagnosed per approved procedure as an uncomplicated reactor trip and the approved Reactor Trip Recovery Procedure was implemented. All safety functions were maintained and the plant was stabilized in Mode 3 at 0300 on July 25, 1986. Following is a timeline showing the sequence of events.

AC Form 366A

NRC Form 366A

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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) DOC	KET NUMBER (2)	LER NUMBER (6)	PAGE	(3)					
	[YEAR SEQUENTIAL NUMBER	NUMBER						
Palo Verde Unit 2 0	5000529	8 6 - 0 4 7 -	010 013 0	F 016					
TEXT (If more space is required, use additional NAC Form 336A's) (17)	NCE OF EVENTS								
01401	MOD OF DVDMID								
TIME DE	SCRIPTION OF EVEN	T							
Prior to trip CP	C A in bypass due	to TI-112CA pro	blem						
23:38 Be (4	gan RCS Leak Rate 2ST-2RCO2)	Surveillance Te	st						
01:00 CP	C A (DNBR/LPD) pl	aced in tripped	condition						
01:15 CP Li	C D (DNBR/LPD) pl near Power Channe	aced in bypass f l Calibration	or						
01:30 Be (7	gan Linear Power 2PA-2RX17)	Channel Calibrat	ion						
02:15 CP	C C auto-restart	received							
02:15:35:000 Re	actor (RCT) trip								
02:15:35:123 Tu	rbine(TRB)/Genera	tor(GEN) trip							
02:15:35:150 Ma	in steam pressure	peak at 1213 ps	sia						
02:15:35:260 St mo (S	eam Bypass Contro dulate open per S BBCS) demand	l Valves (SBCV) team Bypass Cont	1-6 trol System						
02:15:35:290 St Na	eam generator (SC rrow Range Indica) level decrease tion (NR) due to	d to 0.69% shrinkage						
02:15:35:460 SE	BCVs 1-6 close								
02:15:35:500 Op (C os	perator manually s (B)(P) resulting i cillations (Conce	tarted third chan charging systems from #5)	rging pump m						
02:16:15 Pr 21	essurizer (PZR) p 05 psia	pressure bottomed	l out at						
02:16:3" PZ	IR level bottomed	out at 24%							
*1 Do in de wi de	owncomer flowrate acreasing steam pr ecreased due to lo th a FW pump onli emand.	decreased due to essure. SG leve w feedwater flow ne with constant) ≱l ↓ (FW)(SJ) t steam						

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION APPROVED ONB NO 3150-0104

		EXPIRES: 8/31/86	
Y NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)	PAGE (3)
		YEAR SEQUENTIAL REVISION NUMBER NUMBER	
Palo Verde Unit 2	0 15 10 10 10 15 12 19	816 - 01417 - 010 014	OF
nors space is required, use additional NRC Form 366A 's) (17)			
*2	SBCV #1 modulated	open to reduce SG pressur	re.
	Charging pump #3	was stopped approximately	
	4.8 minutes after	the reactor trip.	
*3	SG feed rate incr	eased due to reduction in	
	steam pressure.	The backpressure control	
	valve (PDV-240) w	as taken to manual 6.2	
	oscillations stor	trip and the	
	oborrigoroup prop	pou.	
*4	The Downcomer beg	an to modulate closed to	
	control level. S	G pressure continued to	4
	and recovering SG	level. Approximately 8.	2
	minutes after the	trip, charging pump #3 au	ito
	started on low PZ	R level. No oscillations	-
	were experienced	since PDV 240 was in manua	11.
*5	SG pressure staye	d constant, while the leve	el
	increased. The R	eactor Coolant System (RCS	5)
	temperature remai	ned constant, while the P2	2R
	pressure and reve	I recovered.	
*6	Operator opened s	uction valves for Auxilian	ry
	Feedwater Pump (A	FN-P01) and started the	
	pump. Operator c	decreased steam demand.	-
	MFWP was tripped	when operator realized it	
	was the cause of	the cooldown. This caused	i
	the rate of PZR p	ressure recovery to	
	control pressure.	however PZR heater bank H	305
	would not energiz	e.	
03:00	Operators restore	d plant parameters and	
	stabilized the pl	ant.	
07:03	Radiation Protect	ion reported higher than	
	normal Noble Gas	radiation levels in the	
	Auxiliary Buildin	g (NF)(47 MPC on the 140'	
	Valve Gallery).	lery and 0.4 MPC on the 12	191
08.20	D. M. M. D. M.		
08:30	Radiation Protect	ion reported higher than	
	(5000 dpm on the	140' Ion Exchange Gallerv	1B
	and 1500 dpm on t	he 129' Valve Gallery.	
* Refer to Figure 1 CC #2	programo for the time int		
Refer to rigure 1 50 #2	pressure for the time int	ervals.	

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NRC Form 366A (9-83)

NRC Form 366A 19:831	LICENSEE EVENT REPORT (LER) TEXT CONTIN	E EVENT REPORT (LER) TEXT CONTINUATION					U.S. NUCLEAR REGULATORY COMMISSION APPROVEC OMB NO 3150-0104 EXPIRES: 8/31/68					
FACILITY NAME (1)	DOCKET NUMBER (2)	T	L		1	,	AGE (3)					
		YEAR	F	SEQUENTIAL	REVISION		Π					

0 5 0 0 0 5 2 9 8 6 - 0 4 7 - 0 0 0 5 0F 0 6

Palo Verde Unit 2 TEXT (N more spece is required, use additional NAC Form 3854's) (17)

> The Sequence of Events (SOE) alarm processing program runs on the Plant Monitoring System (PMS) 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 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 designed control room alarms or through subsequent evaluations.

There were no other structures, components, or systems that were inoperable at the start of the event and that contributed to the event other than the items described above.

During the event, control room operator (licensed-utility) actions were appropriate and applicable procedures were followed. Although no procedural deficiencies were noted, evaluations are ongoing which may result in the implementation of procedural enhancements.

This event was not significant to Plant safety. The CPC channel performed as designed when the spurious floating point fault was encountered. As previously stated, the occurrence of the floating point trip is not unexpected at PVNGS or other CPC plants, and the occurrence is anticipated in the design of the CPCs. When a floating point arithmetic fault occurs, the CPC channel reinitializes and sets the trip contact outputs only until initialization has been completed (approximately 60 seconds). While a single channel CPC auto restart is not an unexpected event, this particular event occurred while one other CPC channel was already in a tripped condition - and this combination resulted in a plant trip.

Resolution of the root cause of the CPC auto restarts is an on-going effort. Automatic restarts are not expected to be eliminated entirely at Palo Verde or other CPC plants. This fact is recognized in the CPC design and its associated surveillance and startup testing programs.

The plant tripped as designed. In the normal configuration when one RPS channel is not in the tripped state, the auto restart would not have caused a reactor trip. During this event, no safety limits were approached, no fission product barriers were challenged and no radioactive release limits were exceeded. This event had no impact on the health and safety of the public.

No reactor trips have occurred previously due to the same cause.





Arizona Nuclear Power Project

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

August 22, 1986 ANPP-00058-JGH/TDS/JHT/96.03

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-86-047-00 File: 86-020-404

Dear Sirs:

Attached please find Licensee Event Report (LER) No.86-047-00 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,

Gi Haynes-

J. G. Haynes Vice President Nuclear Production

JGH/JHT/dh

Attachment

cc: 0. M. DeMichele (all w/a)
E. E. Van Brunt, Jr.
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R. P. Zimmerman
A. L. Hon
E. A. Licitra
A. C. Gehr
INFO Records Center